UNIVERSITY OF CALICUT

Abstract

General & Academic - BVoc programme in Pharmaceutical Chemistry under Modified BVoc Regulations 2014 - Revised Scheme and Syllabus - Implemented w.e.f 2018 admission onwards - Corrections - Approved - Orders issued

G & A - IV - J

U.O.No. 236/2020/Admn Dated, Calicut University.P.O, 07.01.2020

Read:-1. U.O No. 3707/2016/Admn dated 31.03.2016
2. U.O No. 7280/2016/Admn dated 13.06.2016
3. U.O.No. 10622/2018/Admn dated 11.09.2018
4. U.O.No. 14524/2019/Admn dated 15.10.2019
5. U.O Note No. 131861/EX-I-ASST-1/2019/PB dated 28.11.2019
6. Remarks of Dean, Faculty of Science dated 03.01.2020

ORDER

The Scheme and Syllabus of B.Voc Programme in Pharmaceutical Chemistry under B.Voc Regulations 2014, in the University, with effect from 2015 admissions has been implemented vide paper read as (1) and an erratum has been issued to the same vide paper read as (2) by attaching the question banks in respect of 2nd to 6th semesters.

The revised Scheme and Syllabus of BVoc Programme in Pharmaceutical Chemistry under BVoc Regulations 2014, was implemented in the University, with effect from 2018 Admissions vide paper read as (3) and the Question Bank of all semester theory courses for the same was implemented vide paper read as (4).

Vide paper read as (5), Examination Branch pointed out certain anomalies in the syllabus of B.Voc Pharmaceutical Chemistry with effect from 2018 admissions implemented as per paper read as (3).

After considering the same, the Chairman, Board of Studies in Pharmaceutical Chemistry forwarded the syllabus, question bank and model question papers for theory and practicals of B.Voc Pharmaceutical Chemistry with effect from 2018 admissions with the following corrections:

1. Course code of the paper Indian Drug Regulatory Guideline and Physical Pharmacy is SDC4DR01.

2. Course code of the paper Pharmaceutical Management is GEC5PM01.

3. The name of the elective paper with course code SDC5EV02 is Introduction to Pharmacognosy.

The Dean, Faculty of Science vide paper read as (6) approved the corrected syllabus, question bank and model question papers for theory and practicals of B.Voc Pharmaceutical Chemistry with effect from 2018 admissions and the same has been approved by the Vice Chancellor subject to ratification by the Academic Council.

The corrected syllabus, question bank and model question papers for theory and practicals of B.Voc Pharmaceutical Chemistry with effect from 2018 admissions is therefore implemented.

Orders are issued accordingly. The U.Os read as (3) and (4) stands modified to this extent.

(The corrected syllabus, question bank and model question papers are appended)

Biju George K

Assistant Registrar

To

1.Principals of affiliated Colleges offering B.Voc Programme in Pharmaceutical Chemistry
2.Controller of Examinations

Copy to :
JCE I/JCE IV/SF/DF/FC

Forwarded / By Order

Section Officer

UNIVERSITY OF CALICUT

B. Voc. Degree Programme in

PHARMACEUTICAL CHEMISTRY

SCHEME AND SYLLABI

For General and Skill Papers

2018 ADMISSION ONWARDS

UNDERGRADUATE B.Voc PROGRAMME IN PARMACEUTICAL CHEMISTRY

PREFACE

B.Voc. Pharmaceutical chemistry is a graduate programme which disciplines at the intersection of chemistry, especially synthetic organic chemistry and pharmacology and various other branch of biological specialities where it involves design, chemical synthetics and development for market of pharmaceutical agents(drugs).
Most pharmacy degrees combine academic research with more vocational training and professional pharmacy skills, such as learning about legal and ethical issues and they will learn all about prescriptions, drugs, medications and clinical practice, and practice responding to different scenarios.
An effective science education can be imparted at the undergraduate level only by revamping the curriculum according to the needs and developments of the modern society from time to time. To achieve this goal, the curriculum should be restructured by giving emphasis on various aspects such as the creativity of students, knowledge of current developments in the discipline, awareness of environmental impacts due to the development of science and technology, and the skills essential for handling equipments and instruments in laboratories and industries.
It is essential to ensure that laboratory chemicals are used at a minimal level without affecting the skill and understanding aimed through laboratory sessions. The change brought about in the present scheme makes use of micro scale techniques and double burette titrations. This has been done without any conceptual deviation from the principles of experiments. This method not only reduces the expenditure on chemicals but also creates an environmental awareness among the students and pollution free atmosphere in the campus. This scheme saves time and energy of students while performing the experiments.

The syllabus has been prepared in a participatory manner, after discussions with a number of faculty members in the subject and uploading the draft syllabus in the university
website and collecting the feedback. As far as possible, the suggested modifications from the
teaching community have been incorporated into the syllabus. During the preparation of the
syllabus, the existing syllabus, the syllabi of XIth & XIIth standards, UGC model curriculum and the syllabi of other universities have also been referred to. Care has been taken to ensure that the syllabus is compatible with the syllabi of other universities at the same level. Sufficient emphasis is given in the syllabus for training in laboratory skills and instrumentation.
The units of the syllabus are well defined. The number of contact hours required for each
unit is also given. A list of reference books is provided at the end of each course.

AIMS

This curriculum has been prepared with the objective of giving sound knowledge and understanding chemistry of pharmacy to undergraduate students. The goal of the syllabus is to equip students with the potential to contribute to academic and industrial environments. This curriculum will expose students to various fields of pharama and develop interest in related disciplines.

BROAD OBJECTIVE

The B. Voc courses are designed with the following objectives,

- To provide judicious mix of skills relating to a profession and appropriate content of General Education.
- To ensure that the students have adequate knowledge and skills, so that they are work ready at each exit point of the programme.

- To understand basic facts and concepts in Pharmaceutical chemistry as well as in chemistry.
- To develop the ability for applying the principles of chemistry in drug synthesis
- To develop skills in the proper handling of instruments and chemicals.
- To be exposed to the different processes used in industries and their applications.
- To make the students eco-friendly by creating a sense of environmental awareness in them.
- To provide flexibility to the students by means of pre-defined entry and multiple exit points.
- To integrate NSQF within the undergraduate level of higher education in order to enhance employability of the graduates and meet industry requirements. Such graduates apart from meeting the needs of local and national industry are also expected to be equipped to become part of the global workforce.

CONTENTS

COURSE STRUCTURE

Credit Distribution

Semester	Common Course		General Component	Skill Component	Total
	English	Additional Language			
I	4	4	4+2+2= 8	5+5+4=14	30
II	4	4	4+3=7	4+4+3+4=15	30
III	4	-	2+3=5	5+5+4+5+2=21	30
Iv	4	-	2+3=5	4+4+3+4+2+4=21	30
V	-	-	3+3+4=10	+5+5+5+5=20	30
VI	-	-	-	30	30
Total	**16**	**8**	**38**	**118**	**180**

Detailed curriculum

Semester	Course Code	Paper code	Course Title	Hrs/ Week	Total Hrs	Credit	Marks
I	GEC1EG01	A01	The Four skills for communication	4	60	4	100
	GEC1ML02 GEC1HD02	MAL1 A01 (2) (A07)	Malayalam-Bhashayum Sahithyavum-I Communication skills in Hindi	4	60	4	100
	GEC1MT01	GEC1MT01	Mathematics-I	4	60	4	100
	GEC1PHC01	CHE1B01	Theoretical and Inorganic Chemistry-I	3	45	2	100
	GEC1PHC02	CHE2B02	Theoretical and Inorganic Chemistry -II	3	45	2	100
	SDC1PHC01	SDC1BC01	Introduction to Biochemistry	4	60	5	100
	SDC1PHC02	SDC1PH01 (P)	Pharmaceutics Practical I	4	60	5	100
	SDC1PHC03	CHE4B05(P)	Inorganic Chemistry-Practical –I	4	60	4	100
II	GEC2EG04	A02	Morden Prose and Drama	4	60	4	100
	GEC2ML05 GEC2HD05	MAL2A02(2) A09	Malayalam-Bhashayum Sahithyavum-II Literature in Hindi	4	60	4	100
	GEC2MT02	GEC2MT02	Mathematics-II	4	60	4	100
	GEC2PHC01	CHE3B03	Physical Chemistry-I	3	45	3	100
	SDC2PHC01	SDC2MB01	Microbiology	4	60	4	100
	SDC2PHC03	SDC2HA01	Human Anatomy and Physiology	3	45	4	100
	SDC2PHC02	CHE6B14(P)	Physical Chemistry – Practical	4	60	3	100
	SDC2PHC03	SDC2INT01	Internship/Project	4	60	4	100

Semester	Course Code	Paper code	Course Title	Hrs /Week	Total Hrs	Credit	Marks
III	GEC3EG07	A03	Inspiring Expressions	4	60	4	100
	GEC3PHC01	GEC3PHY01	Physics-I	2	30	2	100
	GEC3PHC02	CHE4B04	Organic Chemistry I	4	60	3	100
	SDC3PHC01	SDC3PC01	Pharmaceutics	4	60	5	100
	SDC3PHC02	SDC3PIC01	Advanced Pharmaceutical Operation and Inorganic Pharmaceutical Chemistry	4	60	5	100
	SDC3PHC03	CHE6B15 (P)	Organic Chemistry Practical (P)	5	75	4	100
	SDC3PHC04	SDC3PH02 (P)	Pharmaceutics Practical II	5	75	5	100
	SDC3PHY01	SDC3PHY02 (P)	Physics practical-I	2	30	2	100
IV	GEC4EG10	A04	Reading on Society	4	60	4	100
	GEC4PHC01	GEC4PHY03	Physics-II	2	60	2	100
	GEC4PHC02	CHE5B06	Inorganic Chemistry-III	3	45	3	100
	SDC4PHC01	SDC4DP01	Drug design and Pharmacology	4	60	4	100
	SDC4PHC02	SDC4DR01	Indian Drug Regulatory Guideline and Physical Pharmacy	4	60	4	100
	SDC4PHC03	CHE6B17(P)	Inorganic Chemistry III Practical	4	60	3	100
	SDC4PHC04	SDC4PH03(P)	Pharmaceutics Practical III	3	45	4	100
	SDC4PHY04(P)	SDC4PHY04(P)	Physics practical-II	2	30	2	100
	SDC4PHC05	SDC4INT02	Internship/Project	4	60	4	100
V	GEC5PHC02	GEC5OC02	Organic Chemistry II	3	45	3	100
	GEC5PHC03	GEC5PH02	Physical Chemistry II	3	45	3	100
	GEC5PHC01	GEC5PM01	Pharmaceutical Management	4	60	4	100
	SDC5PHC02	SDC5MC01	Medicinal Chemistry	5	75	5	100
	SDC5PHC03	SDC5EV01 SDC5EV02	Elective 1. Health education and community pharmacy 2. Introduction to Pharmacognosy	5	75	5	100
	SDC5PHC04	SDC5MC02(p)	Medicinal Chemistry Practical (P)	5	75	5	100
	SDC5PHC05	SDC5PH04(P)	Pharmaceutics Practical IV	5	75	5	100
VI	SDC5PHC01	SDC6INT03	Major Internship		900	30	100

SEMESTER I

SEMESTER I

GEC1MT01
Mathematics – I
Total Hours 60: credit 4: Hours/week 4

Text : George B. Thomas Jr. and Ross L. Finney : Calculus, LPE, Ninth edition, Pearson Education.
: George B Thomas, Jr and Ross L Finney: CALCULUS, LPE, Ninth edition, Pearson Education.

Module I (2hrs)
Limits and Continuity: (Section 1.2, &1.5 of the Text).

Module II (6 hrs)
Derivatives: The derivative of a function, a quick review of differentiation rules (Section 2.1, 2.2, of the Text)

Module III (12 hrs)
Application of derivatives: Extreme values of a function. The mean value theorem, First derivative test, (Section 3.1, 3.2, 3.3, of the Text).

Module IV (4hrs)
Integration: Riemann sums and Definite integrals;
(Section 4.5, of the Text).Application of Integrals: Areas between curves, Finding Volumes by slicing. (Section 5.1ofthe Text.)

Module V: Hyperbolic functions, Application of Integrals and Improper Integrals, (10hrs)
Hyperbolic Functions- Definitions and Identities, Derivatives and Integrals,
Improper Integrals (Section: 6.10 & 7.6 of the Text)

Module VI : Polar Coordinates (15 hrs)
Polar coordinates, Graphing in Polar Coordinates, Polar equations for conic sections, Integration in Polar coordinates, Cylindrical and Spherical Coordinates.
(Sections 9.6, 9.7, 9.8, 9.9, 10.7 of the Text)

Module IV : Multivariable Functions and Partial Derivatives (11 hrs)
, Partial Derivatives, differentiability, Chain rule (Sections, 12.3, 12.4, 12.5 of the Text)

References
1. S.S. Sastry, Engineering Mathematics, Volume 1, 4th Edition PHI.
2. Muray R Spiegel, Advanced Calculus, Schaum's Outline series.
3. S.S. Sastry, Engineering Mathematics, Volume I & II, 4th Edition PHI.
4. Murray R. Spiegel, Advanced Calculus, Schaum's Outline Series.

SEMESTER I

Code: CHE1B01
Theoretical and inorganic chemistry - I
Total Hours:45; Credits: 2; Hours/Week: 3

Module I: Chemistry as a Discipline of Science (10 hrs)

What is Science? - Scientific statements - Scientific methods – Observation - Posing a question -Formulation of hypothesis – Experiment – Theory – Law - Revision of scientific theories and laws – Role of concepts and models in science - Scientific revolution.

Evolution of chemistry - Ancient speculations on the nature of matter - Early form of chemistry –Alchemy - Origin of modern chemistry - Branches of chemistry - Interdisciplinary areas involvingphysics and biology.

Objectives of Chemical Research - Research design. Components of a research project: Introduction,review of literature, scope, materials and methods, results and discussion, conclusions andbibliography.

Module II: Some Basic Chemical Concepts (8 hrs)

Symbol of elements – Atomic number and mass number - Atomic mass – Isotopes, isobars and isotones -

Molecular mass - Mole concept – Molar volume - Oxidation and reduction – Oxidation number andvalency – Variable valency - Equivalent mass.

Methods of expressing concentration: Weight percentage, molality, molarity, normality, mole fraction,ppm and millimoles.

Module III: Analytical Chemistry - I (9 hrs)

Laboratory Hygiene and Safety: Storage and handling of chemicals. Simple first aids: Electric shocks,fire, cut by glass and inhalation of poisonous gases - Accidents due to acids and alkalies - Burns due tophenol and bromine. Disposal of sodium and broken mercury thermometer - Use of calcium chloride and silica gel in desiccators. Awareness of Material Safety Data Sheet (MSDS) – R & S Phrases (elementaryidea only) – Safe laboratory practices – Lab safety signs.

Volumetric Analysis: Introduction - Primary and secondary standards – Standard solutions - Theory oftitrations involving acids and bases, KMnO4, K2Cr2O7, I2 and liberated I2 - Complexometric titrations.

Indicators: Theory of acid-base, redox, adsorption and complexometric indicators. Double burette method of titration: Principle and advantages.

Module IV: Atomic Structure (9 hrs)

Introduction based on historical development – John Dalton's atomic theory – Thomson’s atom model and its limitations – Rutherford’s atom model and its limitations –

Failure of classical physics – Black body radiation - Planck's quantum hypothesis - Photoelectric effect - Generalization of quantum theory -Atomic spectra of hydrogen and hydrogen like atoms - Ritz-combination principle– Bohr theory of atom – Calculation of Bohr radius, velocity and energy of an electron - Explanation of atomicspectra – Rydberg equation - Limitations of Bohr theory - Sommerfeld modification - Louis de Broglie's matter waves – Wave-particle duality - Electron diffraction - Heisenberg's uncertainty principle.

Module V: Nuclear Chemistry (9 hrs)

Natural radioactivity – Modes of decay – Group displacement law – Theories of disintegration – Rate of decay – Decay constant – Half life period – Gieger-Nuttall rule – Radioactive equilibrium –Disintegration series – Transmutation reactions using protons, deutrons, α-particles and neutrons –Artificial radioactivity – Positron emission and K electron capture – Synthetic elements.

Nuclear stability – N/P ratio – Packing fraction – Mass defect – Binding energy – Nuclear forces –Exchange theory and nuclear fluid theory – Nuclear fission - Atom bomb – Nuclear fusion – Hydrogenbomb - Nuclear reactors - Nuclear reactors in India.

Isotopes: Detection – Aston's mass spectrograph – Separation of isotopes by gaseous diffusion methodand thermal diffusion method – Application of radioactive isotopes – 14C dating – Rock dating – Isotopesas tracers – Study of reaction mechanism (ester hydrolysis) – Radio diagnosis and radiotherapy.

Text Books

1. Jeffrey A. Lee, The Scientific Endeavor: A Primer on Scientific Principles and Practice, Pearson
Education, 1999.
2. C.N.R. Rao, Understanding Chemistry, Universities Press India Ltd., Hyderabad, 1999.
3. Robert H. Hill and David Finster, Laboratory Safety for Chemistry Students, 1st Edition, Wiley,
Hoboken, NJ, 2010.
4. M.C. Day and J. Selbin, Theoretical Inorganic Chemistry, East West Press, New Delhi, 2002.
5. B.R. Puri, L.R. Sharma and K.C. Kalia, Principles of Inorganic Chemistry, 31st Edition,
Milestone Publishers and Distributors, New Delhi, 2013.

6. Satya Prakash, Advanced Inorganic Chemistry, Volume 1, 5th Edition, S. Chand and Sons, New
Delhi, 2012.
7. J. Mendham, R.C. Denney, J. D. Barnes and M. Thomas, Vogel's Text Book of Quantitative
Chemical Analysis, 6th Edition, Pearson Education, Noida, 2013.
8. H.J. Arnikar, Essentials of Nuclear Chemistry, 4th Edition, New Age International (P) Ltd., New
Delhi, 1995 (Reprint 2005).

References

1. T.F Gieryn, Cultural Boundaries of Science, University of Chicago Press, Chicago, 1999.
2. H. Collins and T. Pinch, The Golem: What Everyone Should Know about Science, Cambridge University Press, Cambridge, 1993.

3. C.R. Kothari, Research Methodology: Methods and Techniques, 2nd Revised Edition, New AgeInternational Publishers, New Delhi, 2004.
4. Guidance in a Nutshell - Compilation of Safety Data Sheets, European Chemicals Agency,
Finland, Version 1.0, December 2013.
5. D.A. Skoog, D.M. West, F.J. Holler and S.R. Crouch, Fundamentals of Analytical Chemistry, 8thEdition, Brooks/Cole, Thomson Learning, Inc., USA, 2004.
6. B.K, Sen, Quantum Chemistry – Including Spectroscopy, 3rd Edition, Kalyani publishers, NewDelhi, 2010.
7. D.A. McQuarrie, Quantum Chemistry, 2nd Edition, University Science Books, California, 2008.
8. R.K. Prasad, Quantum Chemistry, 4th Edition, New Age International (P) Ltd., NewDelhi, 2012.
9. J.B. Rajam and L.D. Broglie, Atomic Physics, 7th Edition, S. Chand and Co. Pvt. Ltd., NewDelhi, 1999.
10. S. Glasstone, Source Book on Atomic Energy, 3rd Edition, East-West Press Pvt. Ltd., NewDelhi, 1967.

SEMESTER I

Code: CHE2B02
Theoretical and inorganic chemistry - II
Total Hours: 45; Credits: 3; Hours/Week: 2

Module I: Quantum Chemistry (18hrs)

Operator algebra – Linear and Hermitian operators - Laplacian and Hamiltonian operators - Eigenfunctions and Eigen values of an operator - Postulates of quantum mechanics - Well behavedfunctions.Time independent Schrödinger wave equation - Application to particle in a one dimensional box –Normalization of wave function - Particle in a three-dimensional box – Separation of variables -Degeneracy.

Application of Schrödinger wave equation to hydrogen atom – Conversion of Cartesian coordinates topolar coordinates - The wave equation in spherical polar coordinates (derivation not required) -Separation of wave equation - Radial and angular functions (derivation not required) – Orbitals andconcept of Quantum numbers (n, l, m).

Radial functions - Radial distribution functions and their plots – Shapes of orbitals (s, p and d).Schrödinger equation for multi-electron atoms: Need for approximation methods.

Electron spin – Spin quantum number - Pauli's Exclusion principle - Hund's rule of maximum multiplicity - Aufbau principle – Electronic configuration of atoms.

Module II: Periodic Properties (9 hrs)

Modern periodic law – Long form periodic table. Periodicity in properties: Atomic and ionic radii -Ionization enthalpy - Electron affinity (electron gain enthalpy) – Electronegativity. Electronegativityscales: Pauling and Mullikan scales. Effective nuclear charge – Slater rule and its applications –Polarising power. Diagonal relationship and anomalous behavior of first element in a group (basic ideaonly).

Module III: Chemical Bonding – I (9 hrs)

Introduction – Type of bonds – Octet rule and its limitations.

Ionic Bond: Factors favouring the formation of ionic bonds - Lattice energy of ionic compounds - Born-Lande equation (derivation not expected) – Solvation enthalpy and solubility of ionic compounds –Born-Haber cycle and its applications – Properties of ionic compounds - Polarisation of ions – Fajan'srule and its applications.

Covalent Bond: Lewis theory. VSEPR theory: Postulates - Applications - Shapes of BeF2, BCl3, SnCl2,CCl4, NH3, H2O, PF5, SF4, ClF3, XeF2, SF6, IF5, XeF4, IF7 and XeF6. Valence Bond Theory. Coordinatebond. Hybridization: Definition and characteristics - sp (BeCl2, C2H2), sp2 (BF3, C2H4), sp3 (CH4, NH3,H2O, NH4+, H3O+ and SO42-), sp3d (PCl5), sp3d2 (SF6) and sp3d3 (IF7) hybridizations. Limitations of VBT. Properties of covalent compounds. Polarity of covalent bond – Percentage of ionic character –Dipole moment and molecular structure.

Module IV: Chemical Bonding – II (9 hrs)

Covalent Bond: Molecular Orbital Theory – LCAO - Bonding and anti bonding molecular orbitals –

Bond order and its significance. MO diagrams of homonuclear and heteronuclear diatomic molecules H2, He2, Li2, Be2, B2, C2, N2, O2, F2, CO and NO – Comparison of bond length, magnetic behaviour and bond energy of O2, O2 +, O2 2+, O2- and $O_2$2-.Resonance structures of borate, carbonate and nitrate ions – Comparison of bond energy.Comparison of VB and MO theories.

Metallic Bond: Free electron theory, valence bond theory and band theory (qualitative treatment only) -Explanation of metallic properties based on these theories.

Intermolecular Forces: Introduction. Hydrogen bond: Intra and inter molecular hydrogen bonds - Effecton physical properties. Induction forces and dispersion forces: Van der Waals forces, ion-dipole, dipoledipole, ion-induced dipole, dipole-induced dipole and induced dipole-induced dipole interactions.

Text Books

1. A.K. Chandra, *Introductory Quantum Chemistry,* 4th Edition, Tata McGraw Hill Publishing Company, Noida, 1994.
2. R.K. Prasad, *Quantum Chemistry,* 4th Edition, New Age International(P) Ltd., New Delhi, 2012.
3. B.K, Sen, *Quantum Chemistry – Including Spectroscopy,* 3rd Edition, Kalyani publishers, New Delhi, 2010.
4. B.R. Puri, L.R. Sharma and K.C. Kalia, *Principles of Inorganic Chemistry*, 31st Edition, Milestone Publishers and Distributors, New Delhi, 2013.
5. Satya Prakash, *Advanced Inorganic Chemistry, Volume 1,* 5th Edition, S. Chand and Sons, New Delhi, 2012.
6. Manas Chanda, *Atomic Structure and Chemical Bonding*, 4th Edition, Tata McGraw Hill Publishing Company, Noida, 2007.
7. R. Gopalan, *Inorganic Chemistry for Undergraduates*, Universities Press India Ltd., Hyderabad, 2009.

References

1. D.A. McQuarrie, *Quantum Chemistry*, 2nd Edition, University Science Books, California, 2008.
2. M.C. Day and J. Selbin, *Theoretical Inorganic Chemistry*, East West Press, New Delhi, 2002.
3. P.W. Atkins and R.S. Friedman, *Molecular Quantum Mechanics*, 3rd Edition, Oxford University
Press, New York, 1997.
4. I.N. Levine, *Quantum Chemistry*, 6th Edition, Pearson Education Inc., New Delhi, 2009.
5. Jack Simons, *An Introduction to Theoretical Chemistry*, 2nd Edition, Cambridge University Press,
Cambridge, 2005.
6. J.D. Lee, *Concise Inorganic Chemistry*, 5th Edition, John Wiley and Sons, New York, 2008.

SEMESTER I

Code: SDC1BC01

Introduction to Biochemistry

Total Hours:60 ; Credits:5 ; Hours/Week: 4

MODULE 1 (10 hrs)

Biological macromolecules: carbohydrates
Introduction to carbohydrates, Nomenclature, definition and classification of carbohydrates. Monosaccharides, classification, structural aspect and biological significance. Disaccharides, Oligosaccharides, Polysaccharides. carbohydratemetabolism

MODULE II (10 hrs)

Introduction to lipids
Structure and function diversity of lipids, Definition and classification, Fatty acids, Triacyl glycerols, glycerophospholipids, Sphingolipids, steroids and other biologically important lipids (Terpenes, Steroids, cholesterol etc.)

MODULE 1II (10 hrs)

Proteins and Nucleic acids
Proteins, structure and function, General structure of Amino Acids, Classification of Amino acids, Peptide bond link amino acids in proteins, Composition of amino acid in protein and determining sequence of amino acid residue. Structure of protein, Types of protein structure, Primary structure, Secondary structure, Tertiary structure. Quaternary structure, Various other biologically important protein. Basic studies of nucleic acids.

MODULE 1V (15 hrs)

Enzymes and co-enzymes
Structure and function of enzyme, Classification of enzyme, Enzyme kinetics and its mechanism of action Enzyme inhibition. Types of enzyme inhibition, Reversible enzyme inhibition, Irreversible enzyme inhibition, Regulation of enzyme activity, Enzymes and iso enzymes in clinical diagnosis. Coenzyme classification, Role of vitamin as coenzyme, Biological significance, Metal as coenzyme and its biological significance.

MODULE V (15)

Brief chemistry and role of vitamins. Role of minerals and water in life processes.

Recommended books for the syllabi:

1. Dr. U Satyanarayana, Biochemistry, 2nd edition, Books and allied (P)., 2004.
2. A. White Philip Handler, E.L. Smith, R.L. Hill Lehman, Principles of Biochemistry, 6th Edition, Tata McGraw Hill Publishing Company Ltd., 2004.
3. D.L. Nelson, M.M. Cox, Lehninger Principles of Biochemistry, 4th edition, W.H, Freeman & Company, 2005.

Reference Books:

1. P.C. Champe, R.A. Harvey, Biochemistry, 2nd edition, Lippincott-Raven Publishers, 1994
2. R.K. Murray, D.K. Granner, P.A. Mayes. V.W. Rodwell, Harper's Illustrated Biochemistry, 26th edition, McGraw Hill Publhisher, 2003.

SEMESTER I

Code: SDC1PH01

Pharmaceutics Practical- I (P)

Total Hours:60 ; Credits:5 ; Hours/Week: 4

1. Preparation of standard buffers (citrate, phosphate and carbonate) and measurement of pH.
2. Separation of amino acids by TLC.
3. Qualitative analysis of inorganic as well as organic constituents of Urine.
4. Quantitative estimation of amino acids.
5. Estimation of glucose in urine
6. Estimation of calcium in Blood
7. Estimation of urea in urine
8. Titerable acidity of urine.
9. Estimation of cholesterol in Blood.
10. Estimation of Glucose in blood & urine.
11. Estimation of Urea in blood.
12. Estimation of ketone bodies in blood.

REFERENCE

1. D.T. Pulmmer, An Introduction to Practical Biochemistry, McGraw Hill, 1987.
2. Practical Biochemistry by Harold Varley.
3. Text book of Biochemistry by Satyanarayana.

SEMESTER I

CHE4B05(P)
Inorganic chemistry practical - I
Total Hours60; Credits: 4; Hours/Week: 4

1. Use safety coat, goggles, shoes and gloves in the laboratory.
2. For weighing, either electronic balance or chemical balance may be used.
3. For titrations double burette titration method must be used.
4. A minimum number of 21 experiments should be done, covering III to VII modules, to appear for
the examination.

Module I: Introduction to Volumetric Analysis
1. Weighing using chemical balance and electronic balance.
2. Preparation of standard solutions.

Module II: Technique of Quantitative Dilution
Any five experiments of the following types.
1. Preparation of 100 mL 0.2 M H_2SO_4 from commercial acid.
2. Preparation of 250 mL 0.025 M thiosulphate from 0.1 M thiosulphate.

Module III: Neutralization Titrations
1. Strong acid – strong base titration.
2. Strong acid – weak base titration.
3. Weak acid – strong base titration.
4. Estimation of NH_3 by indirect method.
5. Titration of HCl + CH_3COOH mixture *Vs* NaOH using two different indicators to determine the
composition.
6. Estimation of borax: Standard sodium carbonate.

Module IV: Redox Titrations
a) Permanganometry
1. Estimation of oxalic acid.
2. Estimation of Fe^{2+}/$FeSO_4.7H_2O$/Mohr's salt.
3. Estimation of hydrogen peroxide.
4. Estimation of calcium.
b) Dichrometry
1. Estimation of Fe^{2+}/$FeSO_4.7H_2O$/Mohr's salt using internal indicator.
2. Estimation of Fe^{2+}/$FeSO_4.7H_2O$/Mohr's salt using external indicator.
3. Estimation of ferric iron (after reduction with stannous chloride) using internal indicator.

c) Iodimetry and Iodometry

1. Estimation of iodine.
2. Estimation of copper.
3. Estimation of chromium.

Module V: Precipitation Titration (using adsorption indicator)

1. Estimation of chloride in neutral medium.

Module VI: Complexometric Titrations

1. Estimation of zinc.
2. Estimation of magnesium.
3. Estimation of calcium.
4. Determination of hardness of water.

Module VII: Some Estimations of Practical Importance

1. Determination of acetic acid content in vinegar by titration with NaOH.
2. Determination of alkali content in antacid tablets by titration with HCl.
3. Determination of copper content in brass by iodometric titration.
4. Determination of available chlorine in bleaching powder.
5. Determination of COD of water samples.
6. Estimation of citric acid in lemon or orange.
7. Determination of manganese content in pyrolusite.

References

1. J. Mendham, R.C. Denney, J. D. Barnes and M. Thomas, *Vogel's Textbook of Quantitative Chemical Analysis*, 6th Edition, Pearson Education, Noida, 2013.
2. D.A. Skoog, D.M. West, F.J. Holler and S.R. Crouch, *Fundamentals of Analytical Chemistry*, 8th Edition, Brooks/Cole, Thomson Learning, Inc., USA, 2004.
3. G.D. Christian, *Analytical Chemistry*, 7th Edition, John Wiley and Sons, New York, 2013.
4. A.L. Underwood, *Quantitative Analysis*, 6th Edition, Prentice Hall of India Pvt. Ltd, New Delhi, 1999.
5. D.N. Bajpai, O.P. Pandey and S. Giri, *Practical Chemistry; For I, II & III B. Sc.* Students, S. Chand & Company Ltd, New Delhi, 2012.

SEMESTER II

SEMESTER II

GEC2MT02
Mathematics – II
Total Hours 60: credit 4: Hours/week: 4

Text :
1. Erwin Kreyszig : Advanced Engineering Mathematics, Eighth Edition, Wiley, India.
2. Frank Ayres JR : Matrices, Schaum's Outline Series, TMH Edition.
3.Erwin Kreyszig,
Ross L. Finney, Calculus

Module I : Matrices (18 hrs)
Rank of a Matrix, Non-Singular and Singular matrices, Elementary Transformations, Inverse of an elementary Transformations, Row Canonical form, Normal form.
Systems of Linear equations: Homogeneous and Non Homogenoeus Equations, Characteristic equation of a matrix; Characteristic roots and characteristic vectors.
(relevant sections of Text 2).

Module II : Vector Differential Calculus (20 hrs)
A quick Review of vector algebra, Inner product and vector product in R2 and R3.Vector and
scalar functions and Fields, Derivatives, Curves, Tangents, Arc Length, Velocity and acceleration,Gradient of a scalar field;, Divergence of a vector field, Curl of a Vector
Field.(relevant sections of Text 1).

Module III: **Laplace Transforms (7 hrs)**
Laplace Transforms: Laplace Transform, Inverse Transform
(relevant sections of Text 3 – excluding Proofs).

Module IV : Fourier Series ,Partial differential Equations(15hrs)
Fourier Series : Periodic Functions, Trigonometric Series, Fourier Series, Even and Odd
functions, Half-range Expansions. (Sections 10.1, 10.2, 10.4 of Text 3 – Excluding Proofs).

Reference
1. S.S. Sastry, Engineering Mathematics, Volume II, 4th ed., PHI.
2. Shanthi Narayanan & P.K. Mittal, A Text Book of Matrices, S. Chand.
3. Harry F. Davis & Arthur David Snider, Introduction to Vector Analysis, 6th ed., Universal Book
Stall, New Delhi.
4. Murray R. Spiegel, Vector Analysis, Schaum's Outline Series, Asian Student edition.

SEMESTER II

CHE3B03
Physical chemistry– I
Total Hours: 45; Credits: 3; Hours/Week: 3

Module I: Gaseous State (12 hrs)

Introduction - Postulates of kinetic theory of gases - Derivation of kinetic gas equation - Maxwell'sdistribution of molecular velocities - Root mean square, average and most probable velocities - Collisionnumber - Mean free path - Collision diameter - Deviation from ideal behavior - Compressibility factor –Van der Waals equation of state (derivation required) - Virial equation - Expression of Van der Waalsequation in virial form and calculation of Boyle temperature - PV isotherms of real gases - Continuity of
states - Isotherm of Van der Waals equation - Critical phenomena - Critical constants and theirdetermination - Relationship between critical constants and Van der Waals constants.

Module II: Thermodynamics – I (18 hrs)

Definition of thermodynamic terms - System – Surroundings - Types of systems - Intensive andextensive properties - State and path functions - Zeroth law of thermodynamics - First law ofthermodynamics – Concept of heat, work, internal energy and enthalpy - Heat capacities at constantvolume and at constant pressure & their relationship - Expansion of an ideal gas - Work done in isothermal expansion and reversible isothermal expansion - Calculation of W, q, □E and □H forexpansion of an ideal gas under isothermal and adiabatic conditions - Joule-Thomson effect - Liquefaction of gases - Derivation of the expression for Joule Thomson coefficient – Inversion temperature.Second law of thermodynamics - Need for the law - Different statements of the law - Carnot's cycle and its efficiency - Carnot theorem - Concept of entropy - Entropy as a state function - Entropy as a function
of V & T and P & T - Entropy as a criteria of spontaneity and equilibrium.
Work and free energy functions - Criteria for reversible and irreversible processes - Gibbs-Helmholtz equation - Partial molar free energy - Concept of chemical potential - Gibbs-Duhem equation - Clapeyronequation - Clapeyron-Clausius equation and its application.

Module III: Thermodynamics – II (10hrs)

Thermochemistry - Standard enthalpies of solution, combustion, neutralization, dissociation, formationand reaction – Hess's law – Variation of enthalpy of reaction with temperature – The Kirchhoff equation– Bond energies.
Third law of thermodynamics - Nernst heat theorem - Statement of third law.
Fundamental concepts of Statistical Thermodynamics - Permutations and combinations – Probability -Relation between entropy and probability - Stirling's approximation - Residual entropy and absoluteentropy.

Module IV: Liquid State (10 hrs)

Introduction - Uniqueness of water. Vapour pressure: Explanation and its determination. Surface tension:Explanation and its determination. Parachor: Explanation and its
determination - Application to structureelucidation of compounds. Viscosity: Determination of molecular mass from viscosity measurements.Refraction: Refractive index – Molar refraction and optical exaltation – Application to structure elucidation.

Module V: Chemical Equilibria (10)

Law of chemical equilibrium - Equilibrium constant in terms ofconcentration, partial pressure and mole fractions - Relationship between Kc, Kp and Kx -
Thermodynamic derivation of law of chemical equilibrium - Temperature dependence of equilibriumconstant - Van't Hoff's equation - Homogeneous and heterogenous equilibria - Le Chatelier's principleand its applications to chemical and physical equilibria.

Text Books

1. B.R. Puri, L.R. Sharma and M.S. Pathania, *Principles of Physical Chemistry*, 46th Edition, Vishal Publishing Company, New Delhi, 2013.
2. P.L. Soni, O.P. Dharmarha and U.N. Dash, *Textbook of Physical Chemistry*, 23rd Edition, Sultan
Chand & Sons, New Delhi, 2011.
3. J. Rajaram and J.C. Kuriacose, *Chemical Thermodynamics*, Pearson Education, New Delhi,
2013.
4. F. Daniels and R.A. Alberty, *Physical Chemistry*, 5th Edition, John Wiley and Sons, Canada,
1980.
5. Gurdeep Raj, *Advanced Physical Chemistry*, 35th Edition, Goel Publishing House, Meerut, 2009.

References

1. Gordon M. Barrow, *Physical Chemistry*, 5th Edition, Tata McGraw Hill Education, New Delhi,
2006.
2. K.L. Kapoor, *Physical Chemistry*, Volumes II and III, Macmillan Publishers, Noida, 2004.
3. S. Glasstone and D.H. Lewis, *Elements of Physical Chemistry*, 2nd Edition, Macmillan & Company, UK, 1962.
4. W.J. Moore, *Physical Chemistry*, 5th Edition, Orient Longman, London, 1999.
5. R.P. Rastogi and R.R. Misra, *An Introduction to Chemical Thermodynamics*, 6th Edition, Vikas
Publishing House Pvt. Ltd., Noida, 2002.
6. T.L. Hill, *Introduction to Statistical Thermodynamics,* Addison-Wesley, New York, 1987.
7. P.W. Atkins, *Physical Chemistry*, 8th Edition, Oxford University Press, New Delhi, 2006.
8. G.W. Castellan, *Physical Chemistry*, 3rd Edition, Addison-Wesley Educational

SEMESTER II

Code: SDC2MB01

Microbiology

Total Hours:60 ; Credits:4 ; Hours/Week: 4

Module 1: Introduction to Microbiology (20 hrs)

- Classification of Microorganisms with detailed reference to Bacteria, Fungi, virus, and protozoa- Morphology, isolation and identification, growth and cultural characteristics, enumeration and reproduction.
- Nutritional requirements, growth and cultivation of bacteria and virus. Study of different important media required for the growth of aerobic and anaerobic bacteria & fungi. Differential media, enriched media and selective media, maintenance of lab cultures
- Staining of bacteria, theories of staining and types of staining techniques. General principles of microbial control- sterilization and disinfection.

Module II (10 hrs)
Control of microbes by physical and chemical methods:

A. Disinfection, factors influencing disinfectants, dynamics of disinfection, disinfectants, antiseptics and their evaluation.
B. Sterilization: different methods, validation of sterilization methods and equipments, sterility testing of pharmaceutical products.
C. Clean area classification.
D. Validation of aseptic room.

MODULE III (30 hrs)
Preservative efficacy, Microbial assay of antibiotics and vitamin B12
Types of immunity. Antigens and antibodies: theories of antigen-antibody reactions, applications of antigen-antibody reactions. Interferons. Vaccines and sera - general study of the preparation of different types of vaccines, sera and toxoids. AIDS. Immunity defensive mechanism of body, microbial resistance, interferon.Vaccines,

their preparation, standardization and storage. Sera, the ir preparation, standardization and storage.

Recommended books for the syllabi are:

1. G.gunnz & S.J. Carter "cooper & gunn's tutorial Pharmacy", 6th ed., pitman medical publishing co. London 1972.

2. W.B. Hugo and A.D Russell "Pharmaceutical Microbiology", Blackwell scientific publication,oxford,1987.
3. "Microbiology"- Davis, Duldecco, Eisen.

Reference Books:

1. Remington's Pharmaceutical sciences" Gennaro A.R ed.. 18th Ed, Mack Publishing Co, Easton, pa, USA,1990.

2. L.M. Prescott, G.P. Jarly, D.A Klein," Microbiology" 2nd, Ed Wm. C. Brown publishers, Oxford, 1993.
3. S.P Vyas, V.K.dixit," pharmaceutical Biotechnology"1st ed. CBS Publishers & distributors, New Delhi,1998.
4. N.K Jain" Pharmaceutical Microbiology" Vallabh prakashan, Delhi.
K. Kieslich.ed 'Biotechnology" vol. Via, Verlag Chamie, Switzerland, 1984

SEMESTER II

Code: SDC2HA01

Human Anatomy and Physiology

Total Hours: 45; Credits: 4; Hours/Week:3

Module I (15Hrs)

a. Introduction & Scope of Human Anatomy & Physiology

Scope of anatomy and physiology and terminology used in these subjects.

Sense Organs: Basic anatomy and physiology of the eye (vision), ear (hearing), taste buds, nose (smell) and skin (superficial receptors).

b. Elementary tissues of the human body

c. Elementary tissues of the human body: Epithelial, connective muscular and nervous tissues, their sub-type and characteristics.

Structural & functional organization of cell, its components and functions: Body fluids & its composition, transport mechanisms across the cell membrane, Cell cycle.

Module II (20Hrs)

a) Support & Movement

Osseous system: structure, composition and functions of skeleton, classification of joints, types of movements at joints, Disorders of joints.

Skeletal muscles: Their gross anatomy, physiology of muscle contraction, physiological properties of skeletal muscle and their disorders.

b) Nervous system

Central Nervous System: Functions of different parts of brain and spinal cord, Neurohumoral transmission in the Central Nervous System, reflex action, electroencephalogram, cranial nerves and their functions.

Autonomic Nervous System: Physiology and functions of the autonomic nervous system. Mechanism of neurohumoral transmission in the A.N.S

Module III (20Hrs)

Maintenance of Human body – I

Haemopoietic system: Composition and function of blood and its elements, their disorders, blood groups and their significance, mechanism of coagulation, disorders of platelets and coagulation.

Lymph and Lymphatic system: Composition, formation and circulation of lymph, disorders of lymphand lymphatic system. Basic physiology and functions of spleen.

Cardiovascular system: Basic outline of cardiovascular disorders like hypertension, hypo tension, arteriosclerosis angina, myocardial infarction, congestive heart failure and cardiac arrhythmia.

Respiratory system: Anatomy of respiratory organs, functions of respiration, mechanism and regulation of respiration, respiratory volumes and capacity

Module IV (20Hrs)

Maintenance of Human body-II

Digestive system: Gross anatomy of the gastrointestinal tract functions of its different-parts Including those of liver, pancreas and gall bladder. Various gastro-intestinal secretions and
their role in the absorption and digestion of food, disorders of digestive system.

Urinary system: Various parts, structures and functions of the kidney and urinary tract. Physiology of urine formation and acid base balance. Diseases of the urinary system.

Reproductive system: Male and Female reproductive system and their hormones. Physiology of menstruation, coitus and fertilization.

Endocrine System: Basic anatomy and physiology of pituitary, thyroid, Parathyroid, Andrenals, pancreas, Testes and Ovary, their hormones and functions.

Reference books:

1. Anne M.R. Agur & Ming J. Lee: Grant's Atlas of Anatomy, Lippincott, Williams and Wilkins B.D. Chaurasia's Human Anatomy (3 Volumes) CBS Publishers & Distributors.
2. B. Young, J. W. Heath: Wheater's functional Histology-a Text and Colour Atlas, Churchill Livingstone.
3. Bullock B.L. & Henze R.L. Focus on Pathphysiology, Lippincott Chatterjee, C.C. Human Physiology (Medical Allied Agency, Calcutta)
4. Chummy S. Sinnatamby: Last's Anatomy – Regional and Applied, Churchill Libingstone.
5. Gandhi, T.P. et. al: Human Anatomy, Physiology & Health Education (B.S. Shah Prakashan, Ahmedabad).
6. Garg K et. al: A Text Book of Histology (CBS Publishers, New Delhi).
7. Ghai, C.L.: A Text book of practical physiology (Jaypee Brothers Medical Publisher (P)

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SEMESTER II

CHE6B14(P)
Physical chemistry practical
Total Hours: 60; Credits: 3; Hours/Week:4

General Instructions

1. For weighing, either electronic balance or chemical balance may be used.
2. Use safety coat, goggles, shoes and gloves in the laboratory.
3. A minimum number of 13 experiments must be done, covering the nine modules, to appear for the
Examination

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Module I: Viscosity

1. Determination of viscosity of various liquids using Ostwald's viscometer.
2. Study of glycerine-water system and determination of percentage of glycerine using viscometer
(plot composition against time of flow x density of the solution).

Module II: Colligative properties (Cooling curve method)

1. Determination of cryoscopic constant (Kf) of solid solvent using a solute of known molecularmass.
2. Determination of molecular mass of the solute using a solvent of known cryoscopic constant
(Kf).

Solid solvents: Naphthalene, biphenyl, camphor. Solutes: Naphthalene, biphenyl, 1,4 dichlorobenzene,
diphenylamine, acetanilide, benzophenone.

Module III: Transition Temperature

1. Determination of molal transition point depression constant (Kt) of salt hydrate using solute ofknown molecular mass.
2. Determination of molecular mass of the solute using a solvent of known molal transition point depression constant (Kt).

Salt hydrates: $Na_2S_2O_3.5H_2O$, $CH_3COONa.3H_2O$. Solutes: Urea, Glucose

Module IV: Phase Equilibria

1. Construction of phase diagram & determination of eutectic composition and eutectic
temperature: Naphthalene-biphenyl system, Naphthelene-diphenyl amine system, Biphenyl–
diphenylamine system.
2. Influence of KCl impurity on miscibility temperature of phenol–water system and determination of concentration of given KCl solution.

Module V: Refractometry
1. Determination of composition of glycerine-water mixture by refractive index method.
2. Determination of refractive indices of KCl solutions of different concentration and
concentration of unknown KCl solution.

Module VI: Conductance
1. Conductometric titration of strong acid x strong base.
2. Conductometric titration of mixture of acids (strong and weak) x strong base.

Module VII: Potentiometry
1. Potentiometric titration of strong acid x strong base.
2. Potentiometric titration of weak acid x strong base.

Module VIII: pH metry
1. Preparation of alkaline buffer solutions.
2. pH metric titration of weak acid with strong base and calculation of dissociation constant.

Module IX: Kinetics (Demonstration experiments)
1. Determination of specific reaction rate of the hydrolysis of methyl acetate catalysed by hydrogenion at room temperature.
2. Determination of overall order of saponification of ethyl acetate.

References
1. A. Findlay, Findlay's Practical Physical Chemistry, 9th Edition, John Wiley and Sons, New York,
1972.
2. J.B. Yadav, Advanced Practical Physical Chemistry, Goel Publications, Meerut, 2008.
3. D.P. Shoemaker and C.W. Garland, Experiments in Physical Chemistry, McGraw-Hill Book
Company, New York, 1962.
4. W.G. Palmer, Experimental Physical Chemistry, Cambridge University Press, Cambridge, 2009.
5. R.C. Das and B. Behra, Experiments in Physical Chemistry, Tata McGraw Hill, New Delhi, 1983.
6. D.A. Skoog, D.M. West, F.J. Holler and S.R. Crouch, Fundamentals of Analytical Chemistry, 8thEdition, Brooks/Cole, Thomson Learning, Inc., USA, 2004.

SEMESTER II

Code: SDC2INT01

Internship/ Project
Total Hours: 60; Credits: 4; Hours/Week:4

Internship should be carried out in the industry, not necessarily with industry partner. The major idea for internship is to implement the things learned and to get a real life experience. The Evaluation process follows 80% external assessment and 20% internal assessment.

Every student will be assigned an internal guide, allotted from the parent department concerned or an expert available in the college appointed by the principal or the head of the department. The student has to make regular discussions with the guide while choosing the subject/area and throughout the life time of the project.

SEMESTER III

SEMESTER III

GEC3PHY01
Physics-I
Total Hours: 30; Credits: 2; Hours/Week: 2

Module I Elasticity (6Hrs)
Elastic modulii. (Elementary ideas)-
Work done per unit volume- Poisson's ratio. relation between various elastic constants-
Twisting couple on a cylinder- Torsion pendulum-

Module II Surface Tension & viscosity (5 Hrs)
Surface tension (Elementary ideas)- Variation of surface tension with temperature, impurities, contamination- Effect of evaporation andcondensation.
Viscosity-Coefficient of viscosity-Derivation of poiseuille's equation, stokes equation-
Determination of viscosity by poiseuille's method and stokes method-Brownian motion –
Viscosity of gases

Module III Thermo dynamics (4Hrs)
Thermodynamic processes –Indicator diagram (P-V diagram, P-T diagram, T-V diagram,
T-S diagram)- Work done in Quasi static process-Work done in Isothermal, Adiabatic,
Isochoric, Isobaric processes-First law of thermodynamics-Application to heat capacities-
Entropy-Change of entropy in a carnot's cycle, reversible cycle , irreversible cycleprinciple
of increase of entropy- Entropy and available energy- entropy and disorder

Module IV Conservation of Energy and Momentum (5 Hrs)
Conservation of energy of a particle –Energy function- Potential energy curve-
Conservative and Non conservative forces- Conservation of Linear momentum-Center of
mass frame of reference

Module V Oscillation and waves (5 Hrs)
Simple harmonic motion (Elementary idea)- equation –examples like oscillation of simple pendulum, loaded spring-An harmonic oscillator-Damped harmonic oscillator.

Wave motion-Equation for plane progressive wave-Energy density- Pressure variations of
plane waves-Fourier theorem.

odule VI Quantum mechanics (6 Hrs)
Postulates of quantum mechanics-Wave function-Schrodinger equation (Time dependent &
steady state form)-eigen values and eigen functions-electron microscope and scanning
tunnelling microscope (Qualitative study)

Text for Study:Mechanics-J C Upadhaya
Modern Physics-Arthur Bieser
Heat and thermodynamics-Brijlal and Subramanium

Books for reference-

- Mechanics – J C Upadhyaya
- Special theory of relativity- Resnick
- Modern physics –Arthur Beiser
- Waves, Mechanics & Oscillations- S B Puri
- Properties of matter- D S Mathur
- Heat and Thermo dynamics- D S Mathur (VEdn)
- Properties of matter-JC Upadhaya
- Heat and Thermodynamics - Zemansky
- 5.Physics- Resnick and Halliday
- Thermodynamics- Brijlal and Subramanium

SEMESTER III

CHE4B04
Organic chemistry– I
Total Hours: 60; Credits: 3; Hours/Week: 4

Module I: Introduction to Organic Chemistry (5 hrs)

Historical development – Uniqueness of carbon – Classification of organic compounds - Homologousseries - Functional groups (mention only) - Hybridization in organic compounds (mention only).Isomerism: Classification in to structural isomerism and stereo isomerism. Structural isomerism: Chainisomerism, position isomerism, functional isomerism, metamerism and ring-chain isomerism – Keto-enoltautomerism.

Module II: Stereochemistry (15 hrs)

Representation of Organic Molecules: Fischer, Flying wedge, Sawhorse and Newman projection formulae.

Stereoisomerism: Classification into conformational isomerism and configurational isomerism.*Conformational Isomerism:* Conformations - Dihedral angle - Torsional strain - Conformational analysisof ethane and *n*-butane including energy diagrams – Conformations of glycol. Baeyer's strain theory –Merits and demerits. Conformations of cyclohexane - Axial and equatorial bonds - Ring flipping – Conformations of mono substituted cyclohexane.*Optical Isomerism:* Definition – Specific rotation – Chirality and elements of symmetry – DLconfiguration - Enantiomers - Optical isomerism in glyceraldehyde, lactic acid and tartaric acid - Diastereomers – Meso compounds – Cahn-Ingold-Prelog rules - RS notations for acyclic optical isomerswith one and two asymmetric carbon atoms - Erythro and threo representations (elementary idea only) -

Racemic mixture - Resolution methods - Enantiomeric excess. Optical isomerism in compounds lackingasymmetric carbon atoms: Biphenyls and allenes. Asymmetric synthesis.

Geometrical Isomerism: cis-trans, *syn-anti* and EZ notations with examples - Methods of distinguishinggeometrical isomers using melting point, dipole moment, solubility, cyclisation and heat ofhydrogenation.

Module III: Reaction Mechanism: Basic Concepts (15 hrs)

Definition of reaction mechanism - Curved arrow formalism. Nature of bond fission: Homolysis andheterolysis. Types of reagents: Electrophiles and nucleophiles.

Resonance: Condition, rules and techniques of drawing resonance forms - Resonance energy -Calculation of resonance energy of benzene from heat of hydrogenation.

Electron Displacement Effects: Inductive effect: Definition – Characteristics - +I and -I groups.Applications: Comparison of acidity of (i) formic acid and acetic acid (ii) chlorobutanoic acids.Mesomeric effect: Definition – Characteristics - +M and -M groups.

Applications: Comparison ofbasicity of aniline, *p*-nitroaniline and *p*-anisidine. Hyperconjugation: Definition – Characteristics.
Examples: Propene, ethyl carbocation and ethyl free radical. Applications: Comparison of stabilities of(i) 1-butene and 2-butene (ii) toluene, ethyl benzene and *tert*-butyl benzene. Electromeric effect:

Definition – Characteristics - +E effect (addition of H+ to ethene) and -E effect (addition of CN- toacetaldehyde). Comparison of inductive effect, mesomeric effect and hyperconjugation: Comparisonof electron density in benzene, toluene, phenol, chlorobenzene
and nitrobenzene. Steric effect:Definition, reason and examples.*Reaction Intermediates:* Carbocations, carbanions, free radicals and carbenes (definition, hybridization,
structure, classification, formation, stability and important reactions) - Rearrangement of carbocations– Nitrenes (mention only).
Types and Subtypes of Organic Reactions: Substitution, addition, elimination and rearrangement(definition and simple examples only).

Module IV: Aliphatic Hydrocarbons (15 hrs)
Alkanes: Nomenclature – Isomerism – Preparation from alkenes, alkynes and alkyl halides (reduction andWurtz reaction). Chemical properties: Halogenation (free radical substitution mechanism), aromatisationand isomerisation.*Cycloalkanes:* Nomenclature - Preparation by Freund reaction.*Alkenes:* Nomenclature – Isomerism. Preparation: Dehydrohalogenation of alkyl halides (Saytzeff's rule,mechanism not expected), dehalogenation of dihalides (stereochemistry expected) and dehydration ofalcohols (mechanism expected). Chemical properties: Electrophilic addition - Addition of hydrogen(explanation of stability and heat of hydrogenation based on hyperconjugation and resonance), addition of halogens (mechanism and stereochemistry expected), addition of hydrogen halides (Markownikov andAnti-Markownikov addition with mechanism) and addition of water (mechanism expected) - *Cis* and*trans* hydroxylation, permanganate cleavage and ozonolysis.*Alkadienes:* Classification into cumulated, conjugated and isolated dienes – Thiele's theory of partialvalency - 1,4-addition of 1,3-butadiene – Diels-Alder reaction.
Alkynes: Nomenclature of alkynes and alkenynes – Isomerism – Berthelot's reaction - Preparation from dihalides and acetylides. Chemical properties: Electrophilic addition – Addition of hydrogen usingLindlar's catalyst and Na/liquid ammonia - Addition of halogens and hydrogen halides – Oxymercuration- Ozonolysis - Reaction with chromic acid and KMnO4 - Acidity of 1-alkynes.Comparison of electrophilic addition rate of alkenes and alkynes. Chemistry of the test for unsaturation:Bromine water, bromine in CCl4 and Baeyer's reagent.

Module V: Aromatic Hydrocarbons (6 hrs)
Nomenclature and isomerism in substituted benzene, naphthalene and anthracene - Structure andstability of benzene (Kekule, Resonance and Molecular Orbital concepts). Electrophilic substitutionreactions in benzene with mechanisms: Halogenation, nitration, sulphonation, Friedel-Craft's alkylationand acylation - Orientation of aromatic substitution – Ring activating and deactivating groups

withexamples - *ortho*, *para* and *meta* directing groups - Side chain oxidation.Haworth synthesis of naphthalene – Nitration and sulphonation of naphthalene. Polycyclic arenes ascarcinogens (simple examples only).

Module VI: Aromaticity (4 hrs)

Huckel's (4n+2) rule and its simple applications to benzenoid (benzene, naphthalene and anthracene) and non-benzenoid (furan, pyrrole, pyridine, indole, quinoline, cyclopropenyl cation, tropylium cation,cyclopentadienyl anion and annulenes) systems – Comparison of basicity of (i) pyrrole and pyridine (ii) indole and quinoline - Anti-aromatic compounds.

Text Books

1. L.G. Wade Jr., *Organic Chemistry*, 6th Edition, Pearson Education, New Delhi, 2013.
2. A. Bahl and B.S. Bahl, *Advanced Organic Chemistry*, 1st Multicolour Edition, S. Chand &
Company, New Delhi, 2010.
3. K.S. Tewari, N.K. Vishnoi and S.N. Mehrotra, *A Textbook of Organic Chemistry*, 2nd Edition,
Vikas Publishing House (Pvt.) Ltd., New Delhi, 2004.
4. C.N. Pillai, *Organic Chemistry for Undergraduates*, 1st Edition, University Press, Hyderabad,
2008.
5. S.C. Sharma and M.K. Jain, *Modern Organic Chemistry*, Vishal Publishing Company, New
Delhi, 2014.
6. P.S. Kalsi, *Organic Reactions, Stereochemistry and Mechanism*, 4th Edition, New Age International Publishers, New Delhi, 2006.

References

1. J. Clayden, N. Greeves and S. Warren, *Organic Chemistry*, 2nd Edition, Oxford University Press,
New York, 2012.
2. D. Nasipuri, *Stereochemistry of Organic Compounds: Principles and Applications*, 3rd Edition,
New Age International Publishers, New Delhi, 2011.
3. E.L. Eliel, *Stereochemistry of Carbon Compounds*, Tata McGraw Hill Publishing Company Ltd,
New Delhi, 1992.
4. V.K. Ahluvaliya, *Organic Reaction Mechanisms*, 3rd Edition, Narosa Publishing House, New
Delhi, 2007.
5. M.S. Singh, *Advanced Organic Chemistry: Reactions and Mechanisms*, Pearson Education, New
Delhi, 2014.
6. Peter Sykes, *A Guide Book to Mechanism in Organic Chemistry*, 6th Edition, Pearson Education,
New Delhi, 2013.

SEMESTER III

Code: SDC3PC01

Pharmaceutics

Total Hours: 60; Credits: 5; Hours/Week:4

MODULE I
Posology (8 Hrs)

Meaning of pharmaceutical dose and dosage formulae Factor affecting pharmaceutical dose , dosage route of administration, calculation of doses for infants, adults and elderly patients,medical terms,pharmaceutical distribution system,Healthsystem,first aid measures, General view of pharmaceuticl industries in world wide view.

MODULE II (5 Hrs)
Pharmaceutical Calculations

System of weights and measures in Pharmacy - House hold measures and use of equivalents imperial system to metric system, Enlarging and reducing recipes, , Dilution and concentration of formulation – Calculation of Allegation method - Alligation medial and allegation alternate , percentage solutions, proof spirit, isotonic solutions and displacement value.

MODULE III (15Hrs)

- **Prescription:** definition, parts, handling, sources of errors in prescriptions, knowledge of latin terms commonly used in prescription writing and their translation into English. Modern concepts of dispensing pharmacy.

- **Compounding of medication:** Powders, tablets, Capsules, Tablet triturates, Pills, Lozenges, Ointments, Creams, Pastes, Jellies, suppositories, Suspensions, Emulsions, mixtures, sprays, Inhalations, paints, labeling of dispensed products.
- **Incompatibility:** physical, chemical and therapeutic incompatibilities and their corrections.

MODULE IV (15 Hrs)
- **Community Pharmacy:** Introduction and management community pharmacy organization and structure of retail and wholesale drug store-types of drug stores and design- Legal requirements for establishment, maintenance of drug store. Dispensing of proprietary products, maintenance of records of retail and whole sale.

Inventory control in community pharmacy: definition, various methods of inventory control, ABC, VED, EOQ, lead time, safety, stock.

MODULE V (7Hrs)

Pharmaceutical care: Definition and practical of pharmaceutical care. Emergency – treatment in stock, snake-bite, burns, poisoning, heart diseases, fractures, resuscitation methods. Elements of minor surgery and dressings.

Health education: WHO definition, health promotion care of child, pregnant & breast feeding woman and geriatric patient, role of pharmacist in family planning, prevention of communicable diseases i.e tuberculosis, hepatitis, leprosy, AIDS, syphilis, gonorrhea.

MODULE VI (10Hrs)

Public Health, diseases & Awareness:

Classification of food requirement, balanced diet, nutritional deficiency disorders, their treatment and prevention, specification for drinking water.

Demography and family planning: Demography cycle, family planning, various contraceptive methods, First Aid: Emergency treatment of shock, snake bites, burns, poisoning, fractures and resuscitation methods.

Recommended Books for the syllabi are:

1. Hoover's dispensing of medication, Mack publishing.
2. Pharmaceutical practice, By Diana M Collett and Michale E. Aulton, Elbs publishers.
3. Dispensing for pharmaceutical students, by cooper and Gunn by S.J Carter, Cbs publishers.

Reference books:

1. Joseph Barnett Sprowls, prescription Pharmacy
2. S.J Carter, cooper and Gunn's dispensing for pharmaceutical students, Carter, 11th edition CBS Publishers.
3. N.K.jain and S.N. Sharma. The concise Pharmaceutical Dispensing. Vallabh Prakashan, Delhi.
4. N.K. Jain, Health education and Community pharmacy, CBS publishers.
5. Pharmaceutical Dosage forms and drug Delivery systems By Howard C, Ansel by Lippincott Williams & Wilkins.
6. Remington: the science and practice of pharmacy, Mac publishers.
7. Drug and Cosmetics Act and Rules by Vijay Malik.
8. A practical guide to pharmaceutical care, Roverts John p ed9et.al), American pharmaceutical Association.
9. Current dispensing practices, Nanda Arun, Vallabh Prakashan.
10. Pharmacy Practice for technicians, Ballington Don A, New Age international publication.

SEMESTER III

Code: SDC3PIC01

Advanced pharmaceutical operations and Inorganic pharmaceutical chemistry
total hours: 60; credits: 5; hours/week: 4

Module : I (18 Hrs)

A. Acids and bases-acid base theory, specification of acidity and basicity, inorganic acid (boric acid HCL, HNO_3, H_3PO_4), inorganic acids (H_2SO_4), inorganic bases (strong ammonia solution, calcium hydroxide, KOH, Na_2CO_3, NaOH,).

B. Buffers- theory and mechanism, pharmaceutical buffer selection, pharmaceutical buffer system, preparation of pharmaceutical buffer.
C. Antioxidant- theory, the selection of antioxidants, official antioxidants (hypophosphorous acid, sodium bisulphite, sodium thiosulphate, sodium nitrite, nitrogen).
D. Pharmaceutical accepted glass-chemistry of glass, types of test employed for glass.
E. Water: (water, purified water, water of injection, bacteriostatic water for injection, sterile water for injection).

Module : II
Radio pharmaceuticals and contrast media (14 Hrs)
-radioactivity-alpha; beta and gamma radiations, biological effects of radiations, measurement of radioactivity, G.M. counter; radio isotopes—their uses, storage and precautions with special reference to the official preparations. Radio opaque contrast media—barium sulfate.

MODULE III (10Hrs)
Major intra and extracellular electrolytes

(A) Electrolytes used for replacement therapy—sodium chloride and its preparations, potassium chloride and its preparations.

(B) Physiological acid-base balance and electrolytes used—sodium acetate, potassium acetate, sodium bicarbonate injection, sodium citrate, potassium citrate, sodium lactate injection, ammonium chloride and its injection.

(C) Combination of oral electrolyte powders and solutions

Module : IV Diagnostic Agents and Tests (18 Hrs)

5.1 Radiopaques - organo iodo compounds. Compounds used in function tests, dyes, radio isotopes, RIA, ELISA.

5.2 Dyes used in pharmacy: fluorescein, mercurochrome, acridine dyes.

5.3 Colouring agents: official colours, colour code.

5.4 Liver and gastric function tests and kidney function tests.

References

01. T.E. Wallis, Text Book of Pharmacognosy, 5th Edn., J&A Churchil, 1967

02. W.C. Evans, Trease and Evans' Pharmacognosy, 15th Edn., Bailliere Tindall, 2002.

03. C.K. Kokate, A.P. Purohit and S.B. Gokhlae, Pharmaconosy, Nirai Prakashan, 2007.

04. S.S. Kadam, K.R. Mahadik, K.G. Bothra, Principles of Medicinal Chemistry Vol.1, 18th Edn., Nirali Prkashan, 2007.

05. A. Kar, Medicinal Chemistry, New Age International, 2007.

06. N.K. Jain, A Text Book of Forensic Pharmacy, 6th Edn., Vallabh Prakashan, 2003.

07. P. Ganguli, Intellectual Property Rights: Unleashing the Knowledge Economy, Tata McGraw Hill, 2001.

08. D.M. Vasudevan, S. Sreekumari, V. Kannan, Textbook of Biochemistry for Medical Students, 6th Edn., JP Medical, 2010.

SEMESTER III

Code: CHE6B15(P)
Organic chemistry practical
Total Hours: 75; Credits:4; Hours/Week: 5

General Instructions

1. Micro scale analysis must be adopted for organic qualitative analysis.
2. Use safety coat, goggles, shoes and gloves in the laboratory.
3. Reactions must be carried out in tiles, wherever possible.
4. A minimum number of 7 organic analysis and 7 organic preparations shall be done to appear for
the examination.

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Module I: Reagent Preparation

Preparation of Borshe's reagent, Schiff's reagent, Tollen's Reagent, Fehling's solution, phenolphthalein,
methyl orange, N-Phenylanthranilic acid and neutral FeCl3.

Module II: Determination of Physical Constants

1. Determination of boiling point.
2. Determination of melting point (capillary method and using melting point apparatus).

Module III: Recrystallisation Techniques

Recrystallise any four organic compounds using ethyl acetate, ethanol and water. Note the
crystalline shape.

Module IV: Solvent Extraction (Use ether and record the yield recovery).

1. Aniline from water.
2. Methyl benzoate from water.

Module V: Reactions of Organic Compounds

Study of the reactions of functional groups from the following list (also prepare the derivatives).

1. Phenols (phenol, α-naphthol, β-naphthol).
2. Nitro compounds (nitrobenzene, *o*-nitrotoluene).
3. Amines (aniline, N,N-dimethyl aniline).
4. Halogen compounds (chlorobenzene, benzyl chloride, *p*-dichlorobenzene).
5. Aldehydes and ketones (benzaldehyde, acetophenone).
6. Carboxylic acid (benzoic acid, cinnamic acid, phthalic acid, salicylic acid).
7. Carbohydrates (glucose, sucrose).
8. Amides (benzamide, urea).
9. Esters (ethyl benzoate, methyl salicylate).
10. Hydrocarbons (naphthalene, anthracene).

Module VI: Organic Preparations

1. Halogenation: *p*-bromoacetanilide from acetanilide, Tribromoaniline from aniline.
2. Nitration: *p*-nitroacetanilide from acetanilide
3. Oxidation: Benzoic acid from benzaldehyde, Benzoic acid from toluene.
4. Hydrolysis: Benzoic acid from ethyl benzoate, Benzoic acid from benzamide.
5. Diazo-coupling: Methyl orange from aniline, Phenylazo–β-naphthol from aniline.
6. Haloform reaction: Iodoform from acetone or ethyl methyl ketone.
7. Acylation: Acetylation of salicylic acid or aniline, Benzoylation of aniline or phenol.

Note: *Determine the yield. Calculate the theoretical yield and percentage conversion. Recrystallise the prepared compounds from appropriate solvents.*

Module VII: Chromatography

Paper chromatographic separation of mixture of two amino acids.

References

1. B.S. Furniss, A.J. Hannaford, P.W.G. Smith and A.R. Tatchell, *Vogel's Textbook of Practical*
Organic Chemistry, 5th Edition, Pearson Education, Noida, 2014.
2. F.G. Mann and B.C. Saunders, *Practical Organic Chemistry*, 4th Edition, Pearson Education, Noida,
2011.
3. Arthur I. Vogel, *Elementary Practical Organic Chemistry- Small Scale Preparations*, 2nd Edition,
Pearson Education, Noida, 2013.
4. V.K. Ahluwalia and S. Dhingra, *Comprehensive Practical Organic Chemistry*, Universities Press,
Hyderabad, 2004 (Reprint).

SEMESTER III
Code: SDC3PH02 (P)

Pharmaceutics Practical -II
Total hours: 75; credits: 5; hours/week: 5

(I) Synthesis

Synthesis of some typical organic medicinal compounds, spectral illustration of the intermediates and products formed:

paracetamol, sulphanilamide, hippuran, benzocaine, clofibrate, mercurochrome, phenytoin, dapsone, diodoquin, antipyrine, aminacrine and phenobarbitone.

(II) Dispensing

01. Emulsions

a. Castor oil emulsion
b. Shark liver oil emulsion
c. Liquid paraffin emulsion

02. Liniments

a. Turpentine liniment
b. Methyl salicylate liniment
c. Camphor liniment

03. Ointments

a. Compound benzoic acid ointment
b. Non-staining iodine ointment

04. Pastes

a. Unnas paste
b. Magnesium sulphate paste

05. Creams

a. Vanishing cream
b. Cetrimide cream

06. Paints

a. Mandel's paint
b. Tannic acid glycerine paint

07. Lotions
Calamine lotion

08. Dentrifices
a. Tooth paste
b. Tooth powder

09. Mixtures
Typical mixtures involving incompatibilities.

10. Tablets
a. Aspirin tablet
b. A P C tablets

References
01. T. E. Wallis, Practical Pharmacognosy, Churchill, 1948.
02. A.O. Bentley, J.E. Driver, Bentley and Driver's Textbook of Pharmaceutical Chemistry, 7th Edn., Oxford University Press, 1960.
03. K.A. Connors, A Textbook of Pharmaceutical Analysis, John Wiley & Sons, 2007.
04. J.W. Cooper, C. Gunn, Cooper and Gunn's Dispensing for Pharmaceutical Students, Pitman Medical, 1967.
05. A. Kar, Advanced Practical Medicinal Chemistry, New Age International, 2007.

SEMESTER III

SDC3PHY03(P)
Physics practical-I
Total hours: 30; credits: 2; hours/week: 2

- **Characteristics of Diode and Zener diode**
- Liquid lens- Refractive index of liquid and glass
- **Torsion pendulum- Rigidity modulus**
- Spectrometer- Refractive index of the material of prism
- **Deflection Magnetometer- Moment of a magnet (Tan-A position)**
- **Potentiometer-Measurement of resistance**
- **Young's modulus – Uniform bending –using optic lever**
- Static torsion – Rigidity modulus
- **Spectrometer- Grating- Normal incidence**
- Melde's string- Frequency of fork (Transverse and Longitudinal mode)
- **Half wave rectifier and Full wave rectifier**
- **Field along the axis of a circular coil**

SEMESTER IV

SEMESTER IV

GEC4PHY03
Physics -II
Total Hours: 30; Credits: 2; Hours/Week: 2

Module I
Optics (11hrs)
Laws of reflection and refraction- verification by Fermat's principle
Superposition of two sinusoidal waves (resultant amplitude and intensity)., constructive
and destructive interference Interference by a plane film- colours of thin films
. Fresnels and Fraunhoffer class of diffraction- plane diffractionGrating-resolving power and dispersive power. Experiment with grating Elementary idea- Brewster' law-

Module II Electronics (5 Hrs)
Half wave, Full wave and bridge rectifier circuits- Efficiency & ripple factor- Filter circuits
(capacitor filter and π filters) – Zener diode characteristics- Voltage stabilization
Transistors- CB, CE, CC Configurations- characteristics- Current amplification factors relationconnecting α , β and γ .

Module III Electrostatics (2 Hrs)
Coulomb's law between charges- Electric field- field lines- Electric potential-Gauss law

Module IV Current electricity (2 Hrs)
Drift velocity of charges- electric resistance- super conductivity (basic ideas)- Potentiometer
– determination of resistance- carey fosters bridge-

Module V Magnetism (2Hrs)
Earths magnetism- magnetic elements- Dia magnets-paramagnets and Ferro magnets magnetic moment-Deflection magnetometer-Tan A - Searle's vibration
Magnetometer.

Module VI Nuclear physics (3 Hrs)
Nucleus and its properties- nuclear force- stability of nucleus- binding energy- nuclear
fission- fusion- reactors- Radio activity- α ,β and γ
radiations- half life and mean life- C14 dating.

Module VII Cosmic rays and Elementary particles (5 Hrs)
Elementary particles- Classification- Leptons- Hadrons- resonance particles- quarks- color and flavour-

Books for reference

Text for study: Optics-Brijlal&Subramanian

Principles of Electronics-VK Mehta

- Optics- Ajay Ghatak 2. Optics – Brijlal&Subrahmanian
- Laser fundamentals – Silfast
- Lasers – theory & applications- Thyagarajan & Ghatak
- Principles of Electronics – VK. Mehtha
- Introduction to Electro dynamics-David J Griffith
- Electricity and Magnetism – Arthur F kip
- Concepts of Modern physics – Arthur Beiser
- Nuclear physics – Irvin Kaplan
- Nuclear physics - D.C.Tayal

SEMESTER IV

CHE5B06
Inorganic chemistry - III
Total Hours: 45; Credits: 3; Hours/Week: 3

Module I: Analytical Chemistry - II (5 hrs)

Qualitative Analysis: Applications of solubility product and common ion effect in the precipitation ofcations – Interfering acid radicals and their elimination (oxalate, fluoride, borate, phosphate, chromate,arsenite and arsenate) - Introduction of micro scale experiments in inorganic and organic qualitativeanalysis & their advantages.

Gravimetric analysis - Co-precipitation and post precipitation - Accuracy and precision – Classification and minimization of errors - Sampling and its types (elementary idea only).

Module II: Representative Elements - I (7 hrs)

Hydrogen: Position in the periodic table – Isotopes of hydrogen (separation method not needed) –Difference between *ortho* and *para* hydrogen.

Alkali and Alkaline Earth Metals: Comparative study based on electronic configuration, oxidation state,size, density, melting point, boiling point, electrode potential, ionization energy, metallic character, flamecolour and hydration enthalpy - Reactivity with oxygen and water – Thermal stability and solubility of sulphates and carbonates – Basicity of hydroxides - Anomalous properties of lithium and beryllium -Diagonal relationship between lithium and magnesium & beryllium and aluminium - Preparation and uses of sodium carbonate and plaster of Paris - Structure of $BeCl_2$.

Boron Family: Electronic configuration, size, melting point, boiling point, density, standard electrode potential, ionization energy, electronegativity and oxidation state - Inert pair effect - Reactivity with water, hydrogen and halogen – Comparison of Lewis acidity of boron halides - Anomalous behavior of boron - Diagonal relationship between boron and silicon - Preparation, properties, structure and uses of diborane, boric acid, borazine and boron nitride – Structure of $AlCl_3$.

Carbon Family: Electronic configuration, catenation, size, melting point, boiling point, density, standard electrode potential, ionization energy, electronegativity and oxidation state - Inert pair effect – Reactivity with water, hydrogen and halogen - Allotropy – Structure and hybridization of diamond and graphite –Fullerenes (mention only) – Amorphous carbon. Anomalous properties of carbon.

Module III: Representative Elements - II (9 hrs)

Nitrogen Family: Electronic configuration, size, ionization energy, electronegativity, oxidation state, atomicity and allotropy - Hydrides (comparison of boiling point, reducing property, basic strength and bond angle) – Structure of oxides N and P - Oxy acids of N and P (structure and acidic strength only) –Anomalous properties of nitrogen - Preparation, properties and uses of ammonia and nitric acid.*Oxygen Family:* Electronic configuration, size, ionization energy, electronegativity, oxidation state and atomicity - Hydrides (comparison of boiling point and bond angle) – Structure of SO_2 and SO_3 - Oxy and peroxy

acids of sulphur (structure and acidic strength only) – Anomalous properties of oxygen -Preparation, properties, structure and uses of ozone, hydrogen peroxide and sulphuric acid – Role ofselenium in xerography.
Halogens: Electronic configuration, size, electron affinity, standard reduction potential, bond energy,electronegativity and oxidation state - Hydrides (acidic strength, reducing property and boiling point) –Oxy acids of chlorine (structure and acidic strength only) – Structure of ClO2 – Electropositive character of iodine - Anomalous properties of fluorine - Preparation and uses of hydrochloric acid - General preparation and properties of interhalogen compounds (study of individual members notrequired) – Structure and hybridization of ClF3, ICl3 and IF5 - Comparison of properties of halogens and pseudohalogens (cyanogen as example) – Structure of polyhalide ions.
Noble Gases: Discovery – Occurrence – Separation by charcoal adsorption method - Structure of oxides, fluorides and oxy fluorides of xenon - Reaction of xenon fluorides with water – Uses of noble
gases.

Module IV: Inorganic Polymers & Non-aqueous Solvents (9 hrs)
Inorganic Polymers: Structure and applications of silicones and silicates. Phosphazenes: Preparation, properties and structure of di and tri phosphonitrilic chlorides. SN compounds: Preparation, properties and structure of S2N2, S4N4 and (SN)x.
Non-aqueous Solvents: Classification - General properties - Self ionization and leveling effect –Reactions in liquid ammonia and liquid SO2.

Module V: Environmental Pollution (9 hrs)
Air pollution: Major air pollutants - Oxides of carbon, nitrogen and sulphur - Particulates – Londonsmog and photochemical smog. Effects of air pollution: Acid rain, green house effect and depletion of ozone. Control of air pollution - Alternate refrigerants. Bhopal Tragedy (a brief study).Water pollution: Water pollution due to sewage and domestic wastes – Industrial effluents –Agricultural discharge – Eutrophication. Quality of drinking water - Indian standard and WHO standard. Water quality parameters: DO, BOD and COD – Determination of BOD and COD. Toxic metals in water (Pb, Cd and Hg) - Minamata disaster (a brief study). Control of water pollution - Need for the protection of water bodies.
Thermal pollution, noise pollution and radioactive pollution (Sources, effects and consequences) -Hiroshima, Nagasaki and Chernobyl accidents (a brief study).
Local environmental movements: Silent Valley, Plachimada, Narmada.
Pollution Control Board: Duties and responsibilities.

Module VI: Solid Waste Management (6 hrs)
House hold, municipal and industrial solid waste - Non-degradable, degradable and biodegradablewaste – Hazardous waste - Pollution due to plastics. Solid waste management: Recycling, digestion,dumping, incineration, land treatment and composting. Impacts of medical waste and E-waste & their disposal. Energy production from waste.

Text Books

1. A.I. Vogel, *A Textbook of Quantitative Inorganic Analysis*, 3rd Edition, Longmans, Green, London, 1962.
2. B.R. Puri, L.R. Sharma and K.C. Kalia, *Principles of Inorganic Chemistry*, 31st Edition, Milestone Publishers and Distributors, New Delhi, 2013.
3. J.D. Lee, *Concise Inorganic Chemistry*, 5th Edition, Oxford University Press, New Delhi 2008.
4. P.L. Soni and Mohan Katyal, *Textbook of Inorganic Chemistry*, 20th Edition, S. Chand and Sons,New Delhi, 2013.
5. R. Gopalan, *Inorganic Chemistry for Undergraduates*, Universities Press, Hyderabad, 2009.
6. S.S. Dara, *A Textbook of Environmental Chemistry and Pollution Control*, 8th Edition, S. Chand and Sons, New Delhi, 2008 (Reprint).
7. B.K. Sharma and H. Kaur, *Environmental Chemistry*, Goel Publishing House, Meerut, 1996.

References

1. J. Mendham. R.C. Denney, J.D. Barnes and M. Thomas, *Vogel's Textbook of Quantitative Chemical Analysis*, 6th Edition, Pearson Education, Noida, 2013.
2. D.A. Skoog, D.M. West, F.J. Holler and S.R. Crouch, *Fundamentals of Analytical Chemistry*, 8th Edition, Brooks/Cole, Thomson Learning, Inc., USA, 2004.
3. J.E. Huheey, E.A. Keitler and R.L. Keitler, *Inorganic Chemistry – Principles of Structure and Reactivity*, 4th Edition, Pearson Education, New Delhi, 2013.
4. B. Doughlas, D.H. McDaniel and J.J. Alexander, *Concepts and Models in Inorganic Chemistry*,
3rd Edition, John Wiley and Sons, New York, 1994.
5. D.F. Shriver and P. Atkins, *Inorganic Chemistry*, 5th Edition, Oxford University Press, New York, 2010.
6. Gary L. Miessler, Paul J. Fischer and Donald A. Tarr, *Inorganic Chemistry*, 5th Edition, Prentice Hall, New Jersey, 2013.
7. Wahid U. Malik, G.D. Tuli and R.D. Madan, *Selected Topics in Inorganic Chemistry*, S. Chand and Co., New Delhi, 2010 (Reprint).
8. Gurudeep Raj, *Advanced Inorganic Chemistry Vol-I*, 33rd Edition, Krishna Prakashan Media (P) Ltd., Meerut, 2014.
9. Gurudeep Raj, *Advanced Inorganic Chemistry Vol-II*, 31st Edition, Krishna Prakashan Media (P) Ltd., Meerut, 2008.
10. A.G. Sharpe and H.J. Emeleus, *Modern Aspects of Inorganic Chemistry*, 4th Edition, UBs Publisher's Distributors Ltd., New Delhi, 2000.
11. A.K. De., *Environmental Chemistry*, 6th Edition, New Age International (P) Ltd., New Delhi,2006.
12. A.K. Ahluwalia, *Environmental Chemistry*, Ane Books India, New Delhi, 2008.

SEMESTER IV

Code: SDC4DP01

Drug design and pharmacology
Total Hours: 60; Credits: 4; Hours/Week: 4

Module I

Principles of Drug Therapy and Drug Design (10 Hrs)

1.1 General Principles of Drug Therapy. Relationship between chemical structure, lipid solubility and biological activity of drugs. Stereochemistry and biological activity.

1.2 Drug action-receptor theories. Drug metabolism–different pathways.

1.3 Drug design: various factors of drug design, rational drug design. Methods of lead discovery: optimisation of the lead, natural and synthetic sources of lead compounds. Bioisosterism. Prodrug and soft drug concept. Drug synthesis. Combinatorial synthesis (basic concepts). Retrosynthetic analysis of benzocaine, saccharin, salbutamol and benzodiazepines.

1.4 Basic concepts of CADD, molecular modeling, molecular docking. QSARphysicochemical parameters, introduction to 2D & 3D QSAR.

Module II (8 Hrs)

2.1 General principles of pharmacology: biological response to drugs, passage of drugs across membranes.

2.2 Pharmacokinetic principles: absorption, distribution, metabolism and excretion of drugs. Dose of drugs and routes of administration.

2.3 Pharmacodynamic principles: dose response relationships, mechanism of drug action, unusual and adverse responses of drugs, structurally specific and nonspecific drugs. Ferguson's principle.

2.4 Drug interactions-synergism, antagonism, drug addiction and drug dependence, drug tolerance, drug hypersensitivity.

Module III

Metallic compounds used in pharmaceutical chemistry (10 Hrs)

3.1 Calcium lactate, calcium gluconate, iron gluconate, iron fumerate, ferric ammonium citrate, ferrous sulphate, aluminium hydroxide gel, calamin, zinc oxide, zinc stearate, magnesium stearate, talc, yellow mercuric oxide, trivalent and pentavalent antomonials, selenium sulfide, lithium salts, gold, platinum and bismuth compounds.

3.2 Metal toxicity - cadmium, lead, copper and mercury.

Module IV

Drugs acting on CNS (20 Hrs)

4.1 General anaesthetics. Inhalation anaesthetics - ether, enflurane, halothane, nitrous oxide, cyclopropane. Intravenous anaesthetics - thiopentone sodium, ketamine.

4.2 Hypnotics, sedatives and anxiolytic agents.

4.3 Anxiolytic agents-benzodiazepines, buspirone and meprobamate.

4.4 Anticonvulsants: convulsions, types of epilepsy, barbiturates-hydantoins, oxazolidinediones, succinimides and benzodiazepines.

4.5 Analeptics: xanthines, amphetamines, nikethamide and ethamivan.

4.6 Centrally acting muscle relaxants: glyceryl ethers-mephenesin, alkane diol derivatives-meprobamate, benzodiazepines-librium, diazepam and baclofen.

4.7 Antiparkinson's agents: dopamine agonists, dopamine releasing agents and synthetic anticholinergics.

4.8 Drugs for Alzheimer's disease: cholinergic agonists and acetylcholine esterase inhibitors.

4.9 Synthesis of the following drugs - Enflurane, Ketamine,Etomidate, Phenobarbital,Diazepam, Chlordiazepoxide, Meprobamate, Buspirone, Ethinamide, Nikethamide, Ethamivan, Trimethadione,Ethosuximide, Denzimol, Topiramate, Mephenesin, Levodopa, Besiperidine and Tacrine.

Module V Analgesics (12 Hrs)

5.1 Narcotic analgesics - morphine and its analogues, phenyl(ethyl) piperidines, diphenyl heptanones and benzocaine derivatives.

5.2 Antipyretics and NSAIDs: Basic idea of COX I &I I inhibitors, salicylatesaspirin,p-aminophenol derivatives-paracetamol, phenacetin, pyrazolidinedionesphenyl
butazone, oxyphenbutazone, anthranilicacid derivatives-mefanamic acid, flufenamic acid,indoleacetic acid derivatives-indomethacin, arylacetic/propionic acid derivatives(ibuprofen, ketoprofen, flubiprofen and diclofenac), oxicams(piroxicam and tenoxicam).

5.3 Drugs used for gout - allopurinol, selective COX II inhibitors

5.4 Synthesis of the following drugs-levorphanol, pethidine, methadone, phenyl butazone, flufenamic acid, diclofenac, piroxicam, allopurinol and celicoxib.

References

01. G. Patrick, Medicinal Chemistry, BIOS. 2001.

02. T. Nogrady, D.F. Weaver, Medicinal Chemistry, Oxford University Press, 2005.

03. W.O. Foye, T.L. Lemke, D.A. Williams, Principles of Medicinal Chemistry, 4th Edn., Williams & Wilkins, 1995.

04. J.P. Remington, Remington's Pharmaceutical Sciences, Vol.13, , 19th Edn., Mack,

05. D. Sriram , P. Yogeswari, Medicinal Chemistry, Pearson Education India, 2010.

06. K. D. Tripathi, Essentials of Medical Pharmacology, 6th Edn., Jaypee, 2008

07. L.S. Goodman, A. Gillman, The Pharmacological Basis of Therapeutics, 10th Edn., McGraw Hill, 2001.

08. S.S. Kadam, Principles of Medicinal Chemistry, Vol.I & II, Pragati Books, 2008.

09. A. Kar, Medicinal Chemistry, New Age International, 2007.

10. C.O. Wilson, J.M. Beale, J.H. Block, Textbook of Organic Medicinal and Pharmaceutical Chemistry, 12th Edn., Lippincott Williams and Wilkins

SEMESTER IV

Code: SDC4DR01

Indian Drug Regulatory Guidelines and Physical Pharmacy

Total Hours: 60; Credits: 4; Hours/Week:4

MODULE I (5Hrs)
Good laboratory Practice, Standard operating procedure, Standard Testing procedure, Certificate of Analysis, Method of Analysis, good receipt note.

MODULE II
Approval of new drugs (15 Hrs)
Investigational New Drugs (IND) submission, format & content of IND, content of investigator Brochure, general consideration of new drug Approval (NDA), specific requirements, content & format of NDA, manufacturing control requirement of NDA.GMP, ISO 9000, TQM, ICH

MODULE III (7 Hrs)
Occupational Health and Hazards, Safety at workplace, Accident prevention techniques, Safety Management system, list of hazardous chemicals and handling of toxic and hazardous chemicals, acids, ether & etc.

MODULE IV Forensic Pharmacy (18 Hrs)
Pharmaceutical Legislation in India. Legal aspects of trade in drugs.
The Drugs and Cosmetic Act and rules
Intellectual Property Rights (IPR), Patents, Trademarks, Copy rights, Patent Acts relevant sections (basic ideas only) A brief study of the various Prescription/Non-prescription Products, Medical /Surgical accessories, Diagnostic aids, appliances available in the market

Physical pharmacy

MODULE V Size reduction and separation (15 hrs)

- Size reduction :- Objectives, and factors affecting size reduction, methods of size reduction–Study of Hammer mill, Ball mill, Fluid Enegy mill and Disintegrator.
- Size separation–Size separation by sifting. Official Standard for powders. Sedimentation methods of size separation. Construction and working of cyclone separator.

Recommended Books for the syllabi are:

1. Gary D. Christian, Analytical chemistry, John Wiley & sons N.Y., 5th Ed., 1994.
2. Indian Pharmacopoeia 2007, Volume- I, II and III.
3. International conference on harmonisation of Technical requirements for registration of pharmaceuticals for human use. ICH Harmonised tripartite guideline. Guideline for Good laboratory Practical.

SEMESTER IV

Code: CHE6B17(P)
Inorganic chemistry practcal-III
Total Hours: 60; Credits: 3; Hours/Week: 4

General Instructions

1. Micro scale analysis must be adopted for inorganic qualitative analysis.
2. Mixtures containing more than one interfering anions must be avoided.
3. If interfering anions are not present, cations may be given from the same group.
4. Use safety coat, goggles, shoes and gloves in the laboratory.

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Module I: Inorganic Qualitative Analysis

1. Study of the reactions of following ions.

Anions: Carbonate, sulphate, fluoride, chloride, bromide, iodide, acetate, borate, oxalate,
phosphate and nitrate.

Cations: Lead, bismuth, copper, cadmium, iron, aluminium, cobalt, nickel, manganese, zinc,
barium, calcium, strontium, magnesium and ammonium.

2. Systematic analysis of mixtures containing two cations and two anions from the above list.
3. *Elimination of interfering anions:* Fluoride, borate, oxalate and phosphate.

Module II: Inorganic Preparations

1. Ferric alum
2. Potash alum
3. Mohr's salt
4. Nickel(II) dimethylglyoximate
5. Potassium trisoxalatoferrate(III)
6. Potassium trioxalatochromate(III)
7. Tris(thiourea)copper(I) sulphate
8. Tetraamminecopper(II) sulphate
9. Microcosmic salt
10. Sodium nitroprusside

References

1. G. Svehla, *Vogel's Qualitative Inorganic Analysis*, 7th Edition, Prentice Hall, New Delhi, 1996.
2. V.V. Ramanujam, *Inorganic Semi Micro Qualitative Analysis*, 3rd Edition, The National Publishing
Company, Chennai, 1974.
3. W.G. Palmer, *Experimental Inorganic Chemistry*, Cambridge University Press, 1970.

SEMESTER IV

Code: SDC4PH03(P)

Pharmaceutics Practical III

Total Hours: 45; Credits: 4; Hours/Week:3

I Human anatomy and Physiology

- Study on Human Skelton system
- Demonstration of models
- Blood group identification
- Hb count determination of WBC RBC

II Microbiology

- . Preparation of Various type of culture media :- Preparation of some typical nutrient media for collection and isolation of bacteria – preparation of pure cultures
- Nutrient agar, endo ‘s agar, chapman’sagar,tergitol – 7 agar, Mcconkey agar.
- 2. Identification and staining of bacteria (simple staining, Gram staining, Acid fast staining, negative staining, and capsule staining)
- 3. Examination of Bacteria for motility: - Hanging drop method
- 4. Enumeration of bacteria in milk :- The reductase test
- 5. Evaluation of disinfectants and antiseptics (phenol coefficient test, minimum inhibitory concentration)
- 6. Antibiotic Sensitivity test – disc diffusion method.

SEMESTER IV

Code: SDC4PHY04 (P)

Physics practical-II

Total Hours: 30; Credits:2 ; Hours/Week:2

1. Young's modulus- Pin and microscope (Non- Uniform bending)..
2. Potentiometer- Conversion of Galvanometer in to voltmeter –calibration by standard
   voltmeter
3. .Viscosity of liquid- Capillary flow- Variable pressure head method
4. Logic gates – Verification of truth table
5. **Carey Fosters bridge- Resistivity of the material of wire**
6. **Surface Tension-Capillary rise method-Radius by microscope.**
7. Young's modulus of a cantilever- Pin and microscope method
8. **Potentiometer-Calibration of low range voltmeter**
9. **Moment of inertia of fly wheel**
10. 4.. Tangent galvanometer – Reduction factor
11. **Searle's vibration magneto meter – Comparison of moments**
12.. Newton's rings- Wavelength of sodium light

SEMESTER IV

Code: SDC4INT02

Internship/Project
Total Hours: 60; Credits: 4; Hours/Week:4

Internship should be carried out in the industry, not necessarily with industry partner. The major idea for internship is to implement the things learned and to get a real life experience. The Evaluation process follows 80% external assessment and 20% internal assessment.

Every student will be assigned an internal guide, allotted from the parent department concerned or an expert available in the college appointed by the principal or the head of the department. The student has to make regular discussions with the guide while choosing the subject/area and throughout the life time of the project.

SEMESTER V

SEMESTER V

GEC5OC02
Organic chemistry - II
Total Hours: 45; Credits: 3; Hours/Week: 3

Module I: Halogen Compounds (9 hrs)

Nomenclature – Classification - Isomerism. Preparation of alkyl halides: From alcohols, Swarts reaction,Finkelsain reaction and allylic bromination of alkenes. Preparation of aryl halides: From benzene anddiazonium salts. Nucleophilic substitution reactions: SN1 & SN2 mechanisms - Characteristics and energyprofile diagrams - Comparison of rate of alkyl, aryl, allyl and vinyl halides. Elimination reactions: E1 &E2 mechanisms and their characteristics - Saytzeff's rule. Substitution *Vs* elimination. Nucleophilic aromatic substitution reaction with mechanism: Elimination–addition and addition–elimination mechanisms - Benzyne intermediate. Distinction between nuclear and side chain halogenated hydrocarbons. Uses of CHCl3, CHI3, CF3CHClBr and CF2Cl2 – Uses and health effects of CCl4.

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Module II: Hydroxy Compounds (8 hrs)

Alcohols: Nomenclature – Classification - Isomerism. reparation of ethanol from molasses – Preparation of rectified spirit and absolute alcohol - Power alcohol, proof spirit and denatured spirit (mention only). Chemical properties: Reactions involving cleavage of O-H bonds (acidity and esterification), oxidation (with PCC,- Chemistry of methanol poisoning – Harmful effects of ethanol in the human body. Test for alcohols: Luca's test and Victor Meyer's test.

Phenols:. Chemical properties: Acidity (substituent effects), bromination, nitration, sulphonation, Riemer-Tiemann reaction (mechanism not expected), Liebermann's nitroso reaction.Preparation and applications of phenolphthalein, fluorescein, eosin and alizarin – Reason for the colour change of phenolphthalein with pH. Uses of phenol.

Module III: Aldehydes and Ketones (6 hrs)

Nomenclature – Chemical properties: Nucleophilic addition (addition of water, HCN, bisulphite,alcohol and Grignard reagent - Comparison of nucleophilic addition rate of aliphatic and aromatic aldehydes and ketones), addition-elimination reactions (with hydroxyl amine, hydrazines, semicarbazide,ammonia and amines), reduction (Clemmenson, Wolff-Kishner, metal hydride and MPV reductions) and oxidation (with KMnO4, Tollen's reagent, Fehling's solution, Benedict's reagent, bromine water and Oppenauer oxidation) – Acidity of α-hydrogen - Aldol condensation (mechanism not expected)

Module IV: Carboxylic Acids (8hrs)

Carboxylic Acids: Nomenclature

Chemical properties: Acidity (effect of substituent on the acidity of aliphatic and aromatic carboxylic acids) - HVZ reaction - Decarboxylation - Kolbe electrolysis (mechanism expected) Action of heat on dicarboxylic acids – Blanc's rule. Preparation, reactions and uses of oxalic acid,cinnamic acid and citric acid - Role of lactic acid in exercise -

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Module V: Nitrogen Compounds (9 hrs)

Nitro Compounds:– Harmful effects of nitrobenzene in the human body. Explosives: Definition - TNT, nitroglycerine, RDX and ANFO (structural formula and chemistry behind the explosion).

Amines

Chemical properties: Basicity (effect of substituents on the basicity of aliphatic and aromatic amines), carbylamine reaction, conversion of amine to alkene (Hofmann's elimination with mechanism and stereochemistry), acylation and reaction with nitrous acid. Electrophilic substitution reactions of aniline: Halogenation, nitration and sulphonation. Preparation and uses sulpha drugs – Structural formula of sulphapyridine, sulphadiazine, sulphathiazole and sulphaguanidine. Separation of amines by Hinsberg's method.

Diazonium Salts: Preparation and synthetic applications of benzene diazonium chloride. Preparation of methyl orange - Reason for its colour change with pH.

Carbonic Acid Derivatives: Preparation and properties of urea and semicarbazide – Estimation of urea (hypobromite method and urease method) - Basicity of guanidine.

Module VIII: Heterocyclic & Active Methylene Compounds (5 hrs)

Heterocyclic Compounds: Classification – Nomenclature - Preparation and properties of furan, pyridine and indole.

Active Methylene Compounds: Examples – Preparation of ethyl acetoacetate by Claisen condensation (mechanismNOT expected) - Tautomerism - Synthetic applications of ethylacetoacetate.

Text Books

1. L.G. Wade Jr., *Organic Chemistry*, 6th Edition, Pearson Education, New Delhi, 2013.
2. A. Bahl and B.S. Bahl, *Advanced Organic Chemistry*, 1st Multicolour Edition, S. Chand & Company, New Delhi, 2010.
3. K.S. Tewari, N.K. Vishnoi and S.N. Mehrotra, *A Textbook of Organic Chemistry*, 2nd Edition, Vikas Publishing House (Pvt.) Ltd., New Delhi, 2004.
4. C.N. Pillai, *Organic Chemistry for Undergraduates*, 1st Edition, University Press, Hyderabad, 2008.
5. S.C. Sharma and M.K. Jain, *Modern Organic Chemistry,* Vishal Publishing Company, New Delhi, 2014.

References

1. J. Clayden, N. Greeves and S. Warren, *Organic Chemistry*, 2nd Edition, Oxford University Press, New York, 2012.
2. P.Y. Bruice, *Essential Organic Chemistry*, 1st Edition, Pearson Education, New Delhi, 2013.
3. V.K. Ahluwaliya, *Organic Reaction Mechanisms*, 4th Edition, Narosa Publishing House, New Delhi, 2013 (Reprint).
4. John McMurry, *Fundamentals of Organic Chemistry*, 5th Edition, Brooks/Cole, Pacific Grove, California, 2002.
5. I.L. Finar, *Organic Chemistry Vol. I,* 5th Edition, Pearson Education, New Delhi, 2013.
6. G.M. Louden, *Organic Chemistry*, 4th Edition, Oxford University Press, New York, 2008.
7. Jerry March, *Advanced Organic Chemistry*, 5th Edition, John Wiley and Sons, New York, 2004.
8. R.T. Morrison, R.N. Boyd, *Organic Chemistry*, 7th Edition, Pearson Education, New Delhi, 2013.
9. T.L. Gilchrist, *Heterocyclic Chemistry*, 3rd Edition, Pearson Education, New Delhi, 1997.

SEMESTER V

Course Code: GEC5PH02
Physical chemistry - II
Total Hours: 45; Credits: 3; Hours/Week: 3

Module I: Kinetics & Catalysis (7 hrs)

Kinetics: Chemical kinetics and its scope - Rate of a reaction - Factors influencing the rate of a reaction - Rate law - Order and molecularity - Derivation of rate constants for first, second (with same and differentreactants), third (with same reactants only) and zero order reactions with examples (graphicalrepresentations needed) - Half life period (derivation for first and n_{th} order reactions) - Methods to determine the order of a reaction - Steady state approximation - Parallel reactions, opposing reactions, consecutive reactions and chain reactions with examples (elementary idea only) - Effect of temperature on reaction rates - Arrhenius equation - Determination and significance of Arrhenius parameters -Theories of reaction rates - Collision theory - Derivation of rate equation for bimolecular reactions using collision theory - Transition state theory - Expression for rate constant based on equilibrium constant and thermodynamic aspects (derivation not required) - Unimolecular reactions - Lindemann mechanism.*Catalysis:* Homogeneous and heterogenous catalysis - Theories of homogenous and heterogenouscatalysis - Enzyme catalysis - Michaelis-Menten equation (derivation not required).

Module II: Photochemistry (4 hrs)

Introduction - Difference between thermal and photochemical processes - Beer Lambert's law. Laws of photochemistry: Grothus-Draper law and Stark-Einstein's law of photochemical equivalence. Quantum yield and its explanation – Photosynthesis - Photochemical hydrogen-chlorine and hydrogen-bromine reactions. Photophysical processes: Jablonski diagram – Fluorescence – Phosphorescence. Non-radiative processes: Internal conversion and inter system crossing. Photosensitization – Chemiluminescence.Chemistry of vision.

Module III: Adsorption & Colloids(6 hrs)

Adsorption: Introduction - Difference between adsorption and absorption - Chemisorption and physisorption - Factors affecting adsorption. Adsorption isotherms: Freundlich and Langmuir isotherms(derivation required) - Multilayer adsorption - BET equation (derivation not needed) and its applicationsto surface area measurements. Applications of adsorption.

Colloids: Types and classification - Preparation and purification of colloids - Kinetic, optical and electrical properties of colloids - Protective colloids - Gold number - Hardy-Schulze rule. Emulsions and gels: Properties and applications – Surfactants. Electrical double layer - Zeta potential – Donnan membrane equilibrium - Dorn effect – Applications of colloids.

Module IV: Chromatography (9 hrs)

Introduction – Definition – Classification - Principles and applications of column chromatography, thin layer chromatography, paper chromatography, ion exchange chromatography, gel permeation
chromatography, gas chromatography and high performance liquid chromatography - Rf values.

Module V: Spectroscopy (16 hrs)

Interaction of electromagnetic radiation with matter - Energy levels in molecules - Born-Oppenheimer approximation.

Rotational Spectroscopy: Introduction - Rigid rotor - Expression for energy - Selection rules – Intensities of spectral lines - Determination of bond lengths of diatomic molecules.
Vibrational Spectroscopy: Simple harmonic oscillator – Energy levels - Force constant - Selection rules– Anharmonicity - Fundamental frequencies – Overtones – Fingerprint region - Group frequency concept- Degree of freedom for polyatomic molecules - Modes of vibrations of CO_2 and H_2O.
Raman Spectroscopy: Basic principles – Qualitative treatment of rotational Raman effect – Vibrational Raman spectra - Stokes & anti-stokes lines and their intensity difference - Selection rules – Mutual exclusion principle.
Electronic Spectroscopy: Basic principles - Frank-Condon principle - Electronic transitions - Singlet and triplet states - Dissociation energy of diatomic molecules – Chromophore and auxochrome -Bathochromic and hypsochromic shifts.
Nuclear Magnetic Resonance (NMR) Spectroscopy: Proton NMR and ^{13}C NMR – Principle - Numberand position of signals - Chemical shift - Intensity of signals - Different scales – Spin-spin coupling.

Module VII: Molecular Symmetry and Group Theory (3 hrs)
Elements of symmetry of molecules – Identity, proper axis of rotation, reflection plane, inversion centreand improper axis of rotation – Schonflies notation

Text Books

1. B.R. Puri, L.R. Sharma and M.S. Pathania, *Principles of Physical Chemistry*, 46th Edition, Vishal Publishing Company, New Delhi, 2013.
2. F. Daniels and R.A. Alberty, *Physical Chemistry*, 5th Edition, John Wiley & Sons, Canada, 1980.
3. Gurdeep Raj, *Advanced Physical Chemistry*, 35th Edition, Goel Publishing House, Meerut, 2009.
4. S. Glasstone and D.H. Lewis, *Elements of Physical Chemistry*, 2nd Edition, MacMillan & Company, UK, 1962.
5. J. Rajaram and J.C. Kuriacose, *Kinetics and Mechanism of Chemical Transformation*, 1st Edition, Macmillan India Ltd., New Delhi, 1993.
6. G.H. Jeffery, J. Bassett, J. Mendham and R.C. Denney, *Vogel's Textbook of Quantitative Chemical Analysis*, 5th Edition, John Wiley & Sons, Inc., New York, 1989.
7. C.N. Banwell and E.M. McCash, *Fundamentals* of *Molecular Spectroscopy*, 4th Edition, McGraw–Hill Publishing Company Limited, New Delhi, 2002.
8. Gurudeep R. Chatwal and Sham K. Anand, *Spectroscopy: Atomic and Molecular*, 5th Edition, Himalaya Publishing House, New Delhi, 2013.
9. K. Veera Reddy, *Symmetry & Spectroscopy of Molecules*, 2nd Edition, New Age International, New Delhi, 2009.

References

1. K. Laidler, *Chemical Kinetics*, 3rd Edition, Pearson Education, New Delhi, 2004.
2. K.K. Sharma and L.K. Sharma, *A Textbook of Physical Chemistry*, 5th Edition, Vikas Publishing House, New Delhi, 2012.
3. K.L. Kapoor, *Physical Chemistry Vol. 3&5*, Macmillan Publishers, Noida, 2004.
4. G.K. Vemula Palli, *Physical Chemistry*, Prentice Hall of India, New Delhi, 1997.
5. P.W. Atkins, *Physical Chemistry*, 8th Edition, Oxford University Press, New Delhi, 2006.
6. G.M. Barrow, *Physical Chemistry*, 5th Edition, McGraw Hill, London, 1992.
7. W.J. Moore, *Physical Chemistry*, 5th Edition, Orient Longman, London, 1999.
8. N. Kundu and S.K. Jain, *Physical Chemistry*, S. Chand & Company, New Delhi, 1999.
9. D.A. Skoog, D.M. West, F.J. Holler and S.R. Crouch, *Fundamentals of Analytical Chemistry*, 8th Edition, Brooks/Cole, Thomson Learning, Inc., USA, 2004.
10. B.K. Sharma, *Instrumental Methods of Chemical Analysis*, 24th Edition, Geol Publishing House, Meerut, 2005..
11. P.R. Singh and S.K. Dixit, *Molecular Spectroscopy: Principles and Chemical Applications*, S. Chand & Company, New Delhi 1980.
12. P.K. Bhattacharya, *Group Theory and its Chemical Applications*, Himalaya Publishing House, New Delhi, 1986.
13. F.A. Cotton, *Chemical Applications of Group Theory*, 3rd Edition, John Wiley & Sons, New York, 1990.

SEMESTER V

Code: GEC5PM01

Pharmaceutical Management

Total Hours: 60; Credits: 4; Hours/Week:4

Module I Concept of management (10 Hrs)

Administrative Management (Planning, Organizing Staffing Directing and Controlling). Entrepreneurship development, Operative Management (Personnel, Materials, Production, Financial, Marketing, Time/space, Margin/ Morale) Principles of Management (Coordination, Communication, Motivation, Decision making, leadership, Innovation Creativity, Delegation of Authority / Responsibility. Record Keeping), Identification of key points to give maximum thrust for deve lopment and perfection**.**

Module II Drug regulatory affairs (5 Hrs)

Definitions, procedure of export & import of drug.

Module III Pharmaceutical marketing (10 Hrs)

Functions, buying, selling, transportation, storage financed feedback information, channels of distribution, wholesale, retail, department store, multiple shop and mail order business.

Module IV Salesmanship (5 Hrs)

Principle of sales promotion, advertising, ethics of sales, merchandising, literature, detailing, Recruitment, training, evaluation, compensation to the pharmacist**.**

Module V Market research (10 Hrs)

Measuring & Forecasting Market Demand - Major concept in demand measurement, Estimating current demand Geo-demo- graphic analysis. Estimating industry sales, Market share and future demand. Market segmentation & Market targeting.

Module VIMaterials management (10 Hrs)

A brief exposure of basic principles of management major areas, scope, purchase, stores, inventory control and evaluation of materials management**.**

Module VII: Production management (10 Hrs)

A brief exposure of the different aspects of Production Management– Visible and Invisible inputs, Methodology of Activities Performance Evaluation Technique Process– Flow, Process Know-how, Maintenance Management.

REFERENCE

1. Mohan S, Jai D." Drug Store and Business Management ", 1st edition, 1995,S.V Kar & Co, Jalandhar .
2. Singh S, Singh P." Drug Store and Business Management", 1st edition, 1995, S.Dinesh & Co.Circular Road Jalandhar.
3. Koontz & O"Donnel Principles of Management Tata Mc Graw Hill, Delhi.
4. G. Vidya Sagar, Pharamceutical Industrial Management, 2nd edition, 2005, Pharma Book Syndicate

SEMESTER V

Code: SDC5MC01

Medicinal chemistry
Total Hours: 75; Credits: 5; Hours/Week:5

Module I Drugs acting on ANS (10 Hrs)

1.1 Adrenergic stimulants: Phenyl ethanolamine derivatives-adrenaline, isoprenaline,
salbutamol, ephedrine, and phenylephrine. Imidazole derivatives-naphazoline, xylometazoline and oxymetazoline.
1.2 Adrenergic blockers: α and β adrenoreceptor antagonists-ergot akaloids, phenoxybenzamine, phentolamine, tolazoline, DCI, propranolol, atenolol, labetolol. Neurone blockers–Bretilium and Xylocholine.
1.3 Cholinergic stimulants: nicotinic and muscarinic receptors, acetyl choline and analogues, pilocarpine, bethanechol and carbachol.
1.4 Cholinergic blockers: tertiary and quaternary antimuscarinics, antispasmodic drugs-dicyclomine, glycopyrrolate, antiulcer drugs-pirenzepine, cycloplegic drugs-tropicamide, homatropine
1.5 Anticholinesterases: Competitive inhibitors-physostigmine and neostigmine.
1.6 Non competitive inhibitors: organophosphorus compounds, Nerve gases, Cholinesterase regenerators-2 PAM.
1.7 Ganglion blocking agents: mecamylamine and trimethophan
1.8 Curareform drugs: curare alkaloids, erythrina alkaloids and gallamine.
1.9 Synthesis of the following drugs: salbutamol, naphazoline, tolazoline, propranolol, bretilium, carbachol, mecamylamine and gallamine.

Module II: Drugs acting on CVS (10 Hrs)

2.1 Cardiotonic drugs: cardiac glycosides-their chemistry and stereochemistry, Digoxin and digitoxin.
2.2 Antiarrhythmic drugs: quinidine, disopyramide, lidocaine, phenytoin and procainamide, β-blockers-propranolol. Calcium channel blockers-verapamil and Neurone blockers-bretilium.
2.3 Antihypertensive Drugs: peripheral antiadrenergics-prazosin and terazosin. Centrally acting drugs-reserpine, clonidine and methyl dopa. β-blockerspropranolol, atenolol and labetalol. Calcium channel blockers-nifedipine and amlodipine. ACE inhibitors-captopri. Angiotensin receptor blockers-losartan. Diuretics-thiazide diuretics.
2.4 Antianginal drugs: vasodilators-nitrites and nitrates, β-blockers-propranolol. Calcium channel blockers-verapamil and nifedipine. Miscellaneous-dipyridamol and aspirin.
2.5 Anticoagulants: heparin, coumarin derivatives and indane dione derivatives.

2.6 Antilipidemic agents: atherosclerosis(mention only), Statins-lovastatin, simvastatin, fluvastatin, Fibrates-clofibrate, Miscellaneous-bile acid sequestrants and cholestyramine resin.
2.7 Synthesis of the following drugs: procainamide, disopyramide, amlodipine, verapamil, captopril and fluvastatin.

Module III: Chemotherapy (15 Hrs)
3.1 Antibiotics: β-lactam antibiotics-penicillins and cephalosporins, natural, biosynthetic and semisynthetic penicillins, tetracyclines and chloramphenicol, a brief study of macrolide antibiotics, aminoglycoside antibiotics, polyene antibiotics, fluoroquinolones.
3.2 Sulphonamides: sulphanilamide, N-substituted sulphanilamide derivatives, mechanism of action, sulphones-dapsone, dihydrofolate reductase inhibitorstrimethoprim
and cotrimoxazole.
3.3 Antitubercular agents: first line drugs-isoniazid, rifampicin, pyrazinamide, ethambutol, and streptomycin. Second line drugs-ethionamide, paraaminosalicylic acid and fluoroquinolones.
3.4 Antifungal agents: Antibiotics-amphotericinB, griseofulvin and nystatin. Azole derivatives-ketoconozole,terconozole,fluconozole and clotrimazole. Pyrimidine derivatives- 5 Flucytosine.
3.5 Antiviral drugs: amantidine, interferon and ribavirin. Anti HIV agentszidovudine,
and abacavir. Anti herpes simplex agents-brivudine, vidarabin and
acyclovir. Anti-influeza agents-oseltamivir(tamiflu).
3.6Antiprotozoal agents: Amoebicides-metranidazole and tinidazole. Antimalarialschloroquine,primaquine, mefloquine, quinacrine and proguanil. Anthelmintics piperazines
and benzimidazoles. Miscellaneous-eflornithine and pentamidine.
Synthesis of the following drugs: ampicillin, cephalexin, chloramphenicol, sulphamethoxazole, dapsone, trimethoprim, ethambutol, griseofulvin, clotrimazole, acyclovir, metranidazole, primaquine, mebendazole.

Module IV: Antineoplastic Drugs (10 Hrs)
4.1 Neoplasm-cause therapeutic approaches. Alkylating agents-nitrogen mustards, nitrosourea, aziridines and aryl sulphonates. Antimetabolites-folic acid. Antagonists-purine and pyrimidine antagonists. Antibiotics-anthracyclines, actinomycinD, bleomycin. Plant products-vinca alkaloids, taxol derivatives. Hormones and their antagonists-tamoxifen. Miscellaneos-procarbazine, cisplatin.
4.2 Synthesis of the following drugs: chlorambucil, carmustin, thiotepa, methotrexate,
5-fluoro uracil, procarbazine.

Module V Psychopharmocological Agents (5 Hrs)
5.1 Tranquilisers: rauwolfia alkaloids, meprobamate, oxazepim, benzodiazepines, chlordiazepoxide, phenothiazene derivatives.

5.2 Antidepressants: MAO inhibitors-Isocarboxazide, tranylcypromine and phenelzine. Tricyclic compounds-imipramine, trimipramine, amitriptynine, doxepine, amoxapine. Miscellaneous compounds-fluoxetine and trazodone.

5.3 Antipsychotics: phenothiazine and thiothine derivatives, butyrophenoneshaloperidol,
droperidon, rauwolfia alkaloids.
5.4 Hallucinogens: triptaminederivatives-DMT, psilocybin, phenylalkylaminesmescaline,
lysergic acid derivatives-LSD.
5.5 Synthesis of the following drugs: chlordiazepoxide, meprobamate, imipramine chlorpromazine, tranylcypromine and haloperidol.

ModuleV I Miscellaneous class of compounds (10 Hrs)
6.1 Diuretics: common diuretics and their mechanism of action-mercurial and nonmercurial diuretics, carbonic anhydrase inhibitors- acetazolamide and methazolamide, thiazide derivatives-hydrochlorothiazide, Loop diureticsfurosemide and ethacrynic acid, potassium sparing diuretics-amiloride,
spironolactone.
6.2 Antihistaminic drugs: histamine and its biological role, H1 antagonistsaminoalkyl
ethers, diphenhydramine and doxylamine, ethylenediamine
derivatives-pyrilamine, phenothiazines-promethazine, trimeprazine, piperazine derivatives-cyclizines, miscellaneous compounds-cetrizine and cyproheptadine.
6.3 Hypogycemic agents: type 1 and type 2 diabetes, insulin, suphonyl ureastolbutamide,
acetohexamide and glibenclamide, biguanides-metformin,
thiazolidinediones-rosiglitazone.
6.4 Local anaesthetics: clinical application of local anaesthesia, coca and cocaine, hexylcaine, paraaminobenzoic acid derivative-benzocaine, procaine, tetracaine, chloroprocaine, anilides, lidocaine, etiodacaine and prilocaine.
6.5 Antitussives: centrally acting antitussives-opium alkaloids and synthetic substitutes-codaine, noscapine, pholcodine, ethylmorphine, dextromethorphan, Non narcotic antitussives-diphenhydramine, expectorants-terpin hydrate, guaicol and bromhexine.
6.6 Gastrointestinal drugs: purgatives-irritant, osmotic, bulk and lubricant purgatives,
Antacids-systemic and non systemic antacids, H2 antagonists-cimetidine and ranitidine, proton pump inhibitors-omeprazole and pantaprazole, digestants, carminatives and antidiarrheals.
6.7 Synthesis of the following drugs: acetazolamide, chlorthiazide furosemide, ethacrynic acid, amiloride, diphenhydramine, pyrilamine, promethazine, omeprazole, tolbutamide, phenformin, benzocaine, procaine lidocaine, dextromethorphan.

References
01. G.L. Patrick, Medicinal Chemistry, BIOS, 2001.
02. T. Nogrady, D.F. Weaver, Medicinal Chemistry, Oxford University Press, 2005.
03. W.O. Foye, T.L. Lemke, D.A. Williams, Principles of Medicinal Chemistry, 4th

Edn., Williams & Wilkins, 1995.
04. J.P. Remington, Remington's Pharmaceutical Sciences, Vol.13, 19th Edn., Mack,1990.
05. D. Sriram, P.Yogeswari, Medicinal Chemistry, Pearson Education India, 2010.
06. K.D. Tripathi, Essentials of medical Pharmacology, 6th Edn., Jaypee, 2008
07. L.S. Goodman, A. Gillman, The Pharmacological Basis of Therapeutics, 10th Edn., McGraw Hill, 2001.
08. S.S. Kadam, Principles of Medicinal Chemistry, Vol.I & II, Pragati Books, 2008.
09. A. Kar, Medicinal Chemistry, New Age International, 2007.
10. C.O. Wilson, J.M. Beale, J. Block, Textbook of Organic Medicinal and Pharmaceutical Chemistry, 12th Edn., Lippincott Williams.

SEMESTER V

Code: SDC5EV01

Health education and community pharmacy
Total Hours: 75; Credits:5 ; Hours/Week:5

Module I (15Hrs)

Concept of health-Definition of physical health, mental health, social health, spiritual health determinates of heath, indicators of health, concept of disease, natural history of diseases, the disease agents, concept of prevention of diseases.

Module II (15 Hrs)

Nutrition & health-Classification of foods, requirements, diseases induced due to deficiency of proteins, vitamins, & minerals-treatment & prevention. Demography & family planning – Demography cycle, fertility, family planning, contraceptive methods, behavioral methods, natural family planning method, chemical method, mechanical methods, hormonal contraceptives, population problem of India.

Module III (25 Hrs)

First aid-Emergency treatment in shock, snake-bite, burns, poisoning, heart disease, fractures & resuscitation methods. Elements of minor surgery & dressings. Environment & health-Sources of water supply, water pollution, purification of water, health & air, noise, light-solid waste disposal & control medical entomology, arthropod borne disease & their control, rodents, animals & diseases. Fundamental principles of microbiology – Classification of microbes, isolation, techniques of organisms of common diseases. Communicable diseases-Causative agents, mode of transmission & prevention. a. Respiratory infections- Chicken pox, measles, influenca, diphtheria, whooping cough & tuberculosis. b. Intestinal infections: Poliomyelitis, Malaria, Filariasis.

c. Arthropod borne infections-Plague, Malaris, Filariasis. d. Surface infections-Rabies, Thachoma, Tetanus, Laprosy. e. Sexually transmit ion diseases-Syphilis, Conorrhoea, AIDS. 8. Non-communicable diseases-Causative agents, prevention, care & control. Cancer, Diabetes, Blindness, Cardiovascular diseases.

Module IV (20 Hrs)

Epidemiology-Its scope, methods, uses, dynamics of disease transmission. Immunity & immunizations Immunological products & their does schedule. Principles of disease control & prevention, hospital acquired infection, prevention & control. Disinfection, types of disinfection procedures, for faeces, urine, cu room, liron,deadbodies,instruments.

SEMESTER V

Code: SDC5EV02

Introduction to Pharmacognosy

Total Hours: 75; Credits:5 ; Hours/Week:5

Module I

Introduction to Pharmacognosy (10 Hrs)

Definition, scope, history and development of Pharmacognosy, Introduction to secondary metabolites Definition & Classification.

Module II

Plant tissue & Morphology (10 Hrs)

Plan tissue of simple and complex and tissue system, morphology of root, stem, bark, wood, leaf, flower, fruit and seed, modification of root, stem and leaf, histology of root, stem and leaf.

Module III

Plant taxonomy (10 Hrs)

Study of the following families with special reference to medicinally important plants – Malvaccae, Apocynaceac, solanaceae, Leguminosae, Rubiaceae.

Module IV

Study of drugs containing resins combinations: (10 Hrs)

Introduction, classification, general properties, chemical tests of resins. Pharmacognostic Studies of the following resin containing drugs: Colophony, Podophyllum, Jalap, Cannabis, Capsicus, myrrh, Asafoetida, balsam of Tolu, balsam of Peru, Benzoin, turmeric and Ginger.

Module V

Study of tannins and tannin containing drugs: (5 Hrs)

Introduction, classification, general properties, chemical tests. Drugs: Black catechu, pale catechu and Myrobalans.

Module VI:

Study of Volatile oil containing drugs: (10 Hrs)

Introduction, classification, general properties, chemical tests and general methods of obtaining volatile oils from plants. Pharmacognostic studies of the following drugs, containing volatile oils: Mentha, coriander, carway, dill, fennel, cinnamon, lemon peel, lemon grass, clove, nutmeg, eucalyptus, chenopodium, cardamom, valerian, sandalwood.

Module VII

Basic idea of extraction, isolation and separation of active constituents from medicinal plants and Phytochemical Screning: (20 Hrs)

Basic principle of extraction. The factors which may affect the extraction process. Different type of extracts and their preparations. The comparative studies of different methods employed for extraction of phytoconstituents. Phyto chemical screening of alkaloids, saponins,cardenolides, bufadienolides, flavonoids, tannins, anthraquinones, cyanogenetic glycosides and amino acids in different extracts.

Recommended books for the syllabi are:

1. Pharmacognosy: C.k. kokate, A.p. purohit, S.b. gokhale, Nirali prakashan, Pune, 39th edition, 2007.
2. Pharmacognosy and pharmacobiotechnology, Ashutosh Kar, New Age International Pvt. Ltd. Publishers, 2nd edition,2007.
3. A Text Book of Pharmacognosy: C.S Shah, J.S Quadry, B.S Shah Prakashan, Ahemedabad,8th edition, 1990.
4. Trease and Evan's Pharmacognosy: W.C Evans, W.B. Saunders Co, Singapore, 15th edition 2008.

Reference Books:

1. Pharmacognosy and phytochemistry, part I and II, Vinod D. Rangari, Carrier Publications, 1st edition, Reprint, 2007.
2. Pharmacognosy V.E. Tylar, L.R. Brady, J.E. Habbers, Lea and Febgir Philadelphia, 8th edition, 1981.
3. Cultivation and utilization of Aromatic Plants,handa S.S and Kaul ,M.K, regional Research Laboratory, Jammu, 1st edition,1997.
4. Mukherji P.K, Quality control of Herbal Drugs, Busines Horizon Pharma, Publishers,1st edition,2002.
5. Herbal drug technology,S.S. Agrawal and M.Paridhavi, Universities Press, 1st edition,2007.
6. Essentials of Pharmacognosy, S.H Ansari, Birla Publications Pvt. Ltd, 1st edition,2005-2006.
7. Microscopic profile of powdered drugs used in Indian systems of medicine, Malti G.Chauhan and Pillai APG, volume I, left drugs, 2005, Gujarat Ayurved University, Jamnagar.

SEMESTER V

Code: SDC5MC02 (P)

Medicinal Chemistry (P)
Total Hours: 75; Credits:5 ; Hours/Week:5

1. Synthesis of some typical organic medicinal compounds, spectral illustration of the intermediates and products formed:

- paracetamol,
- sulphanilamide,
- hippuran,
- benzocaine,
- clofibrate,
- mercurochrome,
- phenytoin,
- dapsone,
- diodoquin,
- antipyrine,
- aminacrine and
- phenobarbitone.

2.Preparation, assay including limit tests prescribed in the IP/BP of the following drugs: sodium salicylate, calcium lactate, yellow mercuric oxide, ferrous fumarate, ferric ammonium citrate, potassium antimony citrate, boric acid, light magnesium carbonate, and sodium citrate.

3 . Assay, test for identity and purity of the following synthetic drugs: aspirin, paracetamol, analgin, sulphadiazine (or any other sulphonamide), isoniazide, benzyl benzoate, piperazine, chloropromazine hydrochloride, diethyl carbamazine citrate, oxyphenbutazone, phenytoin sodium, ibuprofen, hexamine, tolbutamide and gamma benzene hexachloride.

4. Analysis of official drugs using common analytical techniques.
5. Assay of Antibiotics. Chemical Assay of Benzyl Pencillin
6. Assay of Vitamins: ascorbic acid, acetomenaphthone, niacinamide, pyridoxine and thiamine.

- To perform assay of Mefenemic acid as per IP’2007. 13
- To perform assay of Calcium gluconate injection as per IP 2007.
- To perform the assay of Isoniazide table as per IP’96
- To find out content of active ingredient of Metformine tablet as per IP’2007.13
- To perform the assay of active ingredient for Riboflavin as per IP’2007.13

SEMESTER V

Code: SDC5PH02 (P)

Pharmaceutics Practical-IV
Total Hours: 75; Credits:5 ; Hours/Week:5

1. **Macroscopic evaluation of crude drugs:-** Identification of crude drugs listed in theory (entire and broken condition) by Morphological characters- plant identification active principles, medicinal properties.
2. Microscopic examination of and identification of the powders of the following crude drugs:- clove, Ginger, Nux vomica, Cumin, cardamom Liquuorice Ashoka Cinamon Vasaka and Nutmeg

3. Qualitative analysis of crude plant extract :- Qualitative analysis of crude plant extract to detect the presence of phytochemicals - alkaloids, carbohydrates, glycosides,tannins ,flavanones and saponins.
4. Isolation phytochemicals from natural products- caffeine from tea,niccottin from tobacco,curcumin from turmeric,lycopene from tomato (not for Exam)
5. Analysis of fixed oils - Acid value ,saponification value,ester value etc.
6. Preparation of herbarium sheets.

SEMESTER VI

Code: SDC6INT03

Major Internship
Total Hours: 900; Credits:30

Objective

The major project should be carried out in the industry, not necessarily with industry partner. The major idea for internship is to implement the things learned and to get a real life experience. The Evaluation process follows 100% external assessment.

Short-term working experience in pharmaceutical companies will help students better understand the pharmaceutical industry, learn the process of drug discovery and development, and build a strong network with experts and fellows in the pharmaceutical field, which can positively contribute to future career development. In addition, it will help students to identify if they really enjoy working in industry and help them in choosing a future career after school.

UNIVERSITY OF CALICUT

B.VOC PHARMACEUTICAL CHEMISTRY

QUESTION BANK –THEORY

SEMESTER I-VI

GC1MT01 mathematics-I

Qusetion Bank and model question paper attached separetely

CHE1B01 THEORETICAL AND INORGANIC CHEMISTRY-I

PART A

MODULE 1

1.A ……..is a testable preposition that explains the occurrence of an observed phenomenon ,asserted as a supposition to guide further investigation.

2. A well –substantiated explanation of a scientific hypothesis is called a …….

3. A concise scientific statement which an empirical generalization of a principle that has passed every conceivable test is called a scientific……..

4. That collection of data and information about a phenomenon through scientists senses or by using scientific instruments or experimental methods is known as scientific…….

5. A physical, mathematical or logical analogy that represents a system entity, phenomenon, theory, law or process and thereby aids explanation is called a ……in science.

6. A ……in science corresponds to paradigm shift.

7. A medieval chemical philosophy in which the transmutation of base metals into gold was one of its objectives is called……

8. The first organic compound to be synthesized was……

9. The interdisciplinary area of science in which biological phenomena are analyzed in the terms of chemical principles is called ……..

10. A "research……" is the conceptual structure or framework within which research is planned to be conducted on the selected topic.

ANSWER KEY

1. Hypothesis
2. Theory
3. Law
4. Observation
5. Model
6. Revolution
7. Alchemy

8. Urea
9. Biochemistry
10. design

MODULE 2

1. Mass exactly equal to $(1/2)^{th}$ the mass of one ^{12}C atom is called an……..
2. The mass of Avogadro number of oxygen atom is …….kg.
3. ……..are atoms that have the same number of neutrons in their nuclei but different mass numbers.
4. The amount of a substance which contains as many particles or entities as there are atoms in exactly 12g of carbon-12 is called a ……
5. One gram molecular mass of any element or compound contains……molecules.
6. The volume occupied by one mole of a substance at a given temperature and pressure is called its ……at that temperature and pressure.
7. The …….. of an element is =atomic mass/valency
8. The ……of an element is a measure of its capacity to combine with other elements to form compounds.
9. Equivalent mass of an acid= molecular mass/…….
10. ……grams of helium (atomic mass = 4) gas occupies a volume of 44.818 dm^3 at 273.15 K and 1.01325 bar.
11. A process in which an atom, molecule or ion ……..one or more electrons is called oxidation.
12. In the reaction between sodium and chlorine [$2Na(s) + Cl_2(g) \rightarrow 2NaCl(s)$], the oxidizing agent is …….
13. The oxidation number of Cr in $Cr_2O_7^{2-}$ is ……
14. …….. of a solution is defined as the number of moles of the solute present per 1000g (or 1 kg) of the solvent.
15. 200g of a 5 % (w/w) aqueous solution of urea contains …….grams of urea.
16. Atoms that have the same mass number but different atomic numbers are called ……
17. The number of nucleons present in $^{23}_{11}Na$ atom is ……
18. Avogadro's number represents the number of atoms in …….. kg of ^{12}C.
19. The oxidation number of oxygen in OF_2 is ……

ANSWER KEY

1. Amu
2. 0.016
3. Isotones
4. Mole
5. 6.022×10^{23}(or Avogadro number)
6. Molar volume
7. Equivalent mass
8. Valency(or valence)
9. Basicity
10. 8

11. Loses
12. Chlorine
13. +6
14. Molality
15. 10
16. Isobars
17. 23
18. 0.012
19. 20. +2

Module III

1) A source or situation that poses danger to property , to the environment or to the life ,health and well being of human and other4 organism is referred to as .....
2) An information bulletin of a chemical that describes the properties , hazards ,precautions for safe handling ,emergency and first aid procedures , and control measures is called a .....
3) Portion of skin effected by acid burn should immediatlely be flushed with lots of .....
4) Systems involving volatile or flammable or toxic or odorous contents or products should be heated in a .....
5) The active mechanism involved in its function of silica gel as desicant is .....
6) Hazards codes and associatd phrases used toindicate the nature of special risks attributed to dangerous substances and preparations are called .....
7) Concordance between the observed value of adetermination and the true or most probable value is termed .....
8) The ratio of the absolute error in a determination to the most probable value of the quantity measured is called .....
9) Eriochrome black T is used as an indicator in .....titrations
10) ..... of an apparatus or instrument involves the correlation of its reading with that of a standard .
11) The number of significant figures in a value reported as 4.0780 g is .....
12) The square of standard deviation is called .....
13) An indicator that can be used in weak acid-strong base titration is .....
14) N-phenylanthranilic acid is an example for a....indicator
15) The legand denticity of EDTA is .....
16) A pure compound from which a standard solution can be prepared by direct weighing followed by required dilution is called a ..... standard .
17) Permanganometry and dichrometry fall in the general class called .....titrimetry .
18) Titration of iodine liberated from a chemical reaction with a reducing agent is called an .....titration .
19) ..... solution is normally used as the indicator in iodometric titrations .
20) Fluorescein act as a/an .....indicator in the titration of chloride ions with silver nitrite

SECTION A : KEY

1) Hazard
2) Material safety data sheet or MSDS
3) Water

4) Fume hood
5) Adsorption
6) R phrases
7) Accuracy
8) Relative error
9) Complexometric or EDTA
10) Calibration
11) Five
12) Variance
13) Phenolphthalein
14) Redox
15) 6
16) Primary
17) Redox
18) Iodometric
19) Starch
20) Adsorption

SECTION A

1) The phenomenon of ejection of electrons from the surface of a metal when light of a suitable frequency falls on it is called .....
2) The lines of a balmer series of the hydrogen spectrum arise from the electronic transition from higher energy level to the ..... level
3) The energies of two radiation with wave length 6000 Å and 2000 Å are in the ratio .....
4) The phenomenon of diffraction of light can be explain on the basis of the ..... nature of light
5) If the energy and momentum of a photon are 'E ' and 'P' respectively ,the velocity of the photon is .....
6) The concept of wave particle duality of matter was first proposed by .....
7) Light consist of particles called .....
8) Wave nature of electron was verified by ..... experiments
9) The phenomenon interference can be explained on the basis of ..... nature of light
10) The phenomenon of photo electric effect establishes the ..... nature of light

SECTION A : KEY

1) Photo electric effect
2) Second
3) 1:3
4) Wave
5) E/P
6) De Broglie
7) Photons
8) Momentum (or velocity)

9) Wave
10) Particle

PART B

MODULE I

1. Give a reasonable explanation of the term science.
2. Explain what is meant by scientific knowledge.
3. Explain what is meant by the term pseudoscience with examples.
4. What are known as sciences.
5. Give two examples each for behavioural sciences and sciences.
6. What are earth sciences?
7. Explain the term biological sciences.
8. Explain the term scientific statement with examples.
9. What does it mean when it is said that a scientific statement should be falsifiable?
10. "Apples sold at that shop are tastier than the mangoes sold there". Is this scientific statement? Justify your answer.
11. What does the term empirical approach mean in science?
12. Name the two ways in which empiricism is approached in science.
13. What does the method of induction mean in science?
14. What does the method of deduction mean in science?
15. Give a definition for the term scientific observation.
16. What is meant by scientific hypothesis?
17. Any scientific hypothesis is falsifiable. What does the statement mean?
18. What is meant by scientific theory?
19. How does a scientific hypothesis differ from a scientific theory?
20. Falsifiability is an important characteristics of a scientific theory. Explain this statement.
21. What is scientific law?
22. Explain the falsifiability characteristic of a scientific law.
23. Mention two common characteristics of a scientific theory and scientific law.
24. Mention one important feature in which a scientific theory is different from a scientific law.
25. Explain the term scientific concept.
26. Explain what the term model means in science.
27. What is meant by revolution in science?

28. Name two interdisciplinary areas involving chemistry and physics, and two involving chemistry and biology.
29. What is chemistry called the central science?
30. What does the term alchemy mean?
31. Name four branches of chemistry.
32. What is scientific research?
33. What are the main objectives of scientific research?
34. What is meant by research design?
35. Name the important components of a research project report.

MODULE II

1. What is meant by chemical symbol of an element? What is the symbol for an element with atomic number 117 according to the IUPAC system?
2. Define atomic number and mass number of an atom.
3. How many electrons, protons and neutrons are there in the U-238 atom?
4. What are isotopes? Explain with examples.
5. What are isobars? Explain with a pair of isobars.
6. Explain the term isotones.
7. Define the term atomic mass and gram atomic mass. What does the term amu means?
8. Define the term molecular mass. What is meant by gram molecular mass?
9. Define mole. What is the relationship between the mass of a sample of a substance and the number of moles present in it?
10. Define Avogadro's number. What is its value?
11. What is meant by the term molar mass?
12. Define valency of an element. What is meant by variable valency?
13. Define the term equivalent mass of an element. What is the relationship between the atomic mass and equivalent mass of an element?
14. Define equivalent mass of an acid. How is the equivalent mass of an acid related to its molecular mass?
15. Define equivalent mass of a base. How is the equivalent mass of a base related to its molecular mass?
16. Define equivalent mass of a salt. What is the equivalent mass of NaCl?
17. Explain the term equivalent mass of an oxidant with suitable examples.
18. Explain equivalent mass of a reductant with suitable examples.
19. Define oxidation and reduction in terms of electronic concept.
20. Define oxidizing and reducing agent as per the electronic concept.
21. Define oxidation number.
22. Define oxidation and reduction in terms of oxidation number concept.
23. Define oxidizing and reducing agent as per the oxidation number concept.
24. Identify the oxidant and reductant in the reaction;

$$2KMnO_4 + 3H_2SO_4 + 5H_2C_2O_4 \rightarrow K_2SO_4 + 2MnSO_4 + 8H_2O + 10CO_2$$

25. What is meant by redox reaction? Give examples.
26. Define molarity of a solution. Also define milli molarity
27. Define normality. Calculate the normality of solution containing 20g of NaOH IN 2

L.

28. Define molality. What is the expression of the molality of a solution that contains w_2 g of non – volatile solute of molecular mass M_2 in w_1 g of a volatile solvent?
29. Define mole fraction of a component in a solution. How does it depend upon the temperature?
30. Define the term mass fraction. How is it related to mass percentage and ppm.

MODULE III

1) what is hazard ?
2) " chemicals should be stored such that incompatible chemicals are separated '' . Justify the statement .
3) Mention two important points with regard to safe storage and safe handling of laboratory chemicals .
4) What is the correct procedure for diluting a concentrated acid ?
5) What is the first step of first aid when parts of skin or eyes come in to contact with a hazardous chemical?
6) Mention the first aid that should be administered for a minor cut by glass .
7) What first aid would you administer to a person who has suffered a major cut from a glass apparatus ?
8) Is it advisable to apply alkali to a portio of body that has suffered a burn from acid contact ? why?
9) Suggest the first aid for a victim who has suffered a chemical burn from an acid or alkali.
10) What is the first aid for a minor heat burn ?
11) What is the step to be taken when phenol comes in to skin contact
12) What is to be done when bromine comes in to skin contact
13) What first aid should be given to a person who has inhaled a hazardous gas in the laboratory ?
14) Explain the procedure for disposal of sodium that has spilled in the laboratory .
15) What is desiccant ? Give an example
16) How does anhydrous calcium chloride function as a desiccant ?
17) Explain the action of silica gel as a desiccant
18) What is the significance of the indicating type of silica gel with regard to its use as desicant ?
19) Explain the term MSDS ?
20) What is an R phrase ?
21) What are S phrases ?
22) What is the simplest method to ensure eye safety in a chemical laboratory ?
23) What is the purpose of fume cupboards in a laboratory ?
24) Describe the symbols used for(a) poisonous material alert and (b) compressed gas alert ,without drawing them .
25) What does the pictograms depicting (a)a flame over a circle and (b) exploding bomb indicate ?

26) Which laboratory safety sign depict (a) an exclamatory mark and (b) leafless tree and dead fish?
27) What is meant by a standard solution ?
28) What is primary standard in volumetric analysis ?
29) Which substance are called secondary standard in titrimetry?
30) Distinguish between acidimetry and alkalimetry .
31) Name three indicators used in acid-base titrations .Indicate th pH range over which they change colour .
32) Which indicator can be used in the titration of
    i) weak base and strong acid
    ii) **strong base and** week acid
    iii) strong acid and strong base
33) what are redox titration ? give example ?
34) what is meant by permanganometry
35) How is end-point detected in permanganometric titration ? why?
36) What is redox indicator? Give an example?
37) How does N-phenylanthranilic acid function as an indicator in the titration of ferrous iron against dichromate ?
38) Name two metal ion indicators
39) Give the structural formula of EDTA . What is the important use ?
40) Name an adsorption indicator
41) How many significant digits are there in each of the following reported value ; (a) 5400 mL (b) 0.00086 g ?
42) Explain the term accuracy with regard to an analytical result .
43) Explain the term precision with respect to analytical determination ?
44) Discuss the meaning of the term most probable value related to an analytical result .
45) What do the terms absolute error and relative error mean with regard to an analytical determination ?
46) Define the terms ‘mean ’ and ‘median ’ with regard to a number of analytical measurements .
47) Give the expression for standard deviation for replicate measurements on sample in an analytical determination .

MODULE IV

1) Mention one important point if failure of classical physics .
2) What is planck’s quantum hypothesis ?
3) What is photo electric effect
4) Give any limitations of bhor theory
5) Calculate the wave length of spectral line in the balmer series if n2 =3
6) Calculate the wave length of spectral line obtained in the lyman series if the electron in the hydrogen atom has been excited to the 3 rd energy level
7) Mention the important limitation that the Rutherford atom model was supposed to have immediately after its proposition
8) What is meant by quantisation of angular momentum of an electron postulated in bhors theory

9) Give the expression for the radius of bhor orbit as well as the velocity and energy of an electron in a hydrogen atom ,explaining the terms involved
10) Give two postulates of Daltons atomic theory

MODULE V

1.What are nuclear forece. Different type of force

2.explain mass effect

3. isotopes with ex

4. nuclear fission,name two nuclear undergoing fission

PART C
MODULE I

1. Logically differentiate between the term science and pseudo science.
2. Discuss the term scientific term with suitable examples.
3. What is scientific statement? What are the criteria for a good scientific statement?
4. Explain the term scientific observation and its role in science.
5. Discuss the empirical approach adopted in the methods of science.
6. Distinguish between the scientific methods of induction and deduction.
7. Name the sequential steps of the scientific methods of research.
8. Discuss the significance of observation in the scientific methods.
9. Explain and discuss the criteria for a scientific hypothesis.
10. Discuss the modes generally adopted for generating a scientific hypothesis.
11. Explain the general steps involved in the experimentation aspect of the scientific method.
12. What are the characteristics of well –designed scientific experiment?
13. What is meant by a scientific theory? Explain the characteristics of a scientific theory.
14. Differentiate between a scientific theory and scientific law.
15. Write a short note on revision of scientific theories and laws.
16. Differentiate between the terms scientific evidence and a scientific proof.
17. Explain the term concepts and the role of concepts in science.
18. What is a scientific model? Discuss the role of models in science.
19. Discuss the various aspects of the scientific revolution.
20. Write a short note on alchemy.
21. Discuss the interdisciplinary areas involving chemistry and physics.
22. Write a short note on interdisciplinary areas involving chemistry and biology.
23. Explain the different branches of chemistry.
24. Write an account of the scope of chemistry.
25. What are the main objectives of chemical research?

26. Write a note on the essential steps involved in chemical research.

MODULE 2
PART C

1. Explain the terms atomic number and mass number with a suitable example.
2. Distinguish between the terms isotopes, isobars, and isotones.
3. Briefly explain the concept of relative atomic mass.
4. Define the terms atomic mass, molecular mass and atomic mass unit on the basis of C – 12 standard.
5. Define the terms mole and Avogadro number. How many moles of magnesium and chloride ions will constitute 1 mole of magnesium chloride?
6. Distinguish between the terms valency and oxidation number.
7. Explain the electronic concept of oxidation and reduction.
8. Define the term oxidation number. Explain the oxidation number concept of oxidation and reduction.
9. Explain the terms oxidant and reductant on the basis of the oxidation number concept.
10. Distinguish between the terms molarity, normality and molality.
11. Define the terms mass fraction and mole fraction of a component in a solution. How are these affected by a temperature change?
12. Name a) 3 concentration terms which are temperature dependent, and b) 3 concentration terms which are temperature independent.
13. Calculate the numbers of electrons, protons and neutrons $^{238}_{92}U$ in atom.
14. The atomic number and mass number of calcium atom are 20 and 40 respectively. Calculate the numbers of electrons, protons and neutrons in Ca^{2+} ion.
15. The atom of an element contains 11 electrons. Its nucleus has 12 neutrons. Give the symbol of the above isotope.
16. Calculate the numbers of electrons, protons and neutrons present in 19.5g of $^{30}_{19}K$.
17. Neon consist of three naturally occurring isotopes, ^{20}Ne, $^{21}Ne$and ^{22}Ne, their percentage abundances in nature being 90.51, 0.27 and 9.22 respectively. Calculate the average atomic mass of neon?
18. Nitrogen has two isotopes: ^{14}N and ^{15}N. The average atomic mass of nitrogen is 14.0067 u. what are the % abundances of the two isotopes in natural nitrogen?
19. Calculate the number of atoms present in:a) 10g of oxygen; b)0.14 g of nitrogen ; c)0.006g of carbon ; d)0.08g of helium ; e)1.15g of sodium ; f)5.6L of hydrogen at STP .(Atomic masses: O=16 ; N=14 ; C=12 ; He=4 ; Na=23 ; H=1)
20. Calculate the number of molecules present in : a)16 g of oxygen; b)0.028 g of nitrogen; c)0.22g of carbon dioxide; d)0.034 g of ammonia; e)0.15 g of nitric oxide(NO); f)2800 ml of CO at STP. (Atomic masses O =16; N =14; C =12; H =1)
21. Calculate the number of moles of molecules present in a)0.22 g of carbon dioxide; b) 4.6 g of nitrogen dioxide(NO_2) ; C)1.6×10^{-6} g of oxygen ; d)5600ml of sulphur dioxide at STP (Atomic masses: C =12; O =16; N =14; S =32)

MODULE III

1) State the important aspect to be considered with regard to safe storage of laboratory chemicals .
2) What are the rules to be followed while handling chemicals?
3) Explain the first aid to be administered to a victim of electric shock
4) Explain the first aid procedures when a person suffers (a)skin contact and (b)eye contact with an acid or alkali
5) Write a note on the first aid steps should be administered to a victim of heat burn
6) What are the first aid treatment for a person who suffers (a) skin contact and (b) eye contact with phenol ?
7) What first aid would you administered to a person who has sufferd (a) skin contact and(b) eye contact with bromine ?
8) Explain procedure for disposal of sodium that has spilled in the laboratory
9) Write a note on the disposal of waste sodium metal
10) Explain the steps to dispose of the mercury spilt on the laboratory floor
11) Explain the use of anhydrous calcium chloride in laboratory desiccator
12) Write a short note on the function of silica gel as a desiccant in desiccator
13) Explain the significance of material safety data sheets of chemicals
14) Explain what the term 'R' phrases means with simple examples
15) Mention some of the important good practices to maintain laboratory hygiene
16) Explain the significance of 's' phrases on the MSDSs of chemicals
17) Write ashort note on laboratory safety practices
18) " carry out dilution of an acid by adding acid carefully to water " .Explain this statement
19) Justify the following statement ;(a) never resort to mouth-suction to fill a pipette ;(b) avoid wearing gold jewellery while involved in an experiment dealing with mercury metal .
20) Write a short note on laboratory safety signs with suitable examples .(A pictorial representation of any sign is not expected).
21) Distinguish between primary and secondary standards as applied to volumetry
22) What are the characteristic that a primary standard should possess?
23) Give a brief account of acid-base titrations .
24) What are the theories of acid-base titrations ? explain one theory in detail
25) Discuss the ostwald 's theory of acid-base indicators
26) Explain the theory of acid-base indicatords with example s
27) Give a brief account of using potassium permanganate in titrimetry
28) Explain the term dichrometric titrations with suitable examples .
29) Explain how a redox indicator works
30) Discuss the principles of iodometric and iodimetric titrations
31) What are precipitation titrations ? Give an account of how they are carried out
32) Briefly explain the term argentometry with suitable examples .

33) Briefly explain how an adsorption indicator functions
34) What are complexometric titrations? Explain with special reference to EDTA titrations.
35) Explain the function of complexometric indicators
36) What are metal ion indicators? Explain their function with suitable examples
37) Explain the principle of double burette method used in titrimetry with suitable examples
38) What are the advantages of double burette method used in titrimetry over the conventional single burette method
39) Distinguish between accuracy and 'precision ' relating to analytical results
40) What do the terms 'absolute error ' mean with regard to analytical determinations ? the true value for the determinations? The true value for the determination of the NaOH in a given aqueos solutions of it is 4.012 g L^{-}1.The result reported by an experimentalist is found to be 3.982 g L^{-}1.Calculate the absolute er ror and relative percentage error .
41) Explain the term standard deviation with respect to analytical determinations
42) Calculate the mean and standard deviation in respect of the following measurements for the concentration of the lead in ppm found in replicate analysis of a sample of blood

    0.751 0.752 0.752 0.756 0.760

    MODULE IV
11) Explain Rutherfords model of atom
12) Summerise the essential aspects of planck's quantum theory
13) Give the important postulates of Bhor 's atomic theory
14) Give the postulates of Daltons atomic theory
15) Derive an expression for the radius of nth electron orbit in a hydrogen atom
16) Discuss atomic spectrum of hydrogen
17) Explain the difects of the Bhor's atom model
18) Write a note on essential features of planck's quantum theory
19) Explain the significance of Heisenberg uncertinity principle
20) Distinguish between matter wave and electromagnetic wave

PART D

MODULE I

1. Discuss the various aspects of the scientific method of research.
2. What is meant by a scientific hypothesis? What are the criteria which should be satisfied by a scientific hypothesis? Mention the important modes of hypothesis generation.
3. Explain the terms scientific hypotheses, theories and laws, highlighting the common and differentiating characteristics.

4. Explain the terms scientific concepts and scientific models and discuss their role in science.
5. Discuss on the topic of revolutions in science and technology.
6. Discuss the interdisciplinary areas involving chemistry and physics, and those involving chemistry and biology.
7. Discuss briefly the components of a research project report.

PART D

1. A) Define oxidation number. Discuss the oxidation number concept of oxidation and reduction. Explain the terms oxidant and reductant with an illustrative

   b) Identify the oxidant and reductant in each of the following reaction:

   i) $Zn + 10HNO_3 \rightarrow 4Zn(NO_3)_2 + NH_4NO_3 + 3H_2O$

   ii) $MnO_2 + 4HCl \rightarrow MnCl_2 + Cl_2 + 2H_2O$

   iii) $3H_2S + 2HNO_3 \rightarrow 2NO + 3S + 4H_2O$

   iv) $2Na + Cl_2 \rightarrow 2Na^+ + 2Cl^-$

2. a) Distinguish between the terms molarity and molality.

   b) (i) Calculate the molarity of a solution containing 18g of urea $[CO(NH_2)_2]$ in 1500ml of it. (ii) 200ml of water is added to 500ml of the above solution. What is the molarity of this diluted solution?

   [Use the molarity equation $M_1V_1=M_2V_2$ to calculate the molarity of the diluted solution]

MODULE III

1) Discuss the safe laboratory practices
2) Explain the simple first-aid procedure that have to be administered to victim if they suffer burns from heat ,acid ,alkali ,phenol and bromine .
3) Discuss the theory of acid base indicators
4) Explain the principle regarding the choice of suitable indicators in different acid base titrations
5) a)explain the action of dipheny amine as redox indicator

   b)which indicator can be used for titration of

   i)oxalic acid and KOH

   ii)Na2 Co3 and H2So4? Explain

6) a)explain the term permanganometry and dichrometry

   b)dicuss the role and function of redox indicators in dichrometric titrations

7) explain the principles behind the use of adsorption indicator.

MODULE IV

1) Explain the term blackbody and black body spectrum .discuss the salient features of planck's quantum theory
2) Derive expression for the radius of n th electron orbit i a hydrogen atom and for the velocity and energy of an electron revoving in it
3) Describe the gold foil experiment conducted by Rutherford and how it led to the proposal of his model of atom .describe Rutherford model of atom .mention its limitations.

CHE2B02 THEORETICAL AND INORGANIC CHEMISTRY-II

SECTION A

MODULE 1

1. A linear operation ($\hat{A}$) that satisfies the condition $\int ø_1^*(Aø_2)dt = \int ø_2 (A^ø_1)^*dt$ for a pair of functions $ø_1$ and $ø_2$ is called a ……operator
2. In the expression $A^ f(x) = cf(x)$, c is called …….
3. If a function ø is to be called a well behaved function, one of the conditions is that it should be……. Valued
4. A wave function ø satisfacting the condition $\int øø^*dt = 1$ is called to be …….
5. A 1s orbital has ……. Radial node (s)
6. The…….quantum number signifies the orbital angular momentum of electron in an atom.
7. A $2P_X$ orbital is ……. Shaped.
8. ∇^2 is called ……. Operator.
9. The wave function ø is called probability……..
10. To every observable in classical mechanics ,there corresponds a linear…… operator in quantum mechanics
11. The spatial distribution of an orbital is spherically symmetrical. The azimuthal quantum number value of an electron in it is …….
12. The radial electron probability for 1s orbital is ……..symmetrical.
13. The spin quantum number for an electron has permitted values, namely …… and …….
14. The $2p_x$, $2p_y$,and$2p_z$ Orbitals of an atom have identical shape , but they differ in their ……..
15. The energy of the electron in the 3d orbital is ……. Than that in the 4s orbital in the Sc atom.
16. The electronic configuration of the tritium atom is ……..
17. The maximum number of electrons that can be accommodated in a d-orbital is …….
18. Among the levels 4f, 6s, 5p and 5d of an atom, the one with the least energy is ……..
19. The presence of two unpaired electrons in the ground state configuration of carbon is in accordance with the rule called ……
20. The number of unpaired electron in the Cr atom Z=24 ……

21. The ground state electronic configuration of copper atom is …….
22. The magnetic quantum number value for the valence electron of potassium (Z=19) is……
23. The designation of a level with n=4and l=2 is …….
24. The azimuthal quantum number of an electron in a 5f orbital is……
25. The atom with electronic configuration [Ar]$3d^5 4s^2$is…….
26. The……quantum number specifies the shape of the orbital in which particular electron is present
27. The lowest energy state of an atom is called it's……..
28. Cr has Z=24 the ground state electronic configuration of Cr^{3+}ion is [Ar]……
29. The electronic configuration of the most electronegative element is ……
30. The number of unpaired electrons in Fe^{3+} is ……
31. The number of 3d electron in $Cu^{2+}$is ……
32. The element whose atom has the electronic structure 2, 8,13,2 is ……
33. The number of orbital present in the M –shell of an atom is …….
34. The magnetic quantum number of an electron is the 3s orbital is ……..
35. 'No two electrons in an atom can have the same set of four quantum numbers'. This rule is called ……

Answer key

1. Hermitian
2. Eigen value
3. Single
4. Normalized
5. Zero
6. Azimuthal
7. Dumb – bell
8. Laplacian
9. Amblitude
10. Hermitian
11. Zero
12. Spherically
13. +1/2 and -1/2
14. Orientations
15. Greater
16. $1s^1$
17. Two
18. 5p
19. Hund's rule
20. 6
21. $4s^1\ 3d^{10}$

22. Zero
23. 4d
24. 3
25. Mn
26. Azimuthal
27. Ground state
28. $3d^3$
29. $1s^2\ 2s^2\ 2p^5$
30. 5
31. 9
32. Mn
33. 9
34. 0
35. Pauli exclusion principle

MODULE 2

1. According to the modern periodic law, the physical and chemical properties of elements are periodic functions of their …….
2. Transition metals are…….block elements
3. The enthalpy change accompanying the removal of the most loosely bound electron from an isolated gaseous atom of an element is called it's ……
4. The halogen element having the highest electron affinity is …….
5. From left to right along a period, the metallic character of elements …….
6. In general, electro negativity …….. on moving from left to right along a period in the periodic table
7. In Pauling's scale, fluorine has an electro negativity value of …….
8. The s and p –block elements other than the noble gases, are collectively called …….
   Elements
9. The effect that results in a decrease in the force of attraction of the nucleus for an electron, caused by the presence of intervening electrons, called ……..
10. The radius of Cl^- ion is …….that of the Cl atom
11. The fifth period of the long form of the periodic table contains …….. elements
12. The d- block elements are also called ……. Elements
13. Alkaline earth metals are ……. Block elements
14. The most electronegative element is ……
15. Lanthanoids and catinoids are collectively known as ……. Elements
16. From the left to right along a period in the long form of the periodic table the atomic radius ……..
17. In general, from left to right along the second period in the long form of the periodic table, the electron gain enthalpy become …….. negative
18. The inner transition elements belong to the …….. block of the periodic table

19. Be shows diagonal relationship with ……
20. The radius of the Na atom is …….. than that of Na^+

Answer key

1. Atomic numbers
2. d
3. ionization enthalpy
4. Cl
5. Decrease
6. Increase
7. 4.0
8. Representative (normal)
9. Screening effect
10. Greater than
11. 18
12. Transition
13. S
14. Inner transition
15. Decrease
16. Fluorine
17. More
18. F
19. Al
20. greater

MODULE III

1. The state of hybridization in Be in BeF_2
2. The shape of BF_3 molecule is……..
3. The state of hybridization of N in NH_4^+ is ……..
4. In a symmetric molecular species having a central atom in the dsp^2hybridization state, the bond angle will be …….
5. The H-N-H bond angle in ammonia is ……
6. SF_6 molecule has ……shape
7. The bond angle in a simple molecule in which the central atom is sp^2 hybridized ……
8. The geometry of a molecule in which the central atom is in a state of sp^3d hybridization……
9. The state of hybridization of S in SF_6 is …….
10. The shape of BeF_2 molecule is….

11. The dipole moment of CCl_4 molecule

12. The number of equivalent Orbitals produced in sp^3 hybridization is ……..

13. The H-O-H bond angle in water molecule is…….

14. H_3O^+ has…… geometry

15. In PF_5 ,P is in the ……. Hybridized state

16. According to VSEPR theory, the shape of $Becl_2$ molecule is ……..

17. The number of sigma bonds in the ethane molecule is ……..

18. The shape of pcl_5 molecule is …….

19. An example for an inter halogen compound in which the central atom is in a state of Sp^3d^3 hybridization is ……..

20. One drawback of VB theory is that it cannot explain the ……. Of molecular O_2.

Answer key

1. Sp
2. Trigonal plannar
3. Sp^3
4. 90^0
5. 107^0
6. Octahedral
7. 120^0
8. Trigonal bipyramidal
9. Sp^3d^2
10. Linear
11. 0
12. 4
13. $104^0 27'$
14. Tetrahedral
15. Sp^3d
16. Linear
17. 5
18. Trigonal bipyramidal
19. IF_7
20. Paramagnatism

MODULE IV

1. When 2 atomic orbitals combine …….. molecular orbital's are formed
2. Maximum number of electrons that can be accommodated in a molecular orbital is ……
3. As compared to a bonding molecular orbital, the corresponding antibonding molecular orbital has a …….. energy
4. Orbital of equal energy are called ……. Orbitals
5. H_2^+has a bond length …….. than He_2^+ion
6. Bond length is ……. Proportional to bond order
7. If a molecule contains unpaired electrons its magnetic nature is ……..
8. The calculated bond order of $O_2^{2-}$is …….
9. A molecule is stable only if its bond order is …….
10. The bond order of N_2^+…… than that of N_2

Answer key

1. 2
2. 2
3. Higher
4. Degenerate
5. Less
6. inversely
7. Magnetic
8. 1.0
9. Positive
10. less

SECTION B

MODULE 1

1. Give the time-dependent and time-independent Schrodinger wave equations.
2. What are operators? Explain.
3. Explain the term Linear operator.
4. Explain the term Hermitian operator.
5. What is meant by a well-behaved wave function.
6. When a wave function said to be normalized?
7. Give the orthogonality condition with regard to two wave functions.
8. Write the Schrodinger wave equation. What is meant by normalization of a wave function?
9. What are (1) a well behaved wave function and (2) a normalized wave function?
10. Represent the energy levels and eigen function for the first two energy levels of an electron in a one-dimensional box.

11. Define the term 'orbital'
12. What designations are given to sublevels having (1) n=2;l=1,(2) n=4;l=3 and (3) n=3;l=2?
13. What are the n, l and m values for an electron in the $2p_x$ orbital?
14. What are the n, l and m values for an electron in the $3p_z$ orbital?
15. Write all the possible values of 'l' if n=4.
16. If l=2 for an electron, what are the permitted values of 'm'?
17. Is it possible for an electron in an atom to have a set of n, l, m and s with values 2,2,0 and +1/2 respectively? Explain your answer.
18. Explain whether the [n, l, m, s] set of [2,1,+2,+1/2] is possible or not for an electron in an atom
19. State and explain the Pauli exclusion principle.
20. State the aufbau principle. What is the aufbau order of energy levels?
21. State the Hund's rule of maximum multiplicity.
22. Write the electronic configuration of the elements with atomic numbers 17 and 25.
23. Write electronic configuration of Cu and Cr.
24. How many unpaired electrons are there in $Fe^{2+}$and Fe^{3+}
25. Copper (1) is diamagnetic whereas copper(2)is paramagnetic. why?
26. What are the n,l and m values for the outer most electron in the ground state of sodium atom?
27. Sketch the shapes of P_x, P_y,and P_z orbitals .
28. Give the angular distribution plots for the p orbitals .
29. Draw the radical probability distribution curve of 2s orbitals .

30.Give the quantum numbers of the electron in the highest energy level of sodium atom

Module II

1. State and explain the modern periodic law
2. Explain why elements having similar chemical properties fall in the same group of the periodic table
3. What is the basis of classification of elements in the modern periodic table?
4. What are d- block elements?
5. What are inner-transition elements? Why are they so named?
6. What are pseudo transition elements ? Why are they so named?
7. Why are noble gas inert?
8. How does the arrangement in the periodic table reflect the electronic arrangements of atom?
9. Explain the term diagonal relationship.
10. What are representative elements.
11. What is meant by the term screening effect of inner electrons?
12. Explain the terms atomic radius and covalent radius
13. Explain the variation of covalent radius along a period.
14. Why is a cation smaller than the neutral atom from which it is formed ?

15. Which is larger: Cl or Cl^-?Justify your answer.
16. Explain the variation of ionic radius down a group
17. Explain the term ionization enthalpy
18. Why is the second ionization enthalpy larger than the first?
19. Explain how the magnitude of screening effect of inner electrons affects ionization enthalpy
20. How does ionization enthalpy vary along a period?Explain
21. Explain the variation of first ionization enthalpy down a group.
22. Which has a higher first ionization enthalpy :nitrogen or oxygen?why?
23. Arrange the following atom in the increasing order of first ionization enthalpy:Li,Be,B. Explain your answer.
24. Among the atoms represented by the following electronic configuration ,which would have the lowest ionization enthalpy. $1s^2\ 2s^2\ 2p^6$;$1s^2 2s^2 2p^5$;$1s^2 2s^2 2p^6 3s^1$.Explain
25. Explain the term electron affinity.
26. How does electron affinity vary along a period?expain.
27. Explain the variation of electron affinity down a group.
28. Explain why the electron affinity of Be is negative .or explain why the electron gain enthalpy of Be is positive.
29. Why does F have a less negative electron gain enthalpy than Cl?or why does F have a lower electron affinity than Cl.
30. Define electronegativity .which element has the highest electronegativity value in the Pauling's scale and which has the lowest?
31. How does electronegativity vary along a period?explain the variation .
32. Explain the variations of electronegativity down a group .
33. Distinguish between the terms electronegativity and electron affinity .
34. Among the atoms represented by the following electronic configuration ,which would have the highest electron affinity. $1s^2\ 2s^2\ 2p^6$;$1s^2 2s^2 2p^6 3s^1$;$1s^2 2s^2 2p^6 3s^2$. Explain
35. Arrange the following atoms in the increasing order of electron affinity ;N,O,F,Cl.
36. Explain why the second ionization enthalpy of sodium is much greater than its first ionization enthalpy.
37. Explain the variations of atomic radius down a group of the periodic table .
38. Name a pair of elements showing diagonal relationship .
39. Explain why the first ionization enthalpy of B is less than that of Be.
40. The ionic radius of K+ is smaller than that of Cl- even though they are isoelectronic why?
41. Which has a higher ionization enthalpy –Mg or Al? Why ?
42. What will be effective nuclear charge felt by a 3d electron of Cr(atomic no:24)?
43. Calculate the effective nuclear charge experienced by the 4s electron of K(Z=19)
44. Calculate the effect nuclear charge felt by a 3p electron of chlorine (atomic no: 17).
45. Calculate the electronegativity of Al (Z=13) on Allred-Rochow scale,given its screening constant= 3.5 and covalent radius =1.25 A.

46. How does the polarizing power of cations vary along a period and down a group?
47. State how the polarizability of anions vary along a period and down a group.

MODULE III

1. What is an ionic bond? Explain with an example.
2. Define lattice energy.
4. What is meant by polarization of an ion?What is a covalent bond? Explain with an example.
5. What is a coordinate bond?
6. Predict the shape of BeF_2 molecule on the basis of the VSEPR theory.
7. What is the shape of BCl_3 molecule?
8. What are the H-N-H bond angles in the ammonium ion?
9. Illustrate how a coordinate bond is formed
10. What is a sigma bond?
11. How is a pi bond formed
12. Mention one difference between a sigma bond and a pi bond
13. What is meant by hybridization?
14. What are the geometries associated with (1) sp^3 hybridization and (2) sp hybridization?
15. What is the shape of an AB_5 type molecule in which the central atom is in a state of sp^3d hybridization
16. Name a molecule each in which the central atom is (1) sp^2 hybridized, and (2) sp^3d^2 hybridized
17. What is the shape IF_7 molecule
18. Why is PCl_5 a reactive molecule
19. Name a molecule which is described as having a T- shape. Mention the state of hybridization of the central atom in it.
20. What is meant by a polar covalent bond?
21. What is a dipole moment of CO_2? Why?
22. Does water have a zero and non zero polar moment? Why?
23. What is the state of hybridization of Be and $BeCl_2$ molecule and what is the shape of the molecule?
24. What is the state of hybridization of N in NH_4^+molecule and what is the H-N-H bond angle in the ion?
25. Name a molecule each in which the central atom is (1) sp^3 hybridized and (2) sp^3d hybridized.

MODULE IV

1. What is meant by bond order? How it is related to bond length and bond energy?
2. What is LCAO principle
3. What is a bonding molecular orbital
4. What is an anti-bonding molecular orbital
5. Give two differences between bonding molecular orbital and anti-bonding molecular

orbital

6. Explain the term 'bond order'. How is bond order related to bond strength?
7. Give the MO configurations and bond orders of H_2 and H_2^+.
8. Calculate the bond order of He_2^+ ion
9. Draw the molecular orbital diagram for He_2^+
10. Explain on the basis of molecular orbital theory why He_2 molecule does not exist
11. Calculate the bond order of F_2 molecule
12. How many electrons are present in (1) bonding Orbitals and(2) anti-bonding orbital in oxygen molecule
13. What is a sigma molecular orbital?
14. Which type of a MO can be referred as a ð MO
15. Mention the essential difference between a ó MO and a ð MO
16. Why are MOs referred to as polycentric orbital
17. Give the MO energy level diagram of the H_2 molecule. Calculate its bond order and predict its magnetic behavior
18. Write the MO configurations of B_2 and C_2 molecules
19. Write the MO configuration of B_2 molecule and account for the type of magnetic behavior shown by it
20. Explain the magnetic behavior of C_2on the basis of MO theory
21. How does MOT explain the paramagnetism of O_2
22. Explain the very high bond dissociation enthalpy of N_2 molecule on the basis of MOT
23. Calculate the bond order of O_2 molecule on the basis of MO configuration
24. The atomic number of F is 9. Write the MO electronic configuration of F_2 molecule and calculate its bond order
25. Write the MO configuration of CO molecule and calculate its bond order
26. Calculate the bond order of NO molecule from its MO configuration
27. Write the MO configuration of CO molecule and predict its magnetic behavior
28. Justify the magnetic behavior of NO molecule on the basis of its MO configuration
29. What are van der Waals forces? Name three types van der Waals force
30. Identify the major type of intermolecular forces present (1) in HCl and (2) in a system of HCl and benzene molecule
31. How do van der Waals forces depend upon temperature
32. How does the strength of intermolecular forces affect the boiling point of a liquid
33. What are dipole-dipole forces?
34. Which among the group 16 hydrides has the highest boiling point? Why?
35. Which has a lower density-ice or water? Explain
36. Explain why water shows anomalous variations of density between 0^0C and 4^0C
37. Why does water possess high specific heat and high heat of vaporization?
38. Name two types of organic compounds which show hydrogen bonding
39. Which has higher boiling point-o-nitro phenol or p-nitro phenol? Why?
40. Differentiate between intramolecular and intermolecular hydrogen bonding
41. How does the band theory explain the electrical conductivity of metals?
42. What explanation can you provide on the basis of band theory for the electrical

conductivity shown by alkaline earth metals?

43. Give the resonance structure of the borate ion?
44. Explain the resonance in carbonate ion?
45. How does resonance explain the equivalence of the three bonds in the nitrite ion?

SECTION C (PARAGRAPH)

MODULE I

1. What are Laplacian and Hamiltonian operators? Explain
2. Explain the terms eigenvalue and eigenfunction .
3. What are the conditions that a wave function must meet for it to be an acceptable wave function ?
4. Explain the significance ofwave function ø
5. What are the postulates of quantum mechanics?
6. Obtain an expression for the energy of a particle in a one –dimensional box. What is it's zero point energy?
7. Write down the Schrodinger wave equation of the H- atom in spherical polar coordinates. Indicate the origin of quantum numbers n, l and m from the above equation.
8. Explain the concept of orbitals.
9. Distinguish between the terms orbit and orbital
10. Give a diagrammatic representation of the s- orbital and the five d- orbitals
11. Give the angular distribution plots for the s- ,p- and d- orbitals
12. Draw the radial probability distribution curves of 2s and 2p orbitals
13. Discuss the Pauli exclusion principle
14. Explain the aufbau principle
15. Discuss the Hund's rule of maximum multiplicity with suitable illustrative example.
16. Explain the extra stability associated with half-filled and completely filled configuration
17. State the principles relevant in the filling up of atomic orbitals
18. Calculate the ground state energy of an electron confined in a one-dimensional box of length 0.2nm.(mass of electron $=9.1*10^{-31}$ kg ;h=$6.626*10^{-34}$Js).Also calculate its energy when it is in the n=4 level.
19. Explain the term degeneracy.
20. Discuss the need for approximation methods in the study of multi-electron systems.

MODULE II

1. Discuss the general chacteristics of the s-block elements
2. What are transition elements? Discuss their general characteristics .
3. Can the zinc group of elements be considered as transition elements?discuss their position in the periodic table

4. Discuss the merits of the long form of periodic table .
5. Discuss the general characteristic of the f block elements.
6. Discuss the variation of covalent radius along a period and down a group.
7. Define ionization enthalpy and electron affinity state how they generally vary down a group of a periodic table
8. Explain the irregularities observed in the variation of electron affinity along the second period.
9. Explain the terms screening effect and effective nuclear charge.
10. Discuss the factors influence the electro negativity of elements.
11. Discuss the general trend in the variation of electro negativity along a period and down a group.
12. Explain how the shielding effect of inner electrons influences the ionization enthalpy and electron affinity of an element .
13. Explain the variation of ionic radius for isoelectric ions along a period.
14. Arrange the following elements in the increasing order of their ionization enthalpies, giving proper explanation:B,C,N,O.
15. Distinguish between the terms electronegativity and electron affinity .Explain the variation of electronegativity along a period and down a group
16. Explain how electronegatives of elements are calculated on Mulliken scale and Allred –Rochow scale
17. Discuss the basic features of Pauling's scale o electronegativity
18. Give the Slater Rules for calculating the shielding constant. How is effective nuclear charge related to the screening constant.
19. Explain the term diagonal relationship .discuss with an example ,illustrating the similarities in properties.
20. Explain with an illustrative example the anomalous behaviour exhibited by the first element of a group.
21. Discuss the variations of electron affinity along a period
22. How does electron affinity vary down a group? Explain the variation
23. Explain the variation of the polarizing power of cations along a period and down a group
24. Explain how the polarizability of anions vary along a period and down a group

MODULE III

1. Give the Born-Lande equation and explain the terms
2. What are the factors which affect the lattice energy of an ionic compound?
3. What are the favourable conditions for the formation of an ionic compound?

5. Define the term lattice energy. What are the energy terms which make up lattice energy of an ionic compound?$AgCl_3$ is sparingly soluble in water while NaCl is soluble. Explain this from lattice energy consideration.

6. Define lattice energy. How does it influence the solubility and melting point of a substance?
7. State Fajan's rules
8. What are conditions which favour ion polarization?
9. Explain the formation of a coordinate covalent bond with a suitable example.
10. Mention three important differences between ionic and covalent compounds
11. What are the important postulates of VSEPR theory
12. Give the shapes of the following molecules on the basis of VSEPR theory
    1)BeF_2; 2)CH_4; 3)BF_3.
13. Explain the shapes of (1) ammonia molecule and (2) SF_6 on the basis of VSEPR theory
14. How does VSEPR theory explain the shape of $SnCl_2$ molecule in the gas phase
15. XeF_2 has a linear shape. How can you account for this on the basis of VSEPR theory?
16. Discuss the structure of XeF_4 on the basis of VSEPR theory
17. Account for the molecular shape of XeF_6 on the basis of VSEPR theory
18. What is the shape of BCl_3 molecule? Justify your answer on the basis of VSEPR theory
19. Name a phosphorous fluoride which has trigonal bipyramidal geometry. Explain the geometry on the basis of VSEPR theory
20. Water is a bent molecule with an H-O-H bond angle 104.5^0. How can you explain this on this basis of VSEPR theory
21. How does VSEPR theory explain the shape of SF_4 molecule
22. Predict argumentatively the shapes of (1)PCl_5 and (2) IF_7 on the basis of VSEPR theory
23. Discuss the shape of chlorine trifluoride on the basis of VSEPR theory
24. How can you account for the shape CCl_4 molecule on the basis of VSEPR theory
25. Distinguish between sigma and pi bonds
26. Depict the orbital overlap diagrams of O_2 and N_2.
27. What is meant by hybridization of atomic Orbitals? What is the type of hybridization of C in each of the following: (1) CCl_4; (2) C_2H_4?
28. Compare the bond length of C-C, C=C,C≡C.
29. What are the different types of hybridizations involving d Orbitals
30. What is the geometry of NH_3 molecule? How will you explain this geometry on the basis of hybridization?
31. The H-N-H bond angle is 107^0 though the state of hybridization of N is sp^3. Why?
32. Explain the shape of water molecule on the basis of orbital hybridization
33. Discuss the shape of sulphate ion on the basis of hybridization
34. How do you account for the shape of water molecule
35. The bond angle in H_2O is 104.5^0 while that of H_2S is 90^0. How will you account for this?
36. sp^3d hybridization does not give fully equivalent Orbitals. Explain
37. Why is the bond formed from a hybrid orbital stronger than that from a pure orbital?
38. Explain the hybridization present in PCl_5?
39. Represent the shapes of NH_3 and SF_6 molecule
40. In CH_4 as well as H_2O, the central atom is sp^3 hybridized. But the bond angle in the case of CH_4 is 109.5^0. How do you explain this?

41. Discuss the shape of IF_7 molecule on the basis of hybridization
42. How does the concept of hybridization explain the shape of CH_4 molecule
43. Explain the bonding in ethylene and the shape of the molecule on the basis of hybridization
44. How does the concept of hybridization explain the geometry of acetylene molecule
45. Discuss sp^3d^2 hybridization and the consequent geometry with an illustrative example
46. How can the shape of hydronium ion be explained on the basis of the concept hybridization
47. What is meant by dipole moment? What is the unit in which it is expressed?
48. Explain why NO_2+ is linear while NO_2 is angular?
49. How will you calculate the bond angle in water knowing the dipole moments of the two –OH bonds?
50. How can dipole moment studies help to differentiate between ortho, mete and para dichlorobenzene?
51. Of cis and trans 1,2-dichloroethenes which has zero dipole moment? Why?
52. State whether the molecule has zero or non-zero dipole moment in each of the following cases: (1) CF_4 (2) CH_3Cl (3) SF_6 (4) OF_2 (5) BeF_2 (6) XeF_2
53. How can you predict the ionic character of a bond?
54. Compare the ionic character of the C-X bond in alkyl halides
55. Mention the general characteristics of covalent compounds
56. Mention two limitations of VBT

MODULE IV

1. Discuss the LCAO principle
2. Distinguish between bonding and anti-bonding molecular Orbitals
3. Give the MO electronic configuration of B_2 and C_2 and compare the bond strength and bond lengths of these molecule
4. Give the MO diagram of B_2 and comment on (1) he stability and (2) magnetic behavior of the molecule
5. Write the MO electronic configuration of C_2 molecule and draw its MO energy diagram. Calculate the bond order and explain it magnetic behavior
6. What is the MO electronic configuration of N_2 molecule? Draw the MO energy diagram for the molecule. Comment on the bond strength and magnetic behavior of the species with proper explanation
7. Molecular nitrogen is diamagnetic while molecular oxygen is paramagnetic. Explain this on the basis of MOT
8. Compare the bond strength and bond lengths in respect of N_2 and O_2 molecule on the basis of Mot
9. Draw the MO energy diagram for CO molecule. Calculate the bond order and explain its stability and magnetic behavior
10. Discuss the MO energy diagram of NO molecule highlighting its bond order, stability and magnetic behavior

11. Compare the bond orders and stabilities of O_2, O_2^- and O_2^+
12. Compare the bond lengths of C-C,C=C and C≡C
13. Calculate the bond orders of B_2^+ and B_2^-
14. Which has a great bond order-NO or NO^+? explain
15. Explain on the basis of MOT why Ne_2 molecule does not exist. [atomic no of Ne is 10]
16. Draw the MO diagram of Li_2 molecule, calculate its bond order and explain its stability and magnetic behavior
17. Be_2 molecule does not exist; explain this on the basis of the MO diagram of Be_2
18. Describe the LCAO method of constructing molecular Orbitals. Sketch the molecular Orbitals formed by combination of 2s orbital and combination of 2p Orbitals
19. Explain how the concept of bond order is useful in predicting the stability of molecule
20. A) Apply MO theory to O_2 molecule. Work out its electronic configuration
    b) Explain how MO theory accounts for the paramagnetism of O_2
21. Discuss the characteristics of the different type of sigma molecular Orbitals
22. Discuss the characteristics of the different type of pi molecular Orbitals.
23. What are sigma molecular orbital? Illustrate the formation of the two type of sigma MOs with a suitable example.
24. What are pi molecular orbital? Illustrate the formation of the two type of pi MOs with a suitable example.
25. Justify using LCAO principle that the number of MOs formed equals the number of AOs taking part in combination.
26. What are the conditions for effective linear combination between atomic Orbitals? Explain
27. Compare the bond order and stability of 1) O_2; 2)O_2^-; 3)O_2^+.
28. Calculate the bond order of 1)B_2; 2)B_2^- 3)B_2^+.
29. What are isoelectronic species? Give examples of two ions or molecules isoelectronic with NO^+ ion
30. Draw the potential energy diagram showing MOs in B_2 Molecule discuss
31. The bond length of O_2^- is 0.121 nm while that of O_2 is 0.112nm explain
32. How are molecular Orbitals formed? Distinguish between MO and AO
33. Which are paramagnetic? a) He_2^+ b)NO c)NO^+ d)N_2^+ e)O_2^- f)B_2^+ g)B_2^- h)B_2
34. Which has greater bond dissociation energy O_2 or O_2^+? Why?
35. Distinguish between atomic Orbitals and molecular Orbitals?
36. Mention the features that distinguish bonding molecular Orbitals from anti bonding molecular Orbitals
37. Discuss the MO diagram of F_2molecule.

38. Draw the MO energy diagram of N_2 and calculate its bond order .comment on its stability and magnetic behavior.
39. Draw the MO energy diagram of CO and discuss.
40. Discuss the bonding stability and magnetic behavior of C_2 using its MO energy diagram.
41. Discuss the MO diagram of N O
42. Discuss the bonding in Li_2 on the basis of MOT.
43. Make a comparison of VB and MO theories
44. free electron theory of metallic bonding
45. How does VBT attempt to explain the nature of bonding in metals?
46. How does the band theory explain the electrical and thermal conductivities of metals
47. How can the band theory explain the behavior of conductors, insulators and semiconductors?
48. How does the electron gas theory explain metallic properties?
49. Explain the term van der Waals forces
50. Write a short note on ion-dipole forces
51. What are dipole-induced dipole forces? Explain
52. Explain the term induced dipole –induced dipole forces with suitable examples
53. Differentiate between induction and dispersion forces
54. Discuss the effect of hydrogen bonding on the physical properties of the substances
55. Write a short note on ion-induced dipole forces.

PART D

MODULE I

1. State and explain the postulates of quantum mechanics.
2. Set up the Schrodinger wave equation for a particle in a one-dimensional box , solve it and get expression for the energy of electron. Explain the term zero-point energy. Briefly explain one application of the particle-in-a-box model.
3. Explain the term radial distribution function and radial distribution curves. Draw the radial distribution curves for 1s, 2s and 2p orbitals of hydrogen atom.
4. What are quantum numbers? Discuss the significance of each quantum number.
5. Discuss with illustrative examples the rules that determine the ground state electronic configurations of atoms.
6. Derive the wave equation for a particle in 3- dimensional box applying the separation of variables method.

MODULE 2

1. a) What are the general features of the long firm of the periodic table b)Mention the defects of the long form
2. Discuss the classification of elements into a)different blocks and b)different types with regard to their position in the periodic table
3. A)Define ionization enthalpy and discuss factors that determine the ionization enthalpy of an element b)explain the variation of ionization

enthalpy along a period and down a group of the periodic table

4. Define electron gain enthalpy. Explain the factors that influence electron gain enthalpy of an element and discuss the variations of electron gain enthalpy along a period and down a group
5. Explain the term effective nuclear charge. Give the Slater's Rules and discuss their applications

MODULE III

1. What is Born-Haber cycle? Discuss with respect to NaCl
2. Write down the Born-Haber cycle for $BaCl_2$? What are the applications of Born-Haber cycle?
3. What are the applications of lattice energy measurements
4. a)Give that the sublimation energy of sodium metal is 108kJ mol^{-1}, heat of dissociation of Cl_2 is122kJ mol^{-1}, ionization energy of sodium is 496kJ mol^{-1} and electron affinity of chlorine is -349kJ mol^{-1}, calculate the lattice energy of NaCl
   (b) given that the lattice of NaCl is -775kJ mol^{-1} and the heat of solution of NaCl is +5kJ mol^{-1} ,calculate the $\Delta_{hyd} H^0$ of NaCl in water
5. What is meant by ion polarization? Discuss Fajan's rules.
6. Discuss the conditions which favour covalent character in ionic compounds.
7. State and explain the postulates of VSEPR theory. How can you apply the theory to predict the shapes of ammonia and water?
8. State the postulates of VSEPR theory. Apply the theory to predict the shape of ClF_3
9. Discuss the shapes of (1) SF_4 and (2) IF_5 on the basis of VSEPR theory
10. Discuss the structure of NH_3 and NH_4+ on the basis of hybridization and explain why the H-N-H bond angle in NH_4+ ion is 109.5^0 whereas that in NH_3 is only 107^0
11. How does VSEPR theory explain the shapes of XeF_2 and XeF_4 molecule?
12. What is meant by orbital hybridization? Explain the molecular geometries associated with sp^2 and sp^3 hybridizations with illustrative examples
13. What are the different type of hybridization involving s, p and d Orbitals? Give one example for each.
14. Applying the theory of hybridization, account for the variation in bond angles of methane, ammonia and water
15. Discuss the hybridization of the central atom S in SF_6 and SO_4^{2-}
16. Water molecule has a bent shape whereas H_3O^+ has a pyramidal shape. Discuss these on the basis of hybridization
17. Discuss how dipole moment studies are helpful in elucidating molecular structure

MODULE IV

1. a) MO theory explains bonding in O_2 molecule better than VB theory. Explain
   b) What are the criteria for the formation of MOs from atomic Orbitals?
2. discuss LCAO- MO approach to bonding in

1) Homonuclear diatomic molecule

2) Heteronuclear diatomic molecule

3. Give an account of MO theory of diatomic molecule taking N_2 molecule as an example.
4. Compare the bond length, magnetic behavior and bond energy of O_2,O_2^- ,O_2^+,O_2^{2-}, and O_2^{2+} on the basis of MOT.
5. Discuss the resonance structures of borate, carbonate and nitrate ions and comment on the bond energies of the bonds in each of them.
6. Discuss the free electron theory of metallic bonding and how it explains the metallic properties
7. What are the salient features of the band theory of metallic bonding? Explain the terms Fermi energy and Fermi level. How does the theory explain the electrical conductivity of metals?
8. Explain the term hydrogen bonding with special reference to the different kind of such bonding
9. Discuss the hydrogen bonding in water and explain the consequent unique properties of water.
10. Explain the different kinds of van der Waals forces that operate in substances

SDCIBC01 BIOCHEMISTRY

MODULE1

Part A

1. Simplest aminoacid is
2. If R = CH_2OH the aminoacid is called.
3. Charge of zwitter ion is
4. Glycine is an example for ……. Type Aminoacids
5. Example for sulfer side chain amino acids
6. Example for essential amino acids
7. Example for non essential aminoacids
8. Phenylalanine is an example for
9. Amino acids are linked by …….bonds
10. An aminoacid unit in a polypeptide is called
11. Linear sequence of amino acids in the polypeptide chain is
12. Cytochrome C contains …….number of residues
13. Helical structure of protein found in
14. The only alpha amino acid in which alpha carbon is not asymmetric carbon atom is A) glycine B)alanine C)serine D)cysteine
15. All protein amino acid is ……configuration
16. Which among the following is an aromatic amino acid
    A)glycine B) alanineC) phenyl alanine D)aspartic acid

17. …….amino acids are those physiologically important one which are not synthesized by the organism from other compound

A. essential B. Non essential C. half essential D.hetrocyclic

18. an ion containg both + and – charge is known as

A. non polar ion B. zwitter ion C. semi-polar ion D. internal ion

19. …… proteins are water soluble proteins whose peptide chains are looped twisted and tightly folded together into a spherical shape

A . fibrous B. globular C. simple D. conjugated

20. …….polynucleotides of very high molecular masses
A. nucleosides B. enzymes C. proteins D.nucleic acids

21. the process by which DNA molecule produce idetitical copies of themselves is called
    A. transcription B. translation C.replication D.mutation
22. which among the following bases is not commonly found in DNA
    A. uracil B. thymine c. Adenine D. cytosine
23. The catalytic activity of an enzyme is decreased by the presenceof certain substances called
    A.activaters B. promoters C. stimulators D. inhibitors

24.The amide linkage that binds adjacent amino acids is called ……

bond .

25.The destruction of the higher levels of structural organisation of protein molecules by physical means or by chemical agents is called ……..

Part A Answers

1. Glycine
2. Serine
3. 0
4. Aliphatoic side chain
5. Cysteine
6. Histidine
7. Alanine
8. Essential
9. Peptide
10. Residue
11. Linear structure
12. 104
13. Keratin of hair

Part B

1. What are peptides.
2. List out the essential amino acids.
3. Differentiate essential and non essential amino acids..
4. Define Zwitter ions.
5. Note on amphoteric property of amino acids.
6. What are amino acids.
7. Discuss general structure of amino acids.
8. Discuss the source and utilized of aminoacids in the body
9. What are essential amino acids ? Name two of them.

10. How are amino acids classified on an electrochemical basis?
11. Define : (i) isoelectric point (ii) zwitter ion .
12. Write down the structures of (i) tryptophan (ii) phenylalanine and (iii) glycine
13. What is mean by peptide linkage ?Give a colour tests for peptide linkage
14. Give two colour tests for proteins
15. Give three examples for neutral amino acids
16. Give one example each for (i) neutral amino acid (ii) acidic amino acid and (iii) basic amino acid .
17. What is meant by primary structure of a protein?
18. Give one example each for (i) essential amino acid, (ii) half – essential amino acid and (iii) basic amino acid
19. What is meant by primary structure of protein ?
20. Give one example each for (i) essential amino acid (ii) half – essential amino acid and (iii) non- essential amino acid
21. What is meant by secondary structure of a protein ?
22. What are the forces which stabilize the tertiary structure of a protein?
23. What are the factors which cause denaturation of a protein?
24. Write down the equation for the condensation of two amino acid molecules and show the peptide bond
25. Give one example each for (i) thioamino acid (ii) cyclic aminoacid and (iii) aromatic amino acid

Part C

1. Give a short note on metabolism of amino acids.
2. Enumerate the biological significance of proteins.
3. Discuss the secondary structure of protein.
4. Note on conjugated and derived proteins.
5. Discuss globular proteins.
6. Explain the types of protein structure.

Part D

1. Explain the types of protein structure.
2. Explain the classification of proteins.
3. Explain he following
   (a) Globular proteins (b) derived proteins.

Module 2

Part A

1 .Name the enzyme which are considered for biological oxidation and

reduction.

2. The enzyme act on peptide bonds.

3. example for simple enzyme

4. example for prosthetic groups

5. Example for coenzyme

6. enzyme-substrate complex is proposed by

7. Chymotripsin is an example for

8. In DNA, the sugar unit present is ……..

9.The pyrimidine base not commonly found in RNA is ……..

10. The nucleotide base sequence of DNA that specifies the amino acid sequence of proteins is known as ……..

11.The characteristic pH at which an enzyme shows maximum catalytic efficiency is called …….pH

12.The catalytic activity of an enzyme is increased by the presence of certain foreign substances generally called ……..

13.The set of chemical reactions by which large macromolecules of the cell are synthesized is called……..

14.The process of glycolysis is accompanied by tahe net generation of …….. ATP molecules per molecule of glucose.

15.The apoenzyme – cofactor complex is called ……..

Part A answers

1. Oxydoreductase
2. Peptidase
3. trypsine
4. porphyrine part of enzyme
5. NAD
6. Micheals and Menten
7. proteinas

Part B

1. Give a short note on oxydoductase.
2. what are isomerases.
3. discuss Lock and Key model.
4. differentiate reversible and irreversible inhibitors.
5. what are coenzymes.
6. In what way does denatured protein differ from the original protein ?
7. Give an example each for a cyclic amino acid and heterocyclic amino acid . Drow their structures
8. What are the methods used for the separation and characterization of amino acids?
9. Write equations to show the reaction between
(i) Glycine and formaldehyde (ii) glycine and nitrous acid.
10. Draw the structure of the chelate formed in the reaction of glycine with Cu^{2+} ions.
11. What is the product optained when an á amino acid is heated? Drow its structure.
12. What is meant by metabolism ?
13. what is ATP? Write the structure of the ATP
14. What is the role of ATP in biochemical reactions ?
15. why is ATP called ‘energy rich molecule’?
16. distinguish between anabolism and catabolism.
17. Mention the different stages in the metabolism of glucose .
18. What is Krebs cycle ?
19. what is meant by transamination ?
20. what is meant by oxidative deamination ?
21. Write the balanced chemical equation for the metabolism of one molecule of glucose .What is the energy released in this process ? 22.What is meant by â-oxidation ?
23. Define the terms ‘enzyme’, ‘coenzyme’, ‘apoenzyme’ and ‘holoenzyme’.
24. What are the ‘prosthetic groups’ and ‘cofactors’?
25. How are enzymes named ?

Part C

1. Discuss hydrolease and plantproteinase.

2. Give a note on enzyme inhibitors.
3. Briefly explain any two coenzymes.
4. What is CoenzymeA
5. Discuss the mechanism of enzyme action.

Part D

1. What are enzymes?Explain the classification of enzymes.
2. Discuss the mechanism of enzyme action.
3. Explain the term Coenzyme with suitable examples.

Module 3

Part A

1. Example for simple lipds
2. Example for compound lipds
3. Example for derived lipds
4. Example for animal fat
5. Example for vegetable oil

Part A Answer

1. Triglycerides
2. Phospolipds
3. Fatty acids
4. Butter
5. Olive oil

Part B

1. what are glycoplipds
2. what is carotenes
3. Give a note on steroieds
4. What are gangliosides
5. What is Rancidity
6. What is iodine value
7. What are different classes of enzymes ?
8. What are the metabolic functions of enzymes ?
9. What is meant by specificity of an enzyme ?
10. What are the different types of enzyme specificity?
11. How does temperature influence enzyme action ?
12. What are the factors which influence enzyme action ?
13. What is meant by inhibition of enzyme action ?

14. What are the different types of enzyme inhabitations?
15. What are isoenzymes ?
16. What are nucleosides and nucleotides ?
17. What are the differences between RNA and DNA?
18. What are the nitrogen bases present in RNA and DNA?
19. Draw the structures of D-ribose and 2-deoxy – D – ribose.
20. What are the components of nucleic acids?
21. What are the different types of hydrogen bonding in DNA ?
22. What are the different types of RNA ?
23. What are the biological functions of DNA?
24. What are the biological functions of RNA ?
25. What is meant by self – replication ?

Part C

1. Briefly explain general properties of fatty acids
2. Briefly explain the synthesis of triglycerides
3. Discuss the biosynthesis of fatty acids
4. Briefly explain oxidation of fatty acids
5. Discuss the following :(a) hydrogenation (b)iodine value (c)rancidity
6. What are saturated fatty acids
7. Give a note on phospolipds
8. Give a note on sterols
9. Note on compound lipids

Part D

1. Define and explain the classification of lipids.
2. Explain the fatty acids
3. Explain on compound lipids
4. Explain steroids.

Module 4

Part A

1. In 2-deoxyribose –OH group is absent at.....position
2. Glucose and fructose form the same.....with the same....
3. Gluconic acid is a monocarboxilic acid where as glucaric acid is .....
4. Fructose is ketone but it is respond to.....test
5. Sucrose is a .....and is a ..... sugar
6. Starch is on hydrolysis yield two components called.....and....
7. The principle of sugar in blood is

Part A Answers

1. C-2
2. Osazone,melting pount
3. Dicarboxylic acid
4. Tollens reagent
5. Disaccharides , non reducing
6. Amylase,amylopectic

Part B

1. Give the structure of maltose
2. Discuss the structure of glucose
3. Note on inversion of sucrose
4. What arethe different steps in the biosynthesis of proteins?

Part C

1.Briefly explain glycogen molecule
2. Note on disaccharides.
3.Explain TCA.
4.Note on Cellulose.

Part D

1. Define and explain the classification of carbohydrates.
2. Explain a polysaccharides.
3. Explain briefly glycolysis
4. Discuss TCA
5. Briefly explain starch as polysaccharides

Module 5

Part B

1. Define glycolysis
2. Metabolism of following carbohydrate and protein
3. Explain the concept of fre energy.

Part C

1. Define glycolysis
2. Metabolism of following carbohydrate and protein
3. Explain the concept of fre energy.
4. Briefly explain TCA cycle and its biological significance.
5. Prepare a note on energetic of the TCA cycle.

Part D

1. Briefly explain TCA cycle and its biological significance.
2. Prepare a note on energetic of the TCA cycle

Module 6

Part A

1. Many nucleotides gives
2. Any on of Pyrimidines base
3. Purine contains
4. Shape of mRNA
5. RNS doesnot posses

Part A Answers

1. Nucleic acid
2. Uracil
3. Six membered pyramidine ring fused to five membered imidazole ring
4. Filament
5. thymine

Part B

1. Note on nitrogen bases
2. What Are purine bases
3. Define rRna
4. Define mRNA
5. Note on mutation.

Part C

1. Give a note on t RNA
2. Briefly explain the synthesis of proteins
3. Discuss the following: (a) PCR (b) DNA sequencing
4. What are the features of genetic code.
5. Note on DNA replication

Part D

1. Briefly explain the types of RNA.
2. Briefly explain recombination of DNA techniques.
3. Discuss the following: (a) PCR (b) DNA sequencing

Module 07

Part B

1. Note on principles and significance of carbohydrate
2. Note on principles and significance of protein
3. Note on principles and significance of lipds
4. Note on caloric value and basal metabolic rate

Part C

1. Note on functional test of liver and kidney
2. Note on principles and significance of following:
   (a) carbohydrate (b) protein (c) lipds
3. Explain the elementary basis of biochemical action of drug

Part D

1. Note on functional test of liver and kidney
2. Note on principles and significance of following:
   (a)carbohydrate (b) protein (c) lipds
3. Explain the elementary basis of biochemical action of drugs
4. Discuss the biochemistry of urine and blood.

SEMESTER II

GC2MT02 Mathematics-II

Qusetion Bank and model question paper attached separetely

CH3B03 PHYSICAL CHEMISTRY

MODULE I

PART A

1. With an increase temperature most probable velocity of gas
   a. Decreases b. increases c. remains unaffected d.may increase or decrease depending upon gas
2. Most probable velocity and RMS velocity of a gas at definite temperature are in the order
   a.á õ>u b. õ<á<u c.á<õ<u d. á<u<õ

3. which among the following has the highest value of RMS velocity at a denite temperature

a. carbondioxide b. sulpherdioxide c. hydrogen d. oxygen

4. the average number of collision suffered by a single molecucle per unit time per unit volume of a gas is called…….

a. collision diameter b. collision frequency c. collision crossection d. collision number

5. for a gas for which õ is the average velocity and Z is the collision number , mean free path(ë) at tcertain temperature is given by…….

a. ë=õ/Z b .ë=Z/õ c.ë=õ*Z d. ë=$õ^Z$

6. In the SI system,the unit of the coefficient of viscosity is ……..

a. NAM^{-2} b. Ms^{-1} c. $N\ m^{-2}$ d.$m^3\ mol^{-1}$

7. the kinectic molecular theory of gases doesnot taking to amount the….

a. intermolecular collision b. intermolecular attraction c. effiecinet of temperature on KE d. molecular collision on the wall

8. which among the following gases have the lowest critical temperature a. H_2 b.O_2

c. CO d. He

9. when 2 or more substance have the reduced pressure (∏) and the same reduced temperature (ϖ) they will have the same reduced volume (ᵠ) this statement is known as……

a. the law of rectilinear diameter b. the law of equipartition of energy c. the law of limiting of density d. the law of corresponding state.

10. the temperature at which the second virial coeffeicent B is Zero for a gas is called

its…….

a. inversion temperature b.. critical temperature c. reduced temperature d. boyle temperature

answerkey

1. B
2. C
3. C
4. D
5. A
6. C
7. B
8. D
9. D
10. D

Section B

1. Define an ideal gas
2. What is meant by a real gas?
3. Give one postulate of kinetic theory that is not applicable to the behavior of real gas.
4. Give the kinetic gas equation and explain the terms.
5. Give the relationship that connects the RMS velocity of a gas with temperature.
6. Write expressions for the average translational kinetic energy (i) per mole and (i) per molecule of ideal gas.
7. Calculate the average translational kinetic energy of O_2 gas per mole at 27^0C. What will be the average K.E per molecule?
8. Calculate the translational K.E of 1 mole of methane gas at -73^0C.
9. Calculate the translational K.E of 2 mole of a gas at 27^0C.
10. Give the Maxwell-Boltzmann law of distribution of molecular velocities and mention the terms used.
11. Define the term *root mean square velocity* of a gas.
12. Define *most probable velocity* of a gas.
13. Explain the term *average velocity* of a gas.
14. Arrive at the ratio of the most probable velocity, average velocity and RMS velocity of a gas at a certain temperature.
15. Calculate the RMS velocity of H_2 molecules at 100^0C.
16. The RMS velocity of oxygen at 298 K is 4.6×10^2 m $s^{-1.}$ Calculate its average velocity.
17. Calculate the RMS velocity N_2 molecules at 27^0C and 700 torr pressure.
18. Calculate the average velocity of CO molecules at S.T.P
19. Calculate the average velocity of nitrogen molecule at 300 K assuming ideal behaviour.
20. Calculate the average velocity of O_2 molecules at 27^0 C.
21. Arrive at a relationship between average velocity and RMS velocity of of a gas at a certain temperature.

22. Calculate the temperature at which H_2 molecules will have an average speed of 1.7825×10^3 m s^{-1}.
23. Calculate the most probable velocity of N_2 molecules at 15^0C.
24. Calculate the most probable velocity of O_2 molecules at 0^0C.
25. "At a given temperature, the average translational K.E per mole of oxygen will be different from that per mole of hydrogen". Is this statement correct? Explain.
26. Define the term collision diameter.
27. What is meant by collision frequency of a gas?
28. What is meant by *mean free path?* How is it related to average velocity?
29. Define the terms mean free path and collision diameter. How are they related?
30. Distinguish between *free paths* and *mean free path.*
31. Give expressions connecting collision diameter of a gas to (i) its collision number, and (ii) its mean free path.
32. Calculate the number of molecules of an ideal gas per unit volume at 300 K and 1 atm pressure.
33. What is meant by the term *viscosity*?
34. Define coefficient of viscosity.
35. What are the units of the coefficient of viscosity in the CGS system and SI system?
36. Give a relationship between coefficient of viscosity and mean free path of a gas.
37. Explain the effect of temperature on the viscosity of a gas.
38. Under what conditions does a real gas approach ideal behavior?
39. What is meant by *compressibility factor*?
40. Give the *van der Waals' equation* for 'n' moles of a gas and explain the terms
41. Give the units of the van der Waals' constants 'a' and 'b' in the SI system.
42. What is meant by *Boyle temperature of a gas*?
43. State the Virial equation of state and explain the terms involved.
44. What is meant by the term *limiting density* of a gas?
45. Give an expression relating the Boyle temperature to the van der Waals' constants.
46. Assuming that methane behaves as a van der Waals gas, calculate its Boyle temperature given that a= 0.2283 N m^4 mol^{-2} and b= 4.28×10^{-5} m^3 mol^{-1}.
47. Assuming that CO_2 behaves as a van der Waals gas, calculate its Boyle temperature given that a= 3.59 atm L^2 mol^{-2} and b= 0.0427 L mol^{-1}.
48. Define *critical temperature* of a gas.
49. What is meant by *critical pressure* of a gas?
50. Define the term *critical volume* of a gas.
51. Give the relationships connecting the *van der Waals' constants* and the *critical* of a gas.
52. Show that
53. Give the relationships for 'a' and 'b' in terms of
54. Briefly explain the principle behind the determination of critical temperature of a gas.
55. State Cailletet and Mathias' *law of rectilinear* diameter.

Part C

1. What features distinguish a real gas from an ideal gas?

2. Calculate the translational kinetic energy of 2 moles of an ideal gas at 300K.
3. Show that the K.E of an ideal gas is a function of its absolute temperature independent of its volume or pressure and molar mass or type of the molecule.
4. The translational K.E of '*n*' moles of oxygen gases at 600K is 22.7 kJ. (i) Calculate (ii) what will be the translational K.E of '*n*' moles of methane gas at 600K if the gases are ideal?
5. Calculate the RMS, average and most probable velocities of SO_2 at 427^0C.
6. At what temperature will the RMS velocity of Chlorine gas be equal to that of sulphur dioxide at 273K?
7. Discuss the effect of temperature on the distribution of molecular velocities.
8. Give the Maxwell's equation for the distribution of molecular velocities. Sketch the distribution curve for two different temperatures and explain the influence of temperatures on distribution.
9. Two bulbs I and II of equal capacities are filled with He and SO_2 respectively. (a) What will be the ratio of the RMS velocities of the two gases if both bulbs are kept at constant temperature? (b) At what temperature will the RMS velocity of SO_2 molecules become half of that of the He molecules at 27^0C? (c) How will the ratio of the RMS velocities be affected if the volume of bulb II becomes 4 times the other at the same temperature?
10. At what temperature will the RMS velocity of O_2 gas be equal to that of H_3 molecule at 27^0C.?
11. At what temperature will the RMS velocity of Cl_2 gas be equal to that of SO_2 gas at S.T.P?
12. At what temperature would the average velocity of methane molecule be the same as the RMS velocity of ethane molecules at 127^0C?
13. Calculate the ratio of the RMS velocities of the He and Ne gases at 25^0C. Also calculate the ratio of average kinetic energies for these two gases.
14. Define the terms *collision diameter, collision frequency* and *mean free path* of a gas. How does mean free path vary with pressure?
15. Define *mean free path*. How does it vary with (a) increase in temperature and (b) decrease of pressure?
16. How does mean free path of a gaseous molecule depend on (a) pressure at constant temperature, and (b) temperature at constant pressure? Explain your answer.
17. Define the term *limiting density* of gas. How is molecular weight of the gas determined accurately by this method?
18. Calculate the mean free path of N_2 at 300 K and 1 atm pressure collision diameter= 0.374 nm.
19. How does collision frequency of a gas depend upon pressure and temperature?
20. The average velocity of a gas at a certain temperature and a pressure is 474.80 m s^{-1}. If the number density under the given conditions is 2.431×10^{25} molecules m^{-3} and the collision diameter is 3.57 A^0, calculate the collision number.
21. Calculate the collision frequency and the mean free path of CO gas at 27^0 C and 100 torr. Given; the molecular diameter of CO= 3.19 A^0.
22. Calculate the collision frequency and the mean free path of a gas at 298K and 0.7895 atm, given its collision diameter= 36.1 nm.
23. The coefficient of viscosity of Chlorine at 20^0C and 1 atm is 147.0 Calculate the molecular diameter of Chlorine.

24. Calculate the coefficient of viscosity of O_2 gas at 298 K if its collision diameter pm and average speed is 424.72 m s^{-1}.
25. Discuss how real gases deviate from Boyle's law?
26. What are the causes for the deviations of real gases from ideal behavior?
27. Explain the significance of van der Waals' constants 'a' and 'b'.
28. Using (i) ideal gas equation and (ii) van der Waals' equation, calculate the exerted by 2 moles of NH_3confined in a 5L flask at 300K. a= 4.17 atm 0.037 L mol^{-1}.
29. Using van der Waals' equation calculate the pressure exerted by 1 mole of a gas in a 1.5 dm^3 flask at 400 K. a= 3.0 atm dm^6 mol^{-2}, b= 0.05 dm^3 mol^{-1}
30. Using van der Waals' equation, calculate the pressure exerted by 44 g of CO_2 in a 0.5 dm^3 flak at 373 K, a= 359.2kPa dm^6 mol^{-2}, b= 0.04267dm^3 mol^{-2}, JK^{-1} mol^{-1}.
31. Calculate the pressure exerted by 1 mole of van der Waals' gas occupying a 1.5 dm^3 at 300K. [R= 8.314 JK^{-1} mol^{-1}]
32. Discuss the virial equation of state.
33. Starting from the van der Waals' equation for 1 mole of gas, obtain it in virial form.
34. Discuss Andrews' experiments on the isotherms of a real gas.
35. Explain the term *continuity of state*.
36. The van der Waals' constants of a gas are: a= 0.751 atm dm^3 mol^{-2} and b= 10^{-2} dm^3 $mole^{-1}$. Assuming that the gas behaves as a van der Waals' gas, calculate critical constants.
37. The van der Waals' constants for CO_2 are: a= 3.61 atm dm^3 mol^{-2} and b= 4.27×mol^{-1}. Assuming that CO_2 behaves as a van der Waals gas, calculate its critical constants.
38. The van der Waals' constants for Cl_2 are: a= 0.6579 N m^4 mol^{-2} and b= 5.62× mol^{-1}. Assuming that Cl_2 behaves as a van der Waals' gas, calculate its critical constants.
39. The van der Waals' constants for gaseous HCl are: a= 0.367 N m^4 mol^{-2} and b= mol-1, find the critical constants.
40. and of a gas are 393 K and 50 atm at respectively. Calculate its 'a' and 'b'. 1.013× N m-2.
41. Calculate the critical temperature of a van der Waals' gas for which P= 101.3×and b= 5.0×$10^{-2}$$dm^3$$mol^{-1}$.
42. Calculate the critical temperature of n-hexane which has a boiling point of 341.9 K.
43. Derive the van der Waals' reduced equation of state and mention its importance.
44. Give the reduced equation of state and explain the law of corresponding states.
45. Write the van der Waals' reduced equation of state and explain the terms.
46. The critical constants for N_2 are: P= 33.54 atm, = 0.09010 $dm^3$$mol^{-1}$ and = 126.3K. If one molecule of N_2 is confined to a volume of 3 dm^3 at a pressure of 15 atm, calculate its reduced pressure, reduced volume and reduced temperature.

47. What is meant by critical compressibility factor? Explain its significance.
48. How are critical temperature and critical pressure of a gas determined?
49. How is critical volume of a gas determined?

Part D

1. (i) Explain the terms collision number, collision frequency and mean free path of a gas. Discuss the effect of pressure and temperature on the mean free path.

   (ii) The collision diameter of O_2 gas is 3.61×10^{-10}m. If the temperature is 298K, calculate (a) the mean free path at 1 atm, (b) the mean free path at 10^{-3}mm Hg pressure, (c) the collision number at 1 atm, and (d) collision frequency at 1 atm. [1 atm= 1.01325×10^5 Nm^{-2}.

2. Discuss the significance of Maxwell's equation for the distribution of molecular velocities and the effect of temperature on such distribution.
3. Discuss the deviation of real gases from Boyle's and Charles' law.
4. Derive the van der Waals' equation for a real gas.
5. Discuss the applicability of van der Walls' equation in explaining real gas behavior under different conditions.
6. Starting from the van der Waals' equation for 1 mole of gas, obtain it in virial form and deduce an expression for Boyle temperature.
7. Discuss Andrew's experiments on the isotherms of CO_2 and bring out the idea of continuity of states.
8. Derive the relationship between van der Waals' constants and critical constants
9. Derive the van der Waals' reduced equation of state. State the law of corresponding states and explain its significance.
10. Discuss the determination of the critical constants of a gas.

Module II

Part A

1. The boiling of liquid is that temperature at which

A. Vapour pressure of liquid = atmospheric pressure b.the vapour pressure of liquid isles than the atmospheric pressue c. The vapour pressure of liquid is greater than the atmospheric pressure. D. The vapour pressure of the liquid is equal to the square root of the atmospheric pressure.

2. With rise in temperature the surface tension of a liquid
   a. Increases b decreases c. Remains the same d. None of above
3. The SI unit of a coeffeicentof viscosity is
   a. Kgm^2 Sec b.Kg $msec^{-1}$ c. Kg m^{-1} d. Kg $m^{-1}sec^{-1}$
4. Which of the following liquids has the maximum viscosity
   A. Water b. Acetone c. Ethyl alchaol d. Glycerine
5. Small droplets are spherical in shape It is due to
   A. High viscosity b. Less viscosity c. The tendancy to acquire minimum surface area d. The tendancy to acquire maximum surface area
   a.
   b. fairly high as compared as polar liquids b. fairly low as compared as polar liquids c.the same as that of polar liquids d. None of these

7. Liquids with high molecular masses .....viscosity

   a.grater b. Lesser c. Zero d. None of these

8. the boiling point of a liquid .....with external pressure

   a. canges b. Always increasesc.always decreases d. Remains the same

9. the liquids with highintermolecular attractive forces have ..... viscosity

   a. low b. Intermedicating c high d.none of these

   answer key

   1. a
   2. B
   3. D
   4. D
   5. B
   6. A
   7. A
   8. A
   9. C

PART B

1. What are the characteristic features of the liquid state?
2. Compare the intermolecular forces in liquids with that in gases.
3. Define the term 'vapour pressure' of a liquid. How does it depend on temperature?
4. Compare the vapour pressures of ethanol, diethyl ether and water and comment on the same.
5. Write an expression for the variation of vapour pressure of a liquid with temperature and explain the terms.
6. What are the units of *viscosity*? How does viscosity vary with temperature?
7. Define 'surface tension' of a liquid. What is the unit of surface tension? How this vary with temperature?
8. Write an equation for the variation of surface tension of a liquid with temperature and explain the terms in it.
9. How will you account for, the following facts?
   i. Drops of a liquid assume spherical shape.
   ii. Water wets glass while mercury does not.
   iii. Increase of temperature decreases surface tension.
10. Define the term *coefficient viscosity*. What are the SI and CGS units of viscosity? How are they related?
11. What are the factors which influence the *viscosity* of a liquid?
12. Referring to the table on molar refractions, calculate the molar refractions of
    i. Methanol
    ii. Acetic acid
13. State the *Lorentz* and *Lorenz* equation and explain the terms.
14. How is *molar refraction* of a liquid related to its *refractive index* and *density*?
15. What is meant by *Optical exaltation*? Illustrate giving an example.
16. Molar refraction is an additive and constitutive property. Explain.
17. Explain *viscosity* on the basis of cohesive forces in liquids.

PART C

1. a) How are molar refraction measurements useful in the structural elucidation of molecules?
   b) Refractive index of a liquid having molecular mass 123 is 1.552. The density of the liquid is 1.203g cm^{-3}. Calculate its molar refraction.
2. a) Explain *surface tension* and *viscosity* on the basis of intermolecular forces.
   b) Explain what is meant by *optical exaltation*.
3. At 298 K, liquids X and Y have vapour pressures of 13.332 kPa and 26.665 kPa respectively, and the corresponding enthalpies of vaporization are 43.57 kJ mol^{-1} and 16.74 kJ mol^{-1}. Calculate the temperature at which both X and Y have the same vapour pressure.
4. At 25^0C an organic liquid of molecular mass 92 rises 1.95 cm in a capillary tube of radius 0.3412 mm. Calculate the surface tension of the liquid. Density of the liquid is 25^0C is 0.866g cm^{-3}.

5. The viscosity of diethyl ether in millipoise is 2.84 at 0^0C. 2.33 at 20^0C and 1.97 at 400C. Calculate ,
    a) Activation energy of diethyl ether for viscous flow;
    b) Its viscosity at 60^0C.
6. In a measurement of viscosity by Ostwald's viscometer at 20.2^0C, water takes 30 seconds to flow between the upper and lower marks while the flow of another liquid of density 1.500 gm cm^{-3} takes 35 seconds. Taking density of water at 20.2^0C to be 0.9982 gm cm^{-3}, calculate the viscosity of the other liquid if the viscosity of water at this temperature is 10 centipoise.
7. Time taken for the same volume of water and benzene to flow in viscometer at 20^0C have been found to be 120 seconds and 88 seconds respectively. The density of benzene at this temperature is 9.879 g cm^{-3}. If the absolute viscosity of water at 20^0C is 10.05×10^{-3} poise, calculate the specific viscosity of benzene at this temperature.
8. Water passes through a viscometer in 30 seconds. The same volume of oil required 2263.7 seconds. Calculate the viscosity of oil if its density is 1.1×10^3 kgm^{-3}. Density of water is 0.998×10^3 kgm^{-3} and viscosity of water is 0.00101$kgm^{-1}s^{-1}$.
9. The refractive index of a liquid of molar mass 72 is 1.34 and its density is 0.98g cm^{-3}. Find its molar refraction.
10. The surface tension of water at 293K is 72.73×10^{-3} Nm^{-2}. How high will water rise in a capillary of diameter 0.01cm?
11. A glass capillary of diameter 0.1 cm is dipped into water. Calculate the level of the water that rises in the capillary if surface tension of water=72.75 dyne cm^{-1}, density=0.9984 g cm^{-3} and contact angle for water=10.
12. Explain why viscosity of liquids decreases with temperature.
13. How can viscosity of a polymer solution be determined?
14. Explain how viscosity measurements are useful in the determination of molecular mass of polymers?
15. Define the terms
    a) Parachor
    b) Coefficient of viscosity
    c) Molar refraction
16. What is meant by additivity of parachor?
17. Parachor is both an additive and constitutive property. Explain.
18. How can surface tension of a liquid be determined by capillary rise method?
19. How can vapour pressure of a liquid be determined?
20. State and explain Clausius-Clapeyron equation.
21. How does (i) viscosity and (ii) surface tension of a liquid change with temperature? Explain.

PART D

1. A) What is meant by parachor? Hw can it be determined ?
   B) explain how parachor measurements are useful in structure elucidation of compounds
   2. A) state the Lorentz and Lorenz equation and explain the terms

B) discuss the method determining the molecular weight of polymer by viscosity measurements

3. the followingproperties of liquidson the basis of intermolecular interactions

i. vapour pressure ii. Viscosity iii. surfacetension

Module III

Section A

1. A system which can exchange neither mass nor energy with the surroundings is called a /an
   A. closed system B. isolated system C. open system D. none of These
2. The properties of a system which are independent of the amount of substance present in the system are called
   A. state functions B. extensive properties C. intensive properties D. none of the above
3. Which among the following is an intensive property of a system
   A. temperature B. enthalpy C. volume D. surface area
4. The process in which the system does not exchange heat with the surroundings in is called an …… process
   A. isothermal B. isochoric C. isobaric D. adiabatic
5. When work is done on the system, its internal energy
   A. Does not change B. decreases C. increases D. may increase or decrease
6. Which among the following is not a state function?

   A. internal energy B. Work C. enthalpy D. entropy

7. For an ideal gas undergoing isothermal change , internal energy change, ÄE, is
   A. zero B. q C.-w D.3/2 RT

10. heat absorbed or evolved at constant pressure in a process is equal to the change in
A. entropy B. internal energy C. enthalpy D. bond energy

11.when a gas expands freely (against vaccum), the work done by the system is

A. positive B. negative C. zero D. positive or negative

12.for the reaction: $C(s)+H_2O(g)\rightarrow CO(g)+H_2(g)$,

A. $q_p=q_v$ B. $q_p=q_v-RT$ C. $q_p=q_v+RT$ D. $q_p=q_v/RT$

13. The ……of the universe always increase in the course of every spontaneous change.

14.which among the following conditions will favour spontaneity for a

process? A.ÄS is positive B.ÄS is negative C.ÄS is zero D. none of these

15.Which among the following is the expression for Gibbs free energy ‘G’ of a system?

16.Free energy change (ÄG)is related to enthalpy change(ÄH) and entropy change (ÄS) as

A.ÄG=ÄH+TÄS B.ÄH=ÄG-TÄS C.ÄH=ÄG+TÄS D.TÄS=ÄG-ÄH

17.A spontaneous change is one in which the system suffers

A. an increase in internal energy B. lowering of entropy C. lowering of free energy D. no energy change.

18.A reaction will never be spontaneous if

A.ÄH is positive and ÄS is negative B.ÄH is negative and ÄS is positive C.ÄH is negative and ÄS is negative D.ÄH is positive and ÄS is positive

19.According to the third law of thermodynamics ,the entropy of all perfectly crystalline solids at absolute zero temperature is taken as

A.100 B. maximum C. zero D. unity

20.The third law of thermodynamics helps in the calculation of

A. Enthalpy changes B. free energy changes C. internal energy change D. absolute entropies

21.A system which can exchange energy but not matter with its surroundings is called a/an ……..system.

22.A property which depends upon the quantity of matter contained in the system is called an …….property.

23.A property of a system is said to be a/an ……if its value depends only upon the state of system and is independent of the path by which the state is reached.

24.An isobaric process is one in which the ……..of the system is kept constant.

25.When 5KJ of work is done on a system and 1KJ heat is given out by the system , ÄE=……..

26.In a process, heat absorbed or evolved at constant volume is equal to the change in ……..

27.For a isothermic reaction ,the enthalpy change is …….

28.A process which has a natural urge to proceed on its own is called a……..process.

29……is a measure of the randomers or disorder.

30.During the vapourisation of a liquid,entropy …….

31.For the reaction :$CaC_2O_4(s) \rightarrow Cao(s)+CO(g)+CO_2(g)$,Äs is ……..

32.The entropy of all perfectly crystalline solids at temperature …….K is taken as zero.

33.For a process at equilibrium ,the free energy change is ……..

34.For a spontaneous change ,$Äs_{system}+Äs_{surroundings}$ is. ……

35.Exothermic reactions involving a decrease in entropy become spontaneous if ÄH is……TÄS in magnitude.

Section B

1. Explain the terms system and surroundings as commonly used thermodynamics.
2. Define an open system
3. What is mean by a closed system
4. Define an isolated system. Give an example
5. What are macroscopic properties? Give 2 examples.
6. What is a intensive property/ give an example
7. What are extensive properties? Give an example
8. Classify the following in to intensive and extensive properties:(a) entropy;(b) viscosity;(c)heat capacity;(d)surface tension
9. Is vapour pressure an intensive property or an extensive property? why?
10. Define the state of a system
11. What meant by a state function? Give an example
12. Define : path function. Give an example
13. Distinguish between the terms isothermal process and adiabatic process.
14. Define isobaric process and isochoric process
15. What is meant by a cyclic process?
16. Explain the term reversible process
17. State the Zeroth law of thermodynamics
18. What is meant by internal energy? is possible to find its absolute value?
19. Give the statement of the first law of thermodynamics and its mathematical formulation
20. What happens to the internal energy of the system if(a) work is done on the system and (b) work is done by the system
21. How is the internal energy change in a process related to heat and work?
22. Define enthalpy
23. Give the relationship between the internal energy change and enthalpy change in a process
24. What is the relationship between q_p and q_v?
25. Give the relationships for (i) ÄE and (ii) H for the adiabatic expansion for an ideal gas

26. What is meant by Joule-Thomson effect?
27. Mention one important application of Joule-Thomson effect
28. What is meant by Joule-Thomson coefficient?
29. Define inversion temperature. What relation does it have with the Joule-Thomson coefficient?
30. What is Joule-Thomson coefficient for an ideal gas?
31. What happens to the temperature of each of the following gases when each is allowed to expand under adiabatic conditions through a small orifice at room temperature:(a) H_2;(b) CO_2?
32. Explain the basic principle applied in Linde's process for liquefying gases
33. What happens the temperature of a gas if it expands under ideal and adiabatic conditions through a porous plug?
34. Why is it that N_2 gets cooled while helium gets warmed when each is allowed to undergo adiabatic expansion through a porous plug?
35. When does the Joule-Thomson coefficient become zero in the adiabatic expansion of a gas through a small orifice?
36. Explain the term spontaneous process
37. How is q related to q in a cyclic process?
38. Define efficiency of a heat engine
39. What is Carnot's theorem?
40. Mention the significance of the term entropy
41. How does the entropy of a gaseous substance change with (i) increase in temperature,and (ii)decrease of pressure?
42. How is the entropy change related to heat exchanged reversibly in a process at constant temperature?
43. State whether entropy increases or decreases during the following changes:(a) dissolution of sugar in water;(b) sublimation of iodine
44. State the second law of thermodynamics in terms of entropy
45. What is entropy criterion for spontaneity?
46. Mention the entropy criterion for the equilibrium state of the process
47. Define entropy of fusion
48. Define entropy of vapourization. how is it related to enthalpy of vaporization?
49. How is the entropy of fusion of a substance related to its enthalpy of fusion?
50. What happens to the entropy of the universe in: (i) a reversible process;(ii) an irreversible process?
51. What is the unit of an entropy change?
52. Define fugacity
53. Give two Maxwell relations
54. Two applications of Gibbs – Helmholtz equation
55. Important applications of third law of thermodynamics

56. Discuss the limitations of the first law of thermodynamic which

Part C

1. Explain the terms state functions and path functions with eg.
2. Explain Zeroth law of thermodynamics
3. Obtain expression for pressure-volume work
4. Show that Cp-Cv+R for one mole ofan ideal gas
5. Differentiate between isotheral,adiabatic,isobaric and isochoric
6. necessitates the second law.
7. Explain the term spontaneous process and non-spontaneous process.
8. State and explain Carnot´s theorem.
9. Define Gibbs free energy .show that the decrease in free energy in a process is equal to the useful work done by the system.
10. Establish the physical significance of Helmholtz free energy.
11. Discuss the physical significance of Gibbs free energy.
12. Discuss the Nernst heat therome.
13. State and explain the third law of thrrmodynamics.
14. Discuss the term residual entropy.

PART D

1.(a)State the zeroth law of thermodynamics and establish its significance .

b) explain the significance and connection between work,heat and enegy

2. derive theexpression for w,ÄE,ÄH and q for the reversible isothermal expansion for vander Walls gas

3. derive expression forJoule – Thomson coefficientand inversion temperature with vander walls constant.

4. describe the carnote's cycle and derive an expressionforthe efficieny for the heat engine

5. a) define the term free energy. What is its physical significance

b) explain the free energy criteria for(i) spontaneous change

(II) an equilibrium state

MODULE IV

partA

1. A non linear molecule with n atoms has.....vibrational degrees of freedom
2. The number of microstates in the given distribution of moleculeiscalled .....probability
3. Particle which obey Fermi-Dirac statistics are called.....
4. Entropy is related to the thermodynamic probability by the equation Answer key
   1. 3n-6
   2. Thermodynamic

3. Fermions
4. S=k lnW

partB

1. Showthat S=kln W
2. Write expression for
   a) Translation partition function b) rotational partition function c)vibrational partitionalfunction d
3. What are Bosons and Fermions
4. What is meant by statistical weigh factor

   PART C
   1. How the internal energy of the system related to its partition function
   2. What is partition function and its diamension write expression for translation, rotation and vibration
   3. Distinguish bosons and fermions
   4. How enthalpy and entropy related to the partition function

PART D

1. Calculate the translation function of a molecule of O_2 at 1atm and 298 K moving in a vessel volume 22.4L
2. What are the concepts used in the derivation of Maxwell-Boltzman distribution

MODULE V

PART A

1. The equilibrium constant K_c ofa reaction depends upon
   A. pressure b. Temperature c. Choice of catalyst d. Initial rwaction concentration
2. a catalyst
   a. increase equilibrium concentration of the products
   b. decrease theequlibrium concentration of the products
   c. increase the rate of forward reaction decrease the rate of backward reaction
   d. speeds up the attainment of equilibrium without affecting the position
3. in a reversible reaction the forward reaction isexothermic. an increase of temperature will
   a. increase its Kc b. Decrease its Kc c. Will not effect Kc d. Increase or decrease Kc answer key
      1. B
      2. D
      3. B

PART B

1. what are reversible reaction

2. give example for reversible reaction
3. define chemical equilibrium
4. How Kc and Kp related
5. Give the vant Hoff equation and its integrated form

PART C

1. Calculate the qulibrium constant of a reaction at 300K if the standard free energy change at 300K is 292900J/mol
2. The standard free energy change of a reaction at 298 K is 28.5KJ calculateKp
3. The equlibrium constant Kp for a reaction at 298.15K is $8.252x10^2$. calculate the $ÄG^0$
4. State and explain the laws of mass action
5. defineKx. Derive its relationship with Kp and Kc

Section D

1. state Le Chatelier principle and apply it to the equilibrium in the Haber process for the manufacture ofNH3
2. Derive the vant Hoff reaction isotherm and from it arrive at the relationship connecting standard free energy change with the equilibrium constant for a reaction.

SDC2MB01 MICROBIOLOGY

PART A

MODULE I

1. Phycology is the study of
   a) Bacteria b) Protozoa c) Algae d) Fungi
2. Algae utilize in biofertilizer production is
   a) Blue green algae b) Green Algae c) Brown algae d) Yellow green Algae
3. Archaebacteria used in biogas production is
   a) Methanogene b) Thermoacidophiles c) Halophiles d) All of these
4. Bacteria which tolerate high salt concentration are called as
   a) Barophile b) Mesophiles c) Halophiles d) None of these
5. The cell wall of algae is mead up of
   a) Peptidoglacan b) Chitin c) Lignin d) Pectin
6. Mycology is study of
   a) Bacteria b) Fungi c) Virus d) Protozoa
7. Viruses have all characteristics, except
   a) has either DNA or RNA b) are obligatory parasite
   c) has metabolic machinery d) are non cultivable on Laboratory media
8. Which of the following is not a prokaryotic
   a) Bacterium b) Paramecium c) Cyanobacteria d) Rickettsia
9. A book Micrographia is written by,
   a) Leeuwenhoek b) Robert Koch c) Fracastaro d) Aristotle
10. Bacteria are ,
    a) Prokaryotic, unicellular b) Eukaryotic unicellular
    c) Prokaryotic multicellular d) Eukaryotic multicellular
11. Which one is photosynthetic organism?
    a) Fungi b) algae c) Protozoa d) Viruses
12. Find out obligate intracellular parasite
    a) Viruses b) Algae c) both a & b d) None of above
13. For the fragrance of soil, which organism is responsible?
    a) Bacteria b) Algae c) Fungi d) Actinomycetes
14. Methanogens are…
    a) Bacteria b) Archaebacteria c) Protozoa d) Algae
15. Absorption of water from soil is property of…
    a) Algae b) Bacterialc) Protozoa d) Fungi
16. The contraversy of spontaneous generation was solved by
    a) Louis Pasteur b) Koch c) Joseph Lister d) Antony Van Leeuwenhoek
17. The use of cotton for filtration was firstly given by…
    a) Robert Koch b) Louis Pasteur c) Spallanzani d) Aristotle
18. Use of phenolic solution as disinfectant during surgery was given by
    a) Joseph Lister b) John Needham c) Robert Koch d) Antony Van Leeuwenhoek

19. The discoverer of penicillin was –

a) Alexander Fleming b) Robert Koch c) Louis Pasteur d) None of above

20. Growth rate > death rate is found in

a) Lag phase b) Log phasec) Stationary phase d) Decline phase

21. Industrial fermentation require organism of

a) Lag phase b) Log phase c) Both a & b d) None of above

22. Bacterial cell can reproduce by

a) Binary fission b) Mitosisc) Meiosis d) All of above

23. Bacterial cell wall mainly composed by a)Peptidoglycan b) Lipidsc) Protein d) Vitamin

24. For the attachment to surface, bacteria use

a) Flagella b) Pili c) Both a & b d) None of above

25. Total cell count determination means counting of

a) Only living cell b) Only non living cell

c) Both living & non living cells d) None of above

26. PHB granules are used for storage of

a) Carbohydrates b) Sulphurc) Lipids d) Phosphate

27. Photosynthetic bacteria contain a)Chlorosome b) Chloroplast c) Both a & b d) None of above

28. Bacterial ribosomes are

a) 80s b) 70sc) 40s d) 60s

28. . ____ method used to know bacterial suspension population from the defined area of microscopic slide.

a) Direct microscopic count b) Most probable number c) both (a) & (b) d) None of these

29 . The instrument used to measure turbidity is a __

a) Autoclave b) Spectrophotometer c) Incubator d) Fermenter

30. For filamentous bacteria and moulds, are usually measured by ___ method

a) Turbidometric b) Dry weight c) All of these d) None of these

31. Bacteria reproduced by __

a) Fragmentation b) Binary fission c) Budding d) all of these

MODULE II

1. Agent used to reduce the number of organisms is known as ……..
2. A type of disinfection carried out at the time of illness is known as ……..
3. Disinfection done after the removal of patient is known as ……..
4. Disinfection done for prophylactic purpose is known as …….
5. Which phase in the bacterial growth curve shows high chemical resistance to disinfectants?
6. What happens to the activity of a disinfectant in presence of organic matter?
7. Example for an aldehyde used as a disinfectant is ……
8. Example for an iodophore is …….
9. Chemical agent used to destroy the growth of micro-organism on living tissue is known as ……
10. High level disinfectants are also known as …….
11. The term which indicates the measure of effectiveness of an antiseptic or disinfectant when compared with phenol…….
12. Sunlight shows germicidal activity due to the presence of ……. in it.

13. Who devised Tyndallization?
14. Other name for Tyndallization is ……
15. Example for a biological indicator used in moist heat sterilization is …….
16. Bacillus subtilis is used as ……. in dry heat sterilization as per IP
17. Method of sterilization of thermo liable substance is…….
18. …….is the process by which an article, surface or medium is free of all living microporganisms.
19. …….is the destruction or removal of all pathogenic organism
20. Give any one of physical method of sterilization
21. Give any one of chemical method of sterilization
22. Give an example for chemical disinfectant that can be safely applied on the skin

Answers

1. Sterilizer
2. Con current disinfection
3. Terminal disinfection
4. Prophylactic disinfection
5. Stationary phase
6. Decreases
7. Formaldehyde or Gluteraldehyde
8. Povidone iodine or Betadine
9. Antiseptic
10. Chemo-sterilant or Liquid Chemical sterilant
11. Rideal-Walker co-efficient
12. Ultra violet rays
13. John Tyndal
14. Fractional Sterilization
15. Spores of Bacillus sterothermophilus or Spores of Clostridium sporogenes
16. Biological indicator
17. Filtration
18. Sterilization
19. Disinfection
20. Heat/filteration etc…
21. Alcohol/phenol etc…
22. antiseptic

MODULE III

23. Agent used to reduce the number of organisms is known as ……..
24. A type of disinfection carried out at the time of illness is known as ……..
25. Disinfection done after the removal of patient is known as ……..
26. Disinfection done for prophylactic purpose is known as …….
27. Which phase in the bacterial growth curve shows high chemical resistance to disinfectants?

28. What happens to the activity of a disinfectant in presence of organic matter?
29. Example for an aldehyde used as a disinfectant is ……
30. Example for an iodophore is …….
31. Chemical agent used to destroy the growth of micro-organism on living tissue is known as ……
32. High level disinfectants are also known as ……..
33. The term which indicates the measure of effectiveness of an antiseptic or disinfectant when compared with phenol…….
34. Sunlight shows germicidal activity due to the presence of ……. in it.
35. Who devised Tyndallization?
36. Other name for Tyndallization is ……
37. Example for a biological indicator used in moist heat sterilization is …….
38. Bacillus subtilis is used as ……. in dry heat sterilization as per IP
39. Method of sterilization of thermo liable substance is…….

Answers

23. Sterilizer
24. Con current disinfection
25. Terminal disinfection
26. Prophylactic disinfection
27. Stationary phase
28. Decreases
29. Formaldehyde or Gluteraldehyde
30. Povidone iodine or Betadine
31. Antiseptic
32. Chemo-sterilant or Liquid Chemical sterilant
33. Rideal-Walker co-efficient
34. Ultra violet rays
35. John Tyndal
36. Fractional Sterilization
37. Spores of Bacillus sterothermophilus or Spores of Clostridium sporogenes
38. Biological indicator
39. Filtration

MODULE IV

1. The kingdom protista has been divided into ……. and ……groups
2. Example for a type of Stainig techniques
3. What indicates the lag phase in the bacteria growth curve
4. What indicates the log phase in the bacteria growth curve
5. What indicates thestationary phase in the bacteria growth curve
6. What indicates the decline phase in the bacteria growth curve

Part A answers

1.prokaryotes and eukryotes

2. simple stainig

3.no appreciable increase in number

4. an exponetional in the bacterial number

5. no increase or decrease in number

6. decrease in thje bacterial population due to cell death

Module 04

1. Large parasites such as helminthes may be killed extracellularly by the action of ….
2. Treatment with bacterial endotoxins results blast formation in …..
3. Chemically an antigen may be …….
4. Immunity is not long lasting to …
5. Lysozyme is present in ……
6. Macrophages are professional antigen presenting cells. The protein molecule ……. is present in
7. Lack of reaction to our own human leukocyte antigens (HLAs) known as …..
8. Which of the following WBCs act as scavengers when they engulf and digest pathogens ….
9. A cell which defends against body cells in which viruses are reproducing is ….
10. What is the result of invasion of a body by pathogens?

Part Aanswer key

1. Eosinophiles
2. B cells
3. Lipid or Polysaccharide or Protein
4. Influenza
5. Saliva
6. CD 8
7. Tolerance
8. Macrophages
9. Cytotoxic T cell
10. Infectio

PART B

MODULE I

1. Give general characters of Bacteria
2. Give general characters of Archaebacteria
3. Give general characters of Algae
4. Give general characters of Fungi

5. Give general characters of Protozoa
6. Give general characters of Virus.
7. Give general characters of Actinomycetes
8. By how many ways bacteria reproduce?
9. What is generation time?.
10. Enlist and describe diagrammatically stages of binary fission.
11. Define bacterial growth.
12. Enlist the phases of bacterial growth curve.
13. Differentiate between conidiophores and sporangiophore.
14. Define lag phase of bacterial growth curve.
15. Define logarithmic phase or Exponential phase of growth curve.
16. Define stationary phase of growth curve.
17. Define death phase of growth curve.
18. Enlist different direct methods to measure the bacterial growth.
19. What is CFU?
20. Enlist different indirect methods to measure the bacterial numbers.
21. Give the significance of growth.
22. What is the difference between growth and reproduction?
23. Draw and label properly bacterial growth curve.
24. Discuss about gram stain.
25. What is enriched media?
26. What is differential media?
27.

MODULE II

1. What is disinfection and disinfectant? How can they classify?
2. What is Sterilization? What are different methods?
3. Write about pasteurization.
4. List out the characteristics of an ideal disinfectant.
5. List out the factors affecting disinfection and explain any to in short connected with medium.
6. List out different modes of action of disinfectant.
7. What is incineration?
8. Principle behind dry heat sterilization.
9. Write about biological or chemical indicators used for evaluation of sterilization.
10. Write about the applications of filtration.

MODULE IV

1. What are the types of immunity?
2. Define the term immunity.
3. What is adoptive immunity?
4. Define racial immunity.
5. Define killed vaccines?
6. Define antigenicity.
7. What is sandwich ELIZA?
8. What are the uses of ELIZA?

PART C

MODULE I

Explain and describe diagrammatically stages of binary fission in bacteria.
2. What is generation time? Enlist different phases of Growth.
3. Explain logarithmic phase or Exponential phase.
4. Explain plate count for measuring bacterial population.
5. Give in brief direct methods to measure the viable count.
6. How will you determine the bacterial number by dry weight method?
7. How will you estimate bacterial number by turbidity method?
8. Give the principle of spectrophotometer.
9. Give the disadvantages of plate count.
10. Explain membrane filtration technique
11. Explain concept of growth & Give the Mathematical expression of growth.
12. Explain in detail Reproduction of Bacteria.
13. Describe Growth Rate & Generation Time.
14. Explain in detail Growth curve of bacterial population.
15. Describe the practical application of Bacterial Growth Curve.
16. Describe reproduction of bacteria by means of budding & fragmentation.
17. Describe the method for measurement of growth.(Only one method)
18. Give the methods for growth determination by using biomass.
19. Give the methods for growth determination by cell count.
20. Describe the significance of growth measurement.

Module III

1. Discuss about the guidelines for the use of disinfectants.
2. Short note on factors affecting disinfectant action.
3. Write about moist heat sterilization at temperature below 100^0 C.
4. Write sterilization control and use of autoclave in detail.
5. What are the different types of radiations used for sterilization and explain their applications.
6. Write a note on filtration, types of filters & applications.
7. Write a note on evaluation of disinfectants
8. Write a note on dynamics of disinfection.

MODULE IV

1. Discuss about mechanism of innate immunity.
2. Make a note on types of active immunity.
3. Discuss passive immunity.
4. What are the factors affecting innate immunity.
5. How age affects immunity?
6. Make a note on types of antigens.
7. Discuss about the general features of antigen-antibody reactions.
8. What are the general features of agglutination reaction?
9. Prepare a note on complement fixation test.
10. Explain radio immuno assay

Part D

MODULE III

1. Write about moist heat sterilization.
2. Write about dry heat sterilization.
3. Elaborate the following ; a) Physical methods of sterilization.
   b) Water bath & vaccine bath.
   c) Tyndallization& steaming.
   d) Incineration & flaming.
   e) Pasteurization &inspissations.
4. Write about moist heat sterilization above 100^0C (Autoclave) [principle, direction for use, precautions, applications & sterilization control] .
5. Write about; a) factors affecting disinfection.
   b) Kinetics of disinfection.
   c) Characteristics of an ideal disinfection.
   d) Examples of disinfection at least 5.

MODULE IV

1. Briefly discuss about native immunity.
2. Make a brief note on acquired immunity.
3. Explain active and passive immunity.
4. Briefly explain the following: (a)Agglutination reaction (b)Complement fixation test
5. Prepare a note on ELIZA test.
6. Discuss the following: (a)EIA (b)RIA (c)CLIA

SDC2HA01 HUMAN ANATOMY &PHYSIOLOGY

Module 1

1. Name a facial bone
2. Medial bone of forearm
3. Thigh bone is
4. Strongest bone of the body
5. Name any bone on feet
6. Muscular dystrophy is
7. Shape of RBC
8. RBC also known as
9. Give a function of lymph
10. The lateral born of forearm
11. Manubrium found in
12. The first seven vertebrae is called
13. The end portion of the vertebrae column is
14. Power full and flexible pillar in our body is
15. Mandible is
16. Total numbers ofpairs of ribs are
17. Metacarpal found on
18. Freely movablejoint is

19. Arthritis is the disorder of…….

20. The source of Ca2+ is

Module 01 Answers

1. Nasal bone
2. Ulna
3. Femur
4. Tibia
5. Metatarsals
6. Disorder of skeletal muscle
7. Disc
8. Erythrocytes
9. To drain the excess interstitial fluid un to the circulatory system
10. radius
11. Sternum
12. Cervical vertebra
13. Coccyx
14. Vertebral column
15. Upper jaw
16. Twelve
17. Palm
18. Synovial joint
19. Joints

20. Sarcoplasmic reticulum

Module 02

1. Heart beat on average about……
2. Tonicity is the properties of…..
3. Digital artery supplies blood to……..
4. Artery supplies blood to kidney
5. Biggest artery of the body
6. The innermost layer of heart
7. Deoxygenated blood reaches to ……chamber of heart
8. Sub maxillary is an example of
9. Jejunum is in the part of
10. Bile produced by

Module 02 answers

1. 72
2. Cardiac muscle
3. Fingers
4. Renal artery
5. Aorta
6. Endo cardium
7. Right atrium
8. Salivary glands
9. Small intestine

10. liver

Module 03

1. Volume of air taken during normal breathing is
2. Mediastinum is
3. Trachea belongs to
4. Lungs are covered by
5. Pulmonary trunk arises from
6. Structural functional unit of kidney is
7. Outer part of kidney is
8. Urine passed to urinary bladder through
9. In kidney the projections on inner side is called
10. Range of pH of extracellular fluid in normal person

Module 03 answers

1. Tidal volume
2. Space between the lungs
3. Respiratory system
4. Pleura
5. Right ventricle
6. Nephron
7. Cortex
8. Ureters
9. Pyramid

10. 7.35-7.45

Module 04

1. Cerebellum found in
2. Growth hormone is
3. Give a function of ovary
4. AIDS stands for
5. Frigidity
6. Spermatozoa produced by
7. Secretion of male reproductive organ is
8. FSH stands for
9. Formation and maturation of ovum is
10. TSH stands for
11. Pituitary gland is also called
12. The hormone produces by testes
13. Adrenal gland found on
14. Two parts of pancreas
15. Hypoglycemia is the disorder of
16. Principal secretion of adrenal medulla is

Module 04 answers

1. Behind the pons and medulla oblongata
2. Somatotrophic hormone

3. Secretion of hormones
4. Acquired Immune Deficiency Syndrome
5. Disorders of menstruation
6. Testis
7. Semen
8. Follicle stimulating hormone
9. Oogenesis
10. Thyroid stimulating hormone
11. Hypophysiscerebri gland
12. Testosterone
13. Kidney
14. Exocrine and endocrine
15. Pancreas
16. Adrenalin

Module 05

1. Power house of cell
2. Adipose tissue also known as
3. Key structure of living cell is
4. Ribosomes found in
5. Neuron contains only one axon is called
6. Nervous tissue is composed of
7. Muscle found in heart
8. Example for an epithelial cells fuse with adjacent cell forming tight junctions in certain organs

9. The two major periods in cell cycle are
10. RNA found in

Module 05 answers

1. Mitochondria
2. Beneath of skin
3. Nucleus
4. Cytoplasm
5. Unipolar
6. Neuron
7. cardiac
8. Alimentary canal
9. Cell growth, division
10. Ribosome

Short answers (2marks)

Module 01

1. Note on appendicular skeletal system
2. Note on ribs
3. Types of joints
4. Various types of movements of joints
5. What are ligaments
6. Note on muscle tone
7. Disorders of skeletal muscles

8. What is muscle tone
9. Compositions of blood
10. Disorders of joints
11. Properties of RBC
12. Functions of RBC
13. Disorders of lymphatic system

Module 02

1. discuss the physiology of heart
2. pulmonary circulation
3. coronary circulation
4. properties of cardiac muscle
5. refractory period of heart
6. nutrition of cardiac muscles
7. how the heart sound produced
8. what is congestive heart failure
9. what is blood pressure
10. give the functions of bile juice
11. Role of teeth in digestive system

Module 03

1. Functions of respiartion
2. What is pulmonary circulation

3. Differentiate inspiratory and expiratory reserve volume
4. Define vital capacity
5. Note on respiratory volumes
6. Write the functions of kidney
7. What is Henle's loop
8. Write about renal circulation
9. Note on glomerular filtration
10. Neat and label the diagram of nephron

Module 04

1. Characteristics of hormone
2. List out the endocrine glands
3. Physiological actions on insulin
4. Physiological actions of adrenalin
5. Note on diabetes-mellitus
6. Physiological actions of insulin
7. List out the endocrine glands and their secretion

Module 05

1. Differentiate mitosis and meiosis
2. Note on cell nucleus
3. What is homeostatic imbalance of cell division
4. Writ about muscular tissue
5. Draw and label the physical structure of cell

Short essay type (4marks)

Module 01

1. Note on vertebral coloumn and its function
2. Note on skull
3. Note on joints of skeletal system
4. Disorders of joints
5. Anatomy and physiology of different types of muscle
6. Physiological properties of skeletal muscles
7. Basic physiology and functions of spleen
8. Mechanism of coagulation of blood
9. Functions and compositions of blood
10. Composition and formation of lymph

Module 02

1. Differentiate between coronary and pulmonary circulation
2. Anatomy of heart
3. Write a note on systemic circulation
4. Discuss cardiac cycle
5. What is ECG
6. Discuss any two cardiac diseases
7. What is BP how it is regulate
8. Functions of large intestine
9. Discuss Absorption of digestive food from g.i, tract

10. Write a note on pancreas
11. Discuss the disorders of digestive system
12. Role of gallbladder
13. Functions of stomach
14. With neat diagram write the anatomy of stomach

Module 03

1. Mechanism of respiration
2. Anatomy of lungs
3. State respiratory volume and vital capacity
4. Discuss mechanism and regulation of respiration
5. Physiology of urine formation
6. Discuss about acid base balance in your body
7. Diseases of kidney
8. With a neat diagram discuss nephron

Module 04

1. Note on spinal cord
2. Discuss cranial nerves
3. Functions of brain
4. Anatomy of brain
5. Physiology of autonomic nerve system
6. Explain hypothalamus

7. Functions of thyroid gland
8. Note on pancreas as endocrine gland

Module 05

1. Discuss epithelial tissue
2. Note on connective tissue
3. Note on neuron
4. Discuss different phases on cell cycle
5. Discuss physical structure of cell

Long essay type (15 marks for each)

Module 01

1. Discuss axial skeletal
2. Discuss lymphatic system
3. General functions and composition of blood
4. Explain skeletal system

Module 02

1. Neat and labeled diagram describe the structure and function of heart
2. Write a note on various circulation of blood vessels
3. Anatomy and disorders of digestive system
4. Neat and label diagram of eye Write the anatomy and physiology of eye
5. Give the anatomy and physiology of following A)Liver B) pancreas

Module 03

1. Label diagram and anatomy of respiratory system
2. Physiology of urine formation
3. Anatomy of kidney
4. One of the function of brain is

Module 04

1. Note on spinal cord
2. Discuss cranial nerves
3. Functions of brain
4. Anatomy of brain
5. Physiology of autonomic nerve system
6. Explain hypothalamus
7. Functions of thyroid gland
8. Note on pancreas as endocrine gland

Module 05

1. Note on neuron
2. Discuss different phases on cell cycle
3. Discuss physical structure of cell

SEMESTER III

GEC3PHY01 PHYSICS-I

Module I

Part A

1. There is no change in volume of a wire due to change in its length on stretching. The Poisson ratio of the wire is:
   (a) -0.5 (b) 0.05 (c) 0 (d) 1
2. The bulk modules for an incompressible liquid is
   (a) Zero (b) one (c) $10^{11}N/m^2$ (d) infinite
3. The rigidity modules of a material in the form of a wire can be determined using.....
4. When the radius of a metal wire is doubled, its young's modules will be:
   (a) Doubled (b) halved (c) remain the same (d) none of the above
5. The unit of modules of elasticity is.....
6. The expression for work done/unit volume in twisting a wire is given by..... .
7. What is the dimensional formula for the modules of elasticity?
8. The type of modules of elasticity of gases is.....
9. The limiting values of Poisson'sratio are.....and .....
10. Give the equation of motion of torsion pendulum.
11. For perfectly compressible material, the Poisson's ratio is..... .
12. If the work done in stretching a wire by 1mm is 2J, the work necessary for stretching another wire of the same material but double the radius and half thr length by 1 mm is.....
13. A wire can support a load 'W' without breaking. If it is cut into two halves, the maximum load that each part can support is..... .
14. Which of the following can't be the volume of Poisson's ratio?
   (a) 0.1 (b) 0.3 (c) 0.48 (d) 0.62
15. Young's modules of a perfectly rigid body is
   (a) 0 (b) 1 (c)infinity (d) any value between 0 to infinity
16. Which material is more elastic
   (a) Rubber (b) wood (c) steel (d) lead
17. The unit of compressibility is.
   (a) Pascal (b) newton (c) m^2/N (d) m/N
18. If y/n=1/z find the value of sigma
   (a) 0 (b) -1 (c) ½ (d) -3/4
19. Two torsional pendulum with wire of same material are oscillated. Find the ratio of period of oscillation if radius and length are in the ratio 1:2.
   (a) 1:8 (b) 4:1 (c) 1:4 (d) 8:1

Answers

1. 0.5
2. Infinite
3. Torsion pendulum
4. Remain the same
5. N/m^2
6. 1/2stress X strain
7. $ML^{-1}T^{-1}$
8. Bulk modulus
9. -1 and 0.5
10. $d^2\Theta/dt^2+c/I\Theta=0$
11. 0.5
12. 16J
13. W
14. 0.62
15. ∞
16. Steel
17. m^2/N
18. -3/4
19. √8:1

Module II

Part A

1. With rise of temperature the surface tension of a liquid:
   (a) Doesn't change (b) increases (c)decreases (d) become zero
2. The velocity of a falling raindrop attains limited value due to:
   (a) Air current (b) upthrust air (c) surface tension (d) viscous force exerted by air
3. The unit of coefficient of viscosity is .....
4. The stoke's equatiobn for the viscous drag acting on a sphere falling through a high viscous medium is given by .....
5. Write down the relation between surface tension and surface energy
6. The dimensions of surface tension are.....
7. The viscosity of gases.....with increase in temperature
8. The viscosity of liquid..... with increase of pressure.

9. When NaCl is added to water, the surface tension of water.....
10. Detergents.....surface tension
11. With increase in temperature, the viscosity of

(a) Gases decreases and liquid increases (b) gases increases and liquid decreases (c) both gases and liquid increases (d) both gases and liquid decreases

12. A liquid rises to a height 'h' in a capillary tube on the earth. The height to which the same liquid would rise in the same tube on the moon is about.....
13. The viscous drag on a small spherical body moving with a speed 'v' is proportional to.....
14. When a body attains thermal velocity its acceleration is.....
15. In a capillary tube, water rises to a height 4 cm. If the cross section area of the two where one-fourth, water would have risen to a height of.....

Answers

1. Decreases
2. Viscous force excreted by air
3. Nm^{-2}
4. $F=6\pi\eta v$
5. S.E/Area
6. MT^{-2}
7. Increases
8. Increases
9. Increases
10. Reduces
11. Gases increases and liquid decreases
12. 6h
13. V
14. Zero
15. 8cm

Module III

PART A

1. During isothermal process internal energy of the system remains__.
2. During isothermal process ___ of the system remains constant.
3. Write down isothermal equation.
4. During isochoric process_____ of the system remains constant.
5. Write down isochoric equation.
6. During adiabatic process____of the system remains constant.
7. Give an example for adiabatic process
8. Give an example for isothermal process.
9. Write down adiabatic equation.
10. Write down isobaric equation

11. During isobaric process, ---- of the system remains constant.
12. Express adiabatic equation in terms of volume and temperature.
13. Express adiabatic equation in terms of pressure and temperature.
14. In PV diagram area under the curve is equal to____.
15. Adiabatic elasticity / isothermal elasticity= ____.
16. in TS diagram area under the curve is equal to____.
17. The unit of entropy is____.
18. Dimensional formula of entropy is___.
19. During carnot cycle entropy of the system_____.
20. In PV diagram, what is the ratio of slope of adiabatic to the slope of isothermal?

Answers

1. Constant
2. Temperature or internal energy
3. PV=CONSTANT OR P1V1=P2V2
4. Volume
5. P/T=CONSTANT
6. Entropy
7. Sudden busting of tyre
8. Melting of ice or boiling of water
9. $pv^{\square}$ = constant
10. V/T= constant
11. Pressure
12. $TV^{\square-1}=K$
13. $T^{\square}=K$
14. Work done
15. □
16. Heat exchanged
17. J/K or Cal/^{0}c
18. $ML^{2}T^{-2}K^{-1}$
19. Remains constant
20. □

Module IV

PART A

1. Give an example for conservative force
2. Give an example for non conservative force
3. For conservative forces, work done around a closed path is _____.
4. The energy possessed by a particle by virtue of its position or state of strain is called_____
5. The energy possessed by a particle by virtue of its motion is called___.
6. What is energy function
7. At any point of a conservative force field the sum of kinetic and potential energy of a particle is _____
8. Curl of a conservative force is___

Answer

1. Gravitational force,electrostatic force

2. Viscous force, frictional force
3. Zero
4. Potential energy
5. Kinetic energy
6. E=K+U
7. Constant
8. zero

Module V

Part A

1. Energy density for a plane harmonic wave is.....
2. The total energy of a particle executing SHM is proportional to;
   (a) Displacement from equilibrium position
   (b) Frequency of oscillation
   (c) Velocity in equilibrium position
   (d) Square of amplitude of motion
3. The unit of angular velocity is.....
4. The variable in sound waves is.....
5. What happens to amplitude as time increases during damping.
6. A particle executing SHM has amplitude 0.6m. The time taken by the particle In covering a distance 0.3m from mean position, if time period is 3.14sec is.....
   (a) 2.6sec (b) 0.26 sec (c) 6.2 sec (d) 0.62 sec
7. The amplitude of a damped oscillator becomes ½ after t seconds. If the amplitude becomes 1/x after 3t second, then x is equal to.
   (a) 0.8 (b) 8 (c) 0.4 (d) 4
8. In SHM, when the displacement is one half the amplitude, what fraction of the total energy is kinetic?
   (a) Zero (b) ¼ (c) ½ (d) ¾
9. Which is the following is transmitted by a wave
   (a) Amplitude (b) Velocity (c) Energy (d) Momentum
10. Which of the following expressions is that of a progressive wave?
    (a) Asin (□t-kx) (b) a sin □ t (c) a cos kx (d) a sin □t cos kx
11. Which of the following equations represent SHM?
    (a) A sin □t+B cos □t
    (b) A sin □t+B cos 2 □t
    (c) A $\sin^2$□t
    (d) $e^{\sin}$□t
12. The equation for progressive wave is Y= A sin(100...t-0.02z). Then velocity of wave is:

(a)500π(b) 5000 π (c) 50 π (d) 5 π

Answers

1. $2\pi^2\nu^2a^2\rho$

2. Square of amplitude of motion
3. Rad/sec
4. Pressure
5. Exponentially decrease
6. 0.26sec
7. 8
8. ¾
9. Energy, momentum
10. Asin (t-kx)
11. Asin (t-kx) + b cos t
12. 5000π

ModuleVI

Part A

One word questions

1. Say true or false:
   An electron microscope can magnify objects than optical microscope
2. Operators associated with observable variables are.....
3. TEM stands for .....
4. According to schrodinger a particle is equivalent to a
   (a) Single wave (b) wave packet (c) light wave (d) cannot behave as wave
5. Wave function has no direct.....
6. The allowed values of energies of a particular system are called:
   (a) Eigen value (b) Eigen function (c) Hamiltonian (d) Wave function
7. The operation d/dx operates on Eigen function gives Eigen value k, then corresponding Eigen vector is:
   (a) Kx (b) cos kx (c) sin kx (d) e^{Kx}
8. According to De-Broglie hypothesis, the momentum p is.....
9. The principle of electron microscope is based on..... (De Broglie wavelength)
10. A proton and alpha particle have the same kinetic energy, ratio of their momenta is given by
    (a) ½ (b) 2 (c) 1 (d) none of the above
11. Momentum of a photon if wavelength 4000 A^0 is.....
12. Which of the following is not an eigen function of the operator d^2/dx^2
    (a) Sin x (b) cos x (c) e^X (d) $\sin^2 x$
13. The principle of STM is based on
    (a) De Broglie hypothesis (b) quantum tannelling (c) both (d) none of the above
14. According to De Broglie hypothesis, the momentum 'p' is
    (a)h/lamda (b)lamda×h (c) lamda/h (d) none of the above

Answers

1. True

2. Eign value operator
3. Tunnelling electron microscope
4. Wavepacket
5. Physicalsignificance
6. Eigen values
7. e^{kx}
8. $p=h/\lambda$
9. De Broglie wavelength
10. ½
11. $6.625x10^{-34}/4000x10^{-10}$
12. Sin^2x
13. Both
14. h/λ

Module VII

One word questions

1. Any frame of reference moving relative to an identical frame with constant velocity will be.....
2. A train moving with constant velocity is:
   (a) An inertial frame (b) A non inertial frame (c) neither inertial nor non inertial frame (d) Sometimes inertial and sometimes non inertial
3. Which of the following is Galilean invariant
   (a) Velocity (b) Acceleration (c) Both of these (d) None of the above
4. The transformation of coordinates of particle from one inertial frame to another is known as:
   (a) Relativistic transformations
   (b) Galilean transformations
   (c) Lorentz transformations
   (d) Newtonian transformations
5. Giant wheel is an inertial frame of reference (true/false)
6. Galilean transformation are valid for v=c (true/false)
7. Identify the frame of reference which is inertial
   (a) Lift moving upward with an acceleration
   (b) Rotating giant wheel.
   (c) A car moving with uniform velocity.
   (d) A car moving with uniform velocity negotiating a curve.

Answers

1. Internal
2. An initial frame
3. Acceleration

4. Galilian transformation
5. Flase
6. False
7. A car moving with uniform velocity

Module VIII

PART A

1. Lorentz transformation coincide with the galilean transformations when_____
2. a cube is moving along one of its face at a very high speed, then it will look like a_____
3. what is the length of a metre scale moving horizontally with a velocity c/2 with respect to an observer on the ground?
4. the proper time interval is the time interval between two events as observed by an observer who is (in an inertial frame of reference, tourist, present at both events, uses a clock at rest relative himself)
5. If an observer moves fast related to a clock and a rod he finds that(the clock is slow and the rod is shortened, the clock is fast and the rod shortened, the clock is slow and the rod remains the same, the clock is fast and the rod is lengthened)
6. Which of the following is applicable to the postulates of special theory of relativity (accelerated frame, non inertial frame, inertial frame, stationary frame).
7. A source emits light with a velocity c. If an observer moves toward the force with a velocity v the velocity of light with respect to him is ____.
8. The presence of muon on the surface of earth is due to __

Answer

1. V<<C
2. Parallelepiped
3. 0.866m
4. Who is present at both
5. The clock is slow and rod is shortened
6. inertial frame
7. C
8. time dilatio

Module I

Part B (short answer)

1. What is bulk Modules of elasticity. How it is related to compressibility.
2. What is torsion pendulum.
3. State Hooke's law in elasticity.
4. Define the terms angle of twist and angle of shear.
5. Define the term modules of rigidity. Write down the relation connecting the three modulii of elasticity.
6. What is torsion rigidity?
7. Which is more elastic, air or water? Why?
8. Define Poisson's ratio. What is the theoretical limit of poisson's ratio.

9. Find out the equation of motion of torsion pendulum.

Module II

Part B

1. Distinguish between stream line flow and turbulent flow of liquids.
2. What is the significance of stoke's formula? What is its use?
3. Give one application of stoke's formula for viscous drag.
4. Define the term 'terminal velocity' of a body falling through a highly viscous medium.
5. How does detergent remove dirt from clothes?
6. What is meant by Brownian motion? How does temperature effect this movement.
7. Explain why liquid posses surface tension.
8. How does temperature and pressure effect the viscosity of a liquid?
9. How does surface tension varies with temperature.
10. What do you meant by sphere of influence?
11. Define coefficient of viscosity. Give its dimensional formula.
12. What is meant by turbulent flow.
13. Define surface tension give its dimension.
14. Small insects can walk on water surface why?
15. Why rain drops attain constant velocity when it falls through air?

Module III

PART B

1. What is meant by thermodynamic equilibrium?
2. What is meant by thermodynamic process?
3. What is meant by isothermal process? Give an example.
4. What is meant by isobaric process?
5. What is mean by adiabatic process? Give an example.
6. What is meant by isochoric process?
7. What is meant by indicator diagram?
8. Draw PV diagram for isothermal expansion
9. Draw PV diagram for adiabatic expansion.
10. Draw PV diagram for isobaric expansion
11. Draw VT diagram for isothermal expansion.
12. Draw VT diagram for adiabatic expansion.
13. Draw VT diagram for isobaric expansion.
14. Draw PT diagram for isothermal expansion.
15. Draw PT diagram for adiabatic expansion.
16. Draw PT diagram for isobaric expansion.
17. What is meant by quasi static process?
18. derive the expression for work done in isobaric process.

19. State first law of thermodynamics.
20. write down the differential form of first law of thermodynamics.
21. What is entropy? Write down its unit and dimensional formula.
22. State clausius theorem
23. Write a short note on principle of increase of entropy.
24. Write a note on entropy and disorder
25. Write a note on entropy and available energy.
26. An ideal gas at 1 atmosphere is slowly compressed to 1/8 of its initial volume. find the resulting pressure.
27. An ideal gas at STP is isobarically compressed to 1/4 of its original volume. find the resultant temperature.
28. Ideal gasat STP is isochorically heated to double its temperature. what will be the final pressure?

Module IV

Part B

1. Define simple harmonic motion.
2. What is damping?
3. What is meant by energy density of a wave.
4. State Fourier theorom
5. Explain the expression for time period of loaded spring.
6. Write down the expression for equation of plane progressive wave and explain each terms.
7. What is an harmonic oscillator?
8. Give the general equation of wave motion. What is its significance.
9. Distinguish between transverse and longitudinal wave.
10. What is meant by periodic motion. Give two examples.
11. What is simple pendulum. Give its period.
12. Represent graphically the variation of potential energy, kinetic energy and total energy of a harmonic oscillator with displacement.
13. Distinguish between periodic motion and oscillatory motion with examples.
14. What is the significance of wave Function?
15. Explain probability density.
16. What is an operator? Give example.
17. Discuss the principle of electron microscope.
18. Give the basic principle of S.T.M
19. Explain the properties of a wave function.
20. What is De Broglie hypothesis.
21. Write down De Broglie wave equation and explain the symbol.
22. What is an electron microscope?
23. Give any two uses of electron microscope.
24. Give the principle of S.T.M. give its two uses.

Module V

PART B

25. State work energy theorem
26. What are conservative forces?
27. What are non conservative forces?
28. What is meant by potential energy curve?
29. What do you mean by potential well?
30. State the law of conservation of linear momentum.
31. Show that in the absence of external force the total linear momentum of a system of particles is constant.
32. What is meant by centre of mass?
33. Prove that when the external force acting on a system is zero then the centre of mass is moving with constant velocity.
34. What is centre of mass frame of reference
35. Find out the expression for the position vector and velocity of centre of mass of a system of particles.
36. What is meant by zero momentum frame of reference?

ModuleV I

Part B

1. Explain the hypothesis of Galilean invariance.
2. What is meant by inertial frames of reference. Give example.
3. Under what condition Lorentz transformation reduces to Galilean transformations?
4. Show that all the inertial frame in constant relative motion are equivalent.
5. Write Galilean transformations for space and time.
6. What is meant by a frame of reference.
7. Mention two properties of an frame of reference.
8. Mention two physical quantities which are invariant under Galilean transformation.
9. Obtain Galilean transformation equation for velocity of a particle moving in space.
10. Show that force is invariant under Galilean transformation.

ModuleVI I

PART B

1. State the postulates of special theory of relativity
2. Write down Lorentz transformation equations
3. Write down inverse Lorentz transformation equations.
4. What is meant by Lorentz Fitzgerald contraction?
5. State the conditions under which Lorentz transformation reduces to galilean transformation.
6. What is meant by length contraction?
7. What is meant by time dilation?
8. What is twin paradox.
9. Explain the experimental verification of time dilation.
10. explain the consequences of Lorentz transformation equations
11. Define proper length and proper time

Module I

Part C (paragraph)

1. Find the work done in stretching a wire.
2. Explain why a cork is more suitable than rubber for making bottle stopper.
3. Given a 2 m length of steel wire with 1 mm diameter, about how much will the wire stretch under a 5 kg load? Y of steel=20×10^{10}pa; g= 9.8 m/s^2.
4. About how large a force is required to stretch a 2 cm diameter steel rod by 0.01 percent? Y= 20×10^{10}pa; g= 9.8m/s^2
5. The shear module of a metal is 5×10^{10}pa.Suppose a shear of force of 20N is applied to the upper surface of a cube of this metal that is 3 cm on each side. How far the top surface be disappeared?
6. How large a pressure(in Pascal) must be applied to water if it is to be compressed by 0.01 percent. What is the ratio of this pressure to atmospheric pressure 1.01×10^5 pa.
7. Calculate the Poisson's ratio for aluminium. Given Y= 7×10^{10}pa and n= 2.5×10^{10}pa.
8. Derive an expression to find out the period of oscillations of a torsion pendulum.

Module II

PART C

1. Distinguish between isothermal and adiabatic processes.
2. Derive the expression for work done during isothermal process.
3. Derive the expression for work done in adiabatic process.
4. Write down the differential form of first law of thermodynamics and apply it to the different thermodynamic processes.
5. Write a note on principle of increase of entropy.
6. Write a note on entropy and available energy.
7. Write a note on entropy and disorder

Module III

Part C

1. How temperature affect surface tension?
2. Explain the effects of impurities on surface tension.
3. Calculate the terminal velocity of an air bubble of radius 2×10^{-5}m raising in water of viscosity 0.8×10^{-3} NS/m^2 density of water=10^3kg/m^3 and g=9.8m/s^2. Neglect the density of air in comaparison to that of water.
4. Water is converged through a pipe 8cm in diameter and 4km in length at rate of 120litres per minute. Calculate the pressure required to maintain the flow. Viscosity of water=0.8×10^{-3}NS/m^2
5. State and prove work energy theorem

6. 2.Distinguish between conservative and nonconservative forces
7. 3.Prove that conservative forces can be expressed as the negative gradient of potential energy.
8. 4.Prove that the curl of a conservative force vanishes.
9. 5.What is potential energy curve? Explain the positions of stable equilibrium, unstable equilibrium & neutral equilibrium.
10. 6. The distance covered by a body of 2 kilogram under the action of a force is related to time t as $t^2/4$. What is the work done by this force in 2 seconds?
11. 7. A force F= a+ bx acts on a particle in the X direction where a and b are constants. Find the work done by this force during a displacement from x =0 to x=d.
12. 8. If a force 5i -3j + k N acts on a particle during a displacement from the point A(20,15,0) to the point B (0,0,7) find the work done on the particle.
13. 9. Show that the force F= yz i +zx j+xy k is conservative.
14. 10. A body of mass 2 kilogram initially at rest is moved by a horizontal force of 0.5N on a smooth frictionless table. Obtain the work done by the force in 8 seconds and show that this equals the change in kinetic energy of the body.
15. 11. Energy of a particle is given by U= A- B/X+c/X^2 where A, B and C are positive quantities and constants. what is the position of stable equilibrium?
16. 12. A 30 kilograms shell is flying at 48 m/s. When it explodes it's one part of 18 kg stops while the remaining part flies on. Find the velocity of the latter.
17. 13. The distance between the centres of the carbon and oxygen atoms in a molecule is 1.13 x 10^{-10} m. locate the centre of mass of the molecule relative to the carbon atom.

18.. The coordinates of the centre of mass of a system of three particles of masses 1kg, 2 kg and 3kg are (2,2,2). what should be the position of the fourth particle of mass 4kg so that the centre of mass of the four particle system is at the origin of the three dimensional co-ordinate system?

Module IV

Part C (paragraph)

1. A body having a man of 4g executes simple harmonicmotion. The force acting on the body when the displacement is 8cm is 24g. Find the period. If the maximum velocity is 500cm/s, find the amplitude and maximum acceleration.
2. A pendulum is of length 50cm. Find its period when it is suspended in
   (a) A stationary lift
   (b) A lift falling at a constant acceleration of $2m/s^2$.
3. Obtain the period of oscillation of a simple pendulum.
4. Show that for a simple harmonic oscillation, the total energy is proportional to the square of the amplitude.
5. A man m kept at the end of a spring vibrates with a frequency of 0.90Hz. When an additional man of ½ kg is added to m the frequency is 0.60Hz. Find m.
6. Show that the velocityof a particle in SHM at a distance... ¾ of its amplitude from the mean equilibrium position.
7. Calculate the total energy of a body suspended from w spring of spring constant 3N/m. If its amplitude of oscillation is 2cm.

8. Calculate the amplitude of the vibrating particle, wave velocity, wavelength, frequency and time period of a wave represented by y=10 sin 2../100 (3600t-20x). In CGS units.
9. Show that the average kinetic energy/unit volume over a period of a progressive wave is equal to half of the total energy of the wave.

Module V

Part C (paragraph)

1. What are the postulates of quantum mechanics.
2. Explain the working of electron microscope.
3. With suitable example explain Eigen value and Eigen function.
4. Calculate the De Broglie wave length of an alpha particle accelerated by a potential difference of 25 KV
5. Determine the velocity and kinetic energy of a neutron having De Broglie wave length equal to 1 ampstron. Given mass of neutron is 1.675×10^{-27}kg.
6. Calculate the wave length associated with electrons whose speed is 0.01 times the speed of light.
7. Find the De Broglie wave length associated with an electron moving with velocity 10^7 m/sec.

Module VI

Part C (paragraph)

1. A ball has velocity 4i^-5j^+10k^ m/s, relative to a train moving with velocity 3i^+4j^m/s relative to an observer on the ground. Calculate the velocity of the ball relative to the ground.
2. Show that length is invariant under Galilean transformation.
3. Shoe that acceleration is invariant under Galilean transformation.

Module VII

PART C

1. Explain length contraction
2. Explain time dilation
3. Explain how time dilation was verified experimentally.
4. A spacecraft of length 125 m and diameter 10 m is moving with a speed of 0.98 c. What is its length and diameter with respect to an observer on earth?
5. A 200 m long train has to pass through 150 m long tunnel. if the train moves towards the tunnel with a speed of 0.8 c, find the length of the train and the tunnel as seen by a man (a) at the train (b) at the tunnel
6. Rocket is 100 m long on earth.when it is in flight its length is 98m to an observer in the space laboratory. Compute the speed of rocket.

7. Anu is 25 years old and her father Anand is 60 years old. Anand goes to space in a spaceship. On returning from space, anand find himself 70 years old whereas his daughter has become 65 years old. Find the velocity of the spaceship.
8. How much younger an astronaut will appear to the earth observer if he returns after 1 year having moved with a velocity 0.8 c

Module I

Part D

1. Show that potential energy stored per unit volume of a strained wire is U= ½ stress× strain.
2. Discuss the method of determining rigidity modules of a wire using torsion pendulum.

Module II

Part D

1. Explain how impurities and contamination affect surface tension. How does the curvature of a liquid surface affect evaporation.
2. Derive an expression for the rate of flow of a liquid through a capillary tube.
3. Discuss poiseuilli's method for determining the coefficient of viscosity.
4. Derive stoke's formula for the velocity of a small sphere falling through a viscous fluid.

Module III

PART D

1. Derive the expressions for work done in isothermal process and adiabatic process.

2. What is entropy? Write a note on entropy and unavailable energy.

Module IV

PART D

1. A) explain conservative and non conservative forces with suitable examples
   B) show that the conservative forces can be expressed as the negative gradient of potential energy
2. A)What do you understand by the potential energy curve?
   B) explain what you mean by the positions of stable unstable and neutral equilibrium

Module V

Part D

1. Show that average potential energy/unit volume over a period T of a progressive wave= average kinetic energy/unit volume over a period T.
2. Explain Simple Harmonic Motion. Obtain the different equation of Simple Harmonic Motion and determine the expressions for its amplitude, velocity and period.
3. Define Simple Harmonic Motion. Show that for small amplitudes, oscillations of a simple pendulum are simple harmonic in nature and hence find its period
4. What is Simple Harmonic Motion. Show that the oscillation of a spring man system are simple harmonic i nature and obtain its period.

Module VI

Part D (essay)

1. Derive the time dependent Schrodingerequation of matter waves. Give the physical interpretation of wave function.
2. Explain the principle and working of an electron microscope.
3. (a) Derive the steady state form of Schrodinger's equation.
   (b) What do you meant by energy Eigen values and Eigen states.

Module VII

Part D (essay)

1. Derive the Galilean transformation equation and explain its invariance.
2. What is meant by Galilean transformation?
   Obtain transformation equation for
   (a) Length
   (b) Velocity
   (c) Acceleration
3. Derive Galilean transformation equation and hence deduce that length is invariant under Galilean transformation.
4. Show that a frame of reference moving with a constant velocity with respect to an inertial frame of reference is also inertial. Derive Galilean transformation equations.

Module VIII

PART D

1. Derive Lorentz transformation equations
2. using Lorentz transformation equation, explain Lorentz Fitzgerald contraction and time dilation.

GEC3OC01 ORGANIC CHEMISTRY I

MODULE 1

Section A

1. The unique property of carbon to form covalent linkages to itself is called …….
2. The shape of *methane* molecule is ……..
3. The general formula of *alkenes* is ……
4. The IUPAC name of *acetic acid* is ……..
5. The structural formula of *prop-2-en-1-ol* is …….
6. CH_3-CH_2-CH_2Cl andCH_3-CHCl-CH_3 illustrates the type of structural isomerism known as …….. isomerism.
7. Adjacent members of a homologous series differ by a …….. Group.
8. *Cyclohexane* and *hex-2-ene* is a pair of structural isomers, called ……. isomers.
9. Among *ethane, ethene, ethyne,* the molecule in which both the carbon atoms are S_2 hybridized is ……..
10. *Butane* is the chain isomer of ……..

Questions with one-word answers

11. What is the IUPAC name of *tert-butyl*-alcohol?
12. What kind of structural isomerism does the pair of *pentan-2-one* and *pentan-3-one* illustrate?
13. What is the state of hybridization of both carbons in *ethane*?
14. How many sigma bonds are there is *acetylene* molecule?
15. What is the tendency of an element to form bonds between its own atoms to form chains of indefinite length or rings known as?
16. What is the functional group present in *ketones*?
17. Write the structural formula of but-2-enal.
18. What is the IUPAC name of CH_3-CH_2-O-CH_2-CH_3?
19. Among *ethane, ethane* and *ethyne*, which contains its carbon atoms in the SP^3 hybridized state?
20. Among *cyclohexane, pyridine, benzene* and *aniline,* which is the heterocyclic compound?

Answer Key:

1. Catenation
2. Tetrahedral
3. C_nH_{2n}
4. Ethanoic acid
5. $CH_2{=}CH–CH_2OH$
6. Position
7. $–CH_2–$
8. Ring-chain
9. Ethyne
10. 2-methylpropane
11. 2-Methylpropan-2-ol
12. Metamerism
13. Sp^2
14. Three
15. Catenation
16. >C=O
17. $CH_3–CH=CH–CHO$
18. Ethoxyethane
19. Ethane
20. Pyridine

Module II

Section A

Fill in the blanks

1. The specific spatial arrangement of atoms or groups that characterizes a particular stereoisomer is called its…….
2. Since conformational isomers are rapidly interconvertible, they exist in ……... equilibrium.
3. The eclipsed conformation of ethane is ……. stable than its staggered conformation.

4. The chair conformation of methyl cyclohexane in which the methyl group is in equatorial position is …….. stable than the one in which it is in axial position.
5. The different spatial arrangements of atoms or groups in a molecule that arises from free rotation about a single bond are called…….
6. Conformational isomerism arises because of ……..rotation about a single bond.
7. The most stable conformation of ethane is the…….. conformation.
8. The least stable conformer of butane is the …… form
9. Two conformers which are non- superimposable mirror image of each other are referred to as conformational……..
10. The most stable conformation of ethylene glycol is its ……. form.
11. The separation of a racemic mixture into its d and l components are called…….
12. Stereoisomer that are not mirror image of each other are called…….
13. The conversion of an enantiomers into the racemic modification is called…….
14. An equimolar mixture of the two enantiomers of a substance is known as the ……. modification.
15. The necessary condition for a substance to show optical isomerism is that its molecule should be ……
16. Optical isomerism results from …….. in molecules.
17. The instrument used to measure the angle of rotation of the plane polarized light effected by an optically active sample is called a ……
18. "All compounds containing chiral centres are optically active". This statement is …….. (True/ false)
19. The biochemical method of resolution makes use of ……. Which selectively assimilate one enantiomers, leaving the other in solution.
20. The ……. form of tartaric acid is optically inactive due to internal compensation.
21. A molecule non-superimposable on its mirror image is called a/an…….. Molecule.
22. A carbon atom bonded to four different atoms or groups is called a/an……. carbon.
23. Geometrical isomerism arises due to restricted rotation about……. bonds.
24. Maleic acid and fumaric acid are……. isomers.
25. Trans-but-2-ene has a…….. dipole moment that cis-but-2-ene.

Questions with one- word answers

26. Which is the most stable conformer of cyclohexane?
27. Which is the least stable conformer of ethane?
28. What is general term used to describe a synthetic process in which an optically active chiral compound is produced from an achiral compound?
29. How many optically active isomers are possible for CH2OH-CHOH-CHOH-CHO?
30. Among –COOH, -$CONH_2$, -$COCH_3$ and –CH_2Brwhich group has the highest priority in the Cahn-Ingold-Prelog system of specifying configuration?
31. Among CH_3-CHCl-CH_2OH, HOOC-CH_2-CH_2OH and HOH_2C-CHOH-CH_2OH, which one shows optical isomerism?
32. Among a pair of cis-trans- isomers, which form generally has a higher melting point?
33. Among CH_2=CHCl, CHCl=CHCl and CH_2=CH-CH_2Cl, which one shows cis-trans isomerism?
34. By what name is cis-but-2-ene-1,4-dioic acid commonly known?
35. For a particular geometrical isomer of an aldoxime the H and OH lie on the same side of the carbon- nitrogen double bond; what is the isomer referred to as?

Answer key:

1. Configuration
2. Dynamic
3. Less
4. More
5. Conformations
6. Free
7. Staggered
8. Fully-eclipsed
9. Diastereomers
10. Gauche
11. Resolution
12. Diastereomers
13. Racemization
14. Racemic

15. mmetric (or enantioselective) synthesis
16. 4 (four) Chiral (dissymmetric)
17. Chirality
18. Polarimeter
19. False
20. Microorganisms
21. Meso
22. Chiral (dissymmetric)
23. Chiral (asymmetric)
24. Double
25. Geometric
26. Lower
27. Chair
28. Eclipsed
29. Asy
30. $-CH_2Br$
31. CH_3-CHCl-CH_2OH
32. Trans
33. CHCl=CHCl
34. Maleic acid
35. syn

Module III

Section A

Fill in the blanks

1. Particles resulting from bond homolysis are called……...
2. t-Butylcation is ……. stable than isopropyl cation.
3. The acidity of chloroacetic acid is …….. than that of acetic acid.
4. An electrophile is a Lewis…….
5. Among the groups, -COOH, -Cl, -CH_3 and –CN, the one showing +I effect is……

6. A resonance hybrid has a……. energy than any of the resonating structures for that molecule.
7. Among the groups, $-NO_2$, -OH, $-NH_2$ and –OR, the one showing –M effect is…….
8. A reactive intermediate species that has a carbon bears a negative charge is called a…….
9. The state of hybridization of the carbon carrying the positive charge in an alkyl cation is ……..
10. The general order of decreasing stability for 1°,2° and 3° alkyl free radicals is …….
11. The benzyl radical is …….. stable than the allyl radical.
12. The carbene involved in the carbylamines reaction in the…….
13. The state of hybridization of C bearing the unshared pair in a triplet carbine is……..
14. The most acidic among the chlorobutanoic acid is……..
15. Among –OH, $-NH_2$, $-NO_2$ and Cl, the group showing meta directing influence in aromatic electrophilic substitution reaction is …….

Questions with one-word answers

16. What is a neutral organic species having an unpaired electron called?
17. What is the name given to a reaction intermediate species that has a carbon that bears a positive charge?
18. What is the state of hybridisation of the carbon bearing the unpaired electron in a simple alkyl free radical?
19. What is the state of hybridisation of the carbon carrying the negative charge in an alkyl carbanion?
20. By which kind of bond cleavage are free radicals produced?
21. What are the particles resulting from bond homolysis called?
22. Among methyl, ethyl, isopropyl and tert-butyl cations, which is the most stable?
23. Which is more acidic- ethanoic acid or 2-chloroethanoic acid?
24. Which is less acidic-formic acid or acetic acid?
25. What kind of bond cleavage yields charged fragments?
26. Which has a higher pk_avalue –ethanoic acid or propanoic acid?
27. Name an electron displacement effect which is a temporary effect taking place only at the requirement of an attacking reagent.
28. What kind of mesomeric effect does nitro group exhibit?

29. Which is more stable- but-1-ene or but-2-ne?
30. What is the name given for the delocalization of electron by the overlap of a sigma bond orbital with s pi or p orbital?

Answer key:

1. Free radicals
2. More
3. Grater
4. Acid
5. $-CH_3$
6. Lower
7. $-NO_2$
8. Carbanion
9. Sp2
10. 3°>2°>1°
11. More
12. Dichlorocarbene (: CCl_2)
13. sp
14. 2-chlorobutanoic acid
15. $-NO_2$
16. Free radical
17. Carbocation
18. Sp^2
19. Sp^3
20. Homolysis
21. Free radicals
22. tert-Butyl cation
23. 2-chloroethanoic acid
24. Acetic acid
25. Heterolysis
26. Propanoic acid
27. Electromeric effect

28. –M effect
29. But-2-ene
30. Hyperconjugation

ModuleIV

Section A

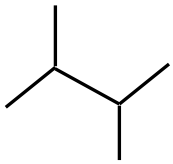
Fill in the blanks

1. Sabatier-Senderens reduction uses the catalyst ……. at 523-573 K.
2. The IUPAC name of $(CH_3)_4C$ is …….
3. Methyl iodide when heated with sodium metal in dry ether solution yield …….
4. The general formula of alkenes is ……. where *n* is the number of carbon atoms.
5. The reaction of an alkyl halide with sodium to produce a higher alkane is called …….
6. Reaction of methane with chlorine in the presence of UV light takes place by a chain mechanism involving reactive intermediate species known as …….
7. Dehydrogenation of hexane by heating with Cr_2O_3/Al_2O_3 catalyst at 600^0C under pressure gives the cyclic compound …….
8. Dehydrohalogenation of $(CH_3)_2CBr-CH_3$ yields …….
9. Primary alkyl halides undergo elimination by the ……. mechanism.
10. Ethylene reacts with Baeyer's reagent to give …….
11. The major product obtained when propene reacts with HI is …….
12. In a 1,2- elimination reaction, the predominant product is the alkene that has the ……. number of alkyl groups attached to the doubly bonded carbon atoms.
13. Dehydration of alcohols yields …….
14. Dihalo compounds in which the halogens are situated on adjacent carbon atoms are called ……. –dihalides.
15. The anti –Markovnikov addition observed when HBr adds to an alkene in the presence of an organic peroxide is called …….
16. Hydrogenation of unsaturated hydrocarbons using ordinary nickel as catalyst at $250\text{-}300^0C$ is known as ……. reduction.
17. Baeyer's reagent is dilute alkaline ……. solution.
18. The alkene that gives methanol as the product of ozonolysis is …….

19. Structural isomerism illustrated by the pair hex -2- ene and hex -3- ene is …….. isomerism.
20. A ……. reaction is one in which two reactants add together to form a cyclic product.
21. Complete dehydrohalogenation of CH_3 –CHBr –CH_2Br yields ……..
22. Pd supported over $BaSO_4$ and partially inactivated with quinolone is called …….. catalyst.
23. Among CH_3–CH_3, CH_2=CH_2 and CH≡CH, ……. contains the most acidic hydrogen.
24. When propyne is passed through hot dilute sulphuric acid in the presence of Hg^{2+} catalyst, the product is ……..
25. The IUPAC name of CH_3 –C≡C–CH_3 is …….
26. Alkynes are generally ……. reactive than alkenes in electrophilic addition reactions.
27. In the presence of a peroxide, addition of HBr to propyne yields …….
28. The ozonolysis of an alkyne C_4H_6 yields two molar proportions of acetic acid as the final product. The original alkyne must be ……
29. Among the sp^2 and sp^3 hybridized C atoms, the most electronegative is the …….. hybridised carbon.
30. Vinyl alcohol and acetaldehyde collectively illustrate the phenomenon of ……tautomerism.

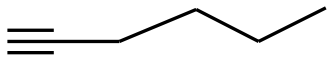
Questions with one-word answers

31. What is IUPAC name of the following compound?



32. What is the IUPAC name of the neopentane?
33. What is the product obtained when 2 –iodopropane is heated with zinc and acetic acid?
34. ?hat is the product obtained when CH_3 –CHBr –CH_2Br is heated with zinc dust in ethanol?
35. Among 2–methylpropan-2-ol, propan-2-ol, propan-1-ol and ethanol, which undergoes dehydration the most easily?
36. What is the major product of dehydrohalogenation of 2-bromopentane?
37. What is the major product obtained when pent-1-ene adds HBr in the presence of benzoyl peroxide?
38. What is the product of ozonolysis of but-2-ene?

39. What is the major product obtained when propene is subjected to acid catalysed hydration?
40. Name the carboxylic acid producted propene is heated with acidic $KMnO_4$ solution.
41. By what name is the cycloaddition reaction in which a diene interacts with a dienophile known as?
42. What is the IUPAC name of $CH_3 –CH=CH –CH_2 –C\equiv CH_3$?
43. Among Baeyer's reagent, ammoniacal silver nitrate solution and Br_2/CCl_4, which reagent can be used for a test to distinguish between but-1-yne and but-2-yne?
44. Among, but-1-ene, but-2-ene, but-1-yne and but-2-yne, which will yield a red precipitate when treated with ammoniacal cuprous chloride solution?
45. What is the product obtained when ethyne is passed into dilute sulphuric acid at 60^0C in the presence of mercuric sulphate catalyst?
46. Name the following alkyne:



Answer Key:

1. Nickel
2. 2,2 –dimethylpropane
3. Ethane
4. C_nH_{2n+2}
5. Wurtz reaction
6. Free radicals
7. Benzene
8. 2 –methylpropene [$(CH_3)_2CH=CH_2$]
9. E2
10. Ethylene glycol (ethane-1,2-diol, $CH_2OH –CH_2OH$)
11. 2 –iodopropane ($CH_3 –CHI –CH_2$)
12. Greater
13. Alkenes
14. Vicinal (vic)
15. Peroxide effect (Kharasch effect)
16. Sabatier-senderens

17. Potassium permanganate ($KMnO_4$)
18. Ethylene (ethene)
19. Position
20. Cycloaddition
21. Propyne
22. Lindlar's
23. $CH \equiv CH$
24. Acetone (propanone, $CH_3 - CO - CH_3$)
25. but-2-yne
26. less
27. 1,1 –dibromopropane ($CH_3 - CH_2 - CHBr_2$)
28. but-2-yne ($CH_3 - C \equiv C - CH_3$)
29. sp
30. keto-enol
31. 2,3 –Dimethylbutane
32. 2,2 –Dimethylpropane
33. Propane
34. 1 –Ethyl-3-methylcyclohexane
35. 2,4 –Dimethylpent-2-ene
36. $CH_3 - CH_2 - CH = CH - CH - CH_2$
37. 4 –Methylpent-2-ene
38. Propene ($CH_3 - CH = CH_2$)
39. 2 –Methylpropan-2-ol
40. Pent-2-ene
41. 1 –Bromopentane
42. Ethanol (Acetaldehyde, $CH_3 - CHO$)
43. Propan-2-ol (Isopropyl alcohol, $CH_3 - CHOH - CH_3$)
44. Ethanoic acid (Acetic acid)
45. Diels-Alder reaction
46. Hex-4-en-1-yne
47. Ammoniacal silver nitrate solution
48. But-1-yne

49. Acetaldehyde (Ethanal, CH_3 –CH=O)
50. Hex-1-yne

Module V

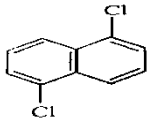
Section A

Fill in the blanks

1. In benzene, the state of hybridization of all the six C atom is ……..
2. The attacking electrophile in an aromatic nitration reaction is the ……. ion.
3. Friedel-Crafts alkylation reaction of benzene is an example for an aromatic…… substitution reaction.
4. –NO_2 groups has……. directing influence in aromatic electrophilic substitution.
5. reaction of benzene with methyl chloride in the presence of anhydrous $AlCl_3$ yields …….
6. Among –Cl, - NH2 and –COOH groups, the one that is a strongly activating group is the ……. group.
7. Among –Br, -OH, -NO_2 and –COOH groups, the one that is a weakly deactivating as well as ortho-para directing is the ……. group.
8. Sulphonation of naphthalene with con. sulphuric acid at 160°C yields ……..as the major product.
9. Strongly deactivating groups are generally ……directing in nature.
10. The type of structural isomerism exhibited by o-, m- and p-dichlorobenzene is……. isomerism.

Questions with one-word answers6

11. Which is the electrophile in aromatic bromination reaction carried out in the presence of a halogen carrier?
12. Among –CHO, -OH, -CN and –COCl groups, which has ortho-para directing influence?
13. What is the product obtained when ortho-xylene undergoes oxidation with alkaline $KMnO_4$ solution?
14. What is the product obtained when benzene reacts with acetyl chloride in the presence of anhydrous aluminium chloride?
15. Suggest name for the following compound:



Answer key:

1. Sp^2
2. Nitronium (NO_2^+)
3. Electrophilic
4. Meta
5. Toluene
6. $-NH_2$
7. –Br
8. β- naphthalene sulphonic acid
9. meta-
10. position
11. Br^+ (bromonium ion)
12. -OH
13. Phthalic acid
14. Acetophenone
15. 1,5-Dichloronaphthalene

Module VI

Section A

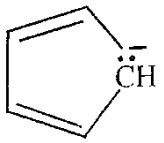
Fill in the blanks

1. Naphthalene is a bicyclic aromatic compound having a delocalized set of …… π electrons.
2. Huckel's rule is obeyed by conjugated cyclic polyenes with ……. π electrons where *'n'* is an integer.
3. Cycloheptatrienylcation is also known as ……. ion.
4. Among naphthalene, tropylium ion and anthracene, the monocyclic aromatic compound is ……

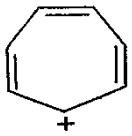
5. Among naphthalene, pyridine, furan and cyclohexane, the benzenoid aromatic compound is ……..
6. Pyridine is ……. basic than pyrrole.
7. Among pyrrole, furan, cyclopentadienyl anion and cyclobutadiene, the antiaromatic compound is …….
8. Completely conjugated monocyclic hydrocarbons are called ……
9. Among the following compounds: phenanthrene, anthracene, [14] annulene and furan, the one that is heterocyclic as well as aromatic is ……
10. Among pyrrole, pyridine and quinoline, the one that loses aromaticity upon protonation is ……..

Questions with one-word answers

11. Which is more basic –indole or quinoline?
12. Among cyclopropenylcation, cyclopentadienylcation, cyclopentadienyl anion and cycloheptatrienylcation, which is the antiaromatic species?
13. State whether the following compound is aromatic, antiaromatic or nonaromatic:



14. What is the name of the following cation?



15. What is the value of '*n*' as per Huckel's rule when a compound has nine pairs of π electrons?

Answer Key

1. 10
2. 4n+2
3. Tropylium
4. Tropylium ion
5. Naphthalene
6. More
7. Cyclobutadiene
8. Annulenes
9. Furan

10. Pyrrole
11. Quinolone
12. Cyclopentadienylcation
13. Aromatic
14. Tropylium ion (cycloheptatrienylcation)
15. 4

Module I

Section B (short answer)

1. What is meant by *catenation*?
2. Give two examples of *homocyclic* compounds.
3. Name and formulate an *alicyclic* compound.
4. Write the structural formulae and names of the isomers having molecular formula C_4H_{10}.
5. Write the structural formulae of *ethyl methyl ketone* and give its IUPAC name.
6. What is a *homologous series*?
7. Give the general formulae of the homologous series of i) alkanes, ii) alkenes, and iii) alkynes.
8. What is meant by functional group?
9. Name the functional group present in each of the following , i) Carboxylic acid, ii) amide, iii) alcohol.
10. If the formulae of the first member of a homologous series is C_2H_4 what are the formulae of the i) fourth member, ii) seventh member, iii) eleventh member?
11. Give the IUPAC names of the isomers of C_3H_7Cl.
12. How many structural isomers are possible for the formulae C_3H_8O?
13. Write the IUPAC names of

    i) $CH_2=CH-CH_2Cl$

    ii) $CH_2=\underset{\displaystyle CH_3}{\overset{|}{C}}-CH=CH_2$

    iii) $CH_3-\underset{\displaystyle O}{\overset{\displaystyle \|}{C}}-CH(CH_3)_2$

14. Write the IUPAC names of:

i) Neopentane ii) sec-Butyl alcohol iii) Ethylene dichloride

15. Write the IUPAC names of:
16. What is meant by position isomerism? Illustrate with an example.
17. Name the type of structural isomerism exhibited by the following pairs of compounds*:*

    (i) 1-propanol and 2-propanol; (ii) propanone and propanal
18. What is meant by *metamerism*? Illustrate metamerism with an example.
19. Name the type of hybridization of carbon in each of the following compounds:

    i) methane; ii) ethylene
20. What is the hybridization of C in *ethane*? How many sigma and pi bonds are there in the ethane molecule
21. What is the shape of *ethyne* molecule? Name the type of hybridization of carbon found in ethyne.
22. What is meant by *tautomerism*? Give an example.
23. Give an example for a pair of *ring-chain isomers.*

Module II

Section B (short answer)

1. Define the term conformation.
2. What is meant by the term configuration?
3. Draw the sawhorse projections of the two extreme conformations of ethane.
4. Draw the Newman projections of the two extreme conformations of ethane.
5. Which conformation of ethane is the most stable and which is the least stable?
6. Which conformation of butane is the most stable and which is the least stable?
7. Draw the Newman projections of the most stable and the least stable conformations of butane.
8. What is meant by angle strain?
9. Which among the cycloalkane rings has the least calculated value of angle strain?
10. Which among the cycloalkane rings has the maximum calculated value of angle strain?
11. Draw the two extreme conformations of cyclohexane.
12. Draw the chair conformation of cyclohexane and mark the equatorial and axial bonds.
13. Draw the chair conformations of methylcyclohexane.

14. What is meant by plane polarized light?
15. What is meant by optical activity? What type of compounds exhibit this property?
16. Define specific rotation?
17. What is symmetry element?
18. Define axis of symmetry.
19. Define plane of symmetry.
20. What is meant by centre of symmetry?
21. Define improper rotation axis.
22. Differentiate between asymmetric and dissymmetric molecules.
23. What is the necessary and essential condition for a molecule to exhibit optical activity?
24. What is meant by chirality?
25. Give two examples for molecules exhibiting optical isomerism.
26. What is meant by a chiral carbon atom?
27. State whether the following molecule will exhibit optical isomerism or not: -HOOC-CH_2-CH(OH)-CH_2-COOH. Explain your answer.
28. Which of the following structures will exhibit optical isomerism:
    (a) CH_3-CHOH-CHO;
    (b) C_6H_5-NH-NH_2? Justify your answer.
29. Write the structural formula of the tartaric acid molecule and mark the chiral carbon atoms.
30. How many optically active forms are possible for tartaric acid?
31. Draw the Fischer projections of the optical isomers of 2-chlorobutane.
32. Draw the Fischer projections of the optical isomers of 2-butanol.
33. What are enantiomers?
34. Define enantiomerism.
35. Draw the flying-wedge projections of the enantiomers of 2-butanol.
36. What are Diastereomers?
37. Distinguish between the terms enantiomers and Diastereomers?
38. What are meso compounds?
39. Is a meso-stereoisomer optically active or not? Justify your answer.
40. How can d-lactic acid and l-lactic acid be differentiated?

41. How many optical isomers are possible for a molecule containing 3 asymmetric carbon atoms? How many of them will be dextrorotatory?
42. Draw the planar formula of meso-tartaric acid and comment on its optical activity giving reason.
43. What is meant by a racemic mixture?
44. What is meant by resolution of a racemic mixture?
45. Give one method for the resolution of a racemic modification.
46. How did Pasteur separate (+) and (-) forms of tartaric acid?
47. What is meant by racemization?
48. Give an example for the process of racemization.
49. What is meant by the term asymmetric synthesis?
50. Give an example for asymmetric synthesis?
51. What are structures of the enantiomeric forms of glyceraldehyde?
52. What are the structure of the enantiomeric forms of 1,3-dichloroallene?
53. Illustrate the enantiomerism observed among biphenyls with a suitable example.
54. How does meso tartaric acid differ from racemic tartaric acid?
55. Which of the following compounds are optically active?
    i. 2-hydroxypropanoic acid;
    ii. 2-bromooctanol;
    iii. Tertiary-butyl alcohol;
    iv. Tartaric acid;
    v. 2-chlorobuane;
    vi. 2-methyl-2-chlorohexane.
56. Which of the following structures will exhibit optical isomerism?
    (a) $HOOC\text{-}CH_2\text{-}CH(OH)\text{-}CH_2\text{-}COOH$.
    (b) $CH_3\text{-}CH(OH)\text{-}CHO$
    (c) $H_2N\text{-}NH\text{-}C_6H_5$.
57. What is geometrical isomerism due to? Draw the geometrical isomers of 2-butene and name them.
58. Draw the structures of maleic and fumaric acids. How can they be distinguished?
59. How can maleic acid be converted to fumaric acid?
60. Give two physical methods to distinguish between maleic acid and fumaric acid.

61. Mention one method by which cis-2-butene can be distinguished from trans-2-butene.
62. Name and formulate the geometrical isomers of acetaldoxime.
63. Draw the structures of E-butenal.

Module III

Section B (short answer)

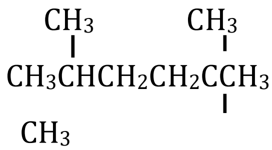
1. What is meant by inductive effect?
2. Name two groups which show –I effect?
3. Name two groups which shows +I effect?
4. Which is the stronger acid- acetic acid or formic acid? Justify your answer.
5. Which is the weaker acid-acetic acid or chloroacetic acid? Justify your answer.
6. Arrange ammonia, methylamine, dimethylamine and trimethylamine in the decreasing order of their basicities.
7. what is meant by Electromeric effect?
8. What is meant by resonance effect?
9. Define Hyperconjugation.
10. Name two groups which shows +M effect.
11. Name two groups which shows –M effect.
12. What is meant by steric effect?
13. Mention one difference in the characteristic of inductive effect and Electromeric effect.
14. Mention one difference in the characteristic of inductive effect and mesomeric effect.
15. Which is more stable-ethene or propene? Why?
16. Which is more stable –but-1-ene or but-2-ene? Why?
17. Draw the resonance structure of aniline.
18. Draw the resonance structure of nitrobenzene.
19. Illustrate the +E effect operative during the addition of proton to ethene.
20. Illustrate the – E effect taking the example of the addition of cyanide ion to ethanal.
21. why is trimethylamine less basic than dimethylamine?
22. What is meant homolytic fission of a bond?
23. Explain the term heterolysis.
24. What are electrophiles? Give two examples.

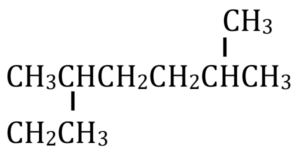
25. Give an example each for a positive electrophile and a neutral electrophile.
26. What are nucleophiles? Give two examples.
27. Name a neutral electrophile and a negative nucleophile.
28. What are free radicals? How they are formed?
29. What is meant by carbocation? Give two examples.
30. What is meant by carbanion? Give two examples.
31. How does the allylcation get stabilized?
32. Which is generally the most stable-1°,2°,3°or the methyl carbocation?
33. Give an example for a 1,2-shift.
34. How is the state of hybridisation related to carbanion stability?
35. Give an example for a reaction undergone by a carbanion.
36. What are carbenes? Give two examples.
37. Distinguish between a singlet carbene and a triplet carbene.
38. What are nitrenes?
39. Give two examples for nitrenes.
40. Mention a reaction involving the formation of a nitrenes.
41. Name the state of hybridisation of the underlined C in each of the following;
    (i) CH_3-$\underline{C}H_2^{\bullet}$ (ii) CH_3-$\underline{C}H_2^{-}$ (iii) CH_3-$\underline{C}H_2^{+}$ (iv) $C\equiv\underline{C}H_2$
42. which is the most acidic among the chlorobutanoic acid? Justify your answer.
43. Which is more stable-cis –but-2-ene or trans-but-2-ene? explain.
44. Which is more easily esterified with ethanol in presence of HCl-benzoic acid or 2,4,6-trimethylbenzoic acid? Justify your answer.
45. Give an example for a reaction with equation in which rearrangement of carbocation is involved.

ModuleI V

Section B (Short answer)

1. Draw the structure for each of the following compounds:
   (a) 2,2,4-trimethylpentane
   (b) 3 –ethyl-2-methylhexane.
2. Give the IUPAC name of:

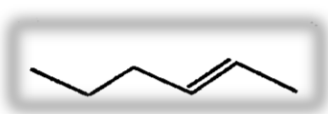
(a) 

(b) 

3. How can *1-bromo-2-methylbutane* be converted to *3,6-dimethyloctane*?
4. How can *heptane* be converted to *toluene*?
5. What is *Wurtz* reaction?
6. How can *butane* be obtained from 2-*bromobutane*?
7. What happens when *methane* reacts with excess of *chlorine* in the presence of UV light?
8. Illustrate an *isomerisation* reaction of an alkane.
9. What is meant by the *aromatisation* of alkanes? Illustrate with an example.
10. How can *but-2-yne* be converted to *butane*?
11. Illustrate *catalytic hydrogenation* of alkenes with a suitable example.
12. How can *1,4-dibromobutane* be converted to *cyclobutane*? What is the reaction known as?
13. What is *Freund reaction*? Illustrate with an example.
14. Name the following compounds:

(a) 

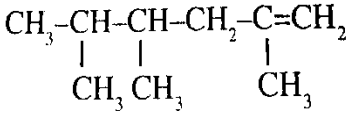
(b)



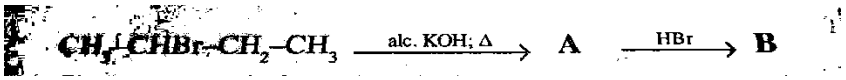
15. Draw a bond-line structure for each of the following compounds:

(a) 4-Ethyl-2-methylhex-2-ene (b) 1,2-Dimethylcyclobutene

16. Write the structural formulae of : (a) 2-methylpenta-1,3-diene; (b) 2-ethylbut-1-ene
17. Give the IUPAC name of:

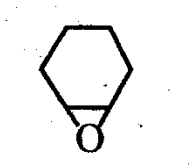


18. What is an *elimination reaction*? Give an example.
19. Complete the following equation by identifying **A** and **B** (major products):



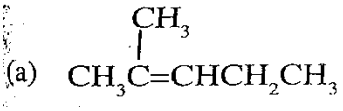
20. Give an example for a *dehydrohalogenation* reaction with equation.
21. State Saytzeff's rule.
22. Mention a method for the conversion of *2-bromo-2-methylpropane* to *2-methylpropene*.
23. What are the products obtained when *2-bromobutane* is heated with alcoholic KOH?
24. What happens when *propan-2-ol* is heated with 60% H_2SO_4 at 373K?
25. Which notation can be assigned to *trans*-1,2-dichloroethene (*trans*-CHCl=CHCl) –E or Z? Explain.
26. What are electrophilic addition reactions? Give an example.
27. State *Markovnikov's rule*.
28. What is meant by *peroxide effect*?
29. Write the equations for the reaction of *but-2-ene* with (i) $Br_2$and (ii) HCl.
30. How can *propylene* be converted to *isopropyl alcohol*?
31. What is meant by the *hydration* reaction? Illustrate with an example.
32. What is meant by the *Baeyer's test for unsaturation*? Give an example for the reaction.
33. What is meant by *Sabatier-senderens reduction* ?
34. What are the products of ozonolysis of *2-methylpropene* ?
35. What alkene would you treat with a peroxyacid in order to obtain each of the following epoxides?

    (a)

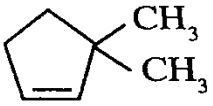


    (b)

36. What is the product obtained when cyclopentane is treated with peroxyaceticacid?
    What is the product obtained when the previous product is subjected to acidic hydrolysis?
37. Menthene, a hydrocarbon found in mint plants, has the IUPAC name 1-isopropyl-4-methylcyclohexene. What is the structure of menthene?
38. What product would you expect to obtain from catalytic hydrogenation of the following alkenes?

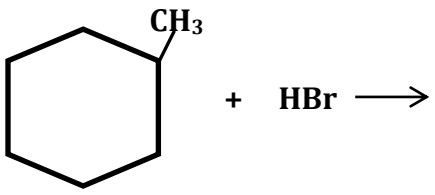


(b)



39. Predict the product of the reaction of *1,2-dimethylcyclohexene* with $KMnO_4/H_3O^+$.
40. An alkene (C_6H_{12}) upon heating with acidic $KMnO_4$ solution yields *propanone* and *butanone* as products. Name and formulate the alkene.
41. What alkene gives a mixture of *acetone* and *propanoic acid* on reaction with acidic $KMnO_4$?
42. Write an equation each for the reaction of bromine at room temperature with (a) propene and (b) 4-methylcyclohexene.
43. How can *2-methylpropene* beconverted to *2-methylpropan-2-ol*?
44. Complete the following equations:

(a)

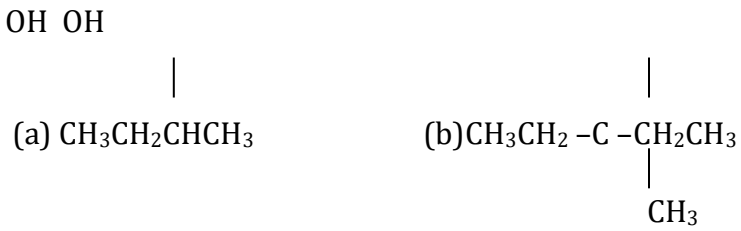


(b) $\mathbf{CH_3CH_2CH_2CH{=}CH_2 + \ HI \longrightarrow}$

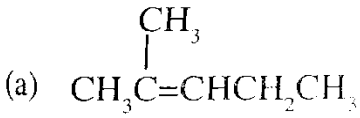
45. What are the two possible addition products obtained when *pent-2-ene* reacts with HBr?
46. Write equations for the following reactions and name the product in each case.
    (a) Hex-3-ene + HI $\longrightarrow$

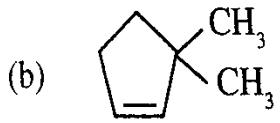
(b) But-1-ene + HBr $\xrightarrow{\text{Peroxide}}$

47. Name and formulate the alkene from which the alcohol shown can be obtained by acid-catalysed hydration in each of the following cases:

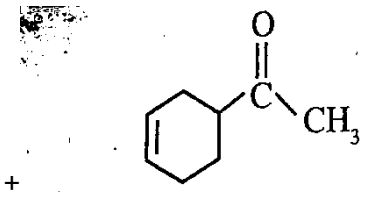


48. Write equations for the acid-catalysed hydration of (a) 1-methylcyclopentene and (b) 2,5-dimethylhept-2-ene. Name the product in each case.
49. Write equations for the acid-catalysed hydration of (a) hex-3-ene and (b) but-2-ene. Name the product in each case.
50. Name and formulate the product obtained from catalytic hydrogenation of each of the following:





51. Which alkene will give only acetone, $(CH_3)_2C=O$, as the sole ozonolysis product?
52. Which alkene will give acetone and formaldehyde as its ozonolysis product?
53. Name and formulate the two carbonyl compounds obtained as products of ozonolysisof but-1-ene.
54. What are the products obtained when *buta-1,3-diene* reacts with HBr?
55. What is *Diels-Alder reaction*? Illustrate with an example.
56. What happens when *buta-1,3-diene* is treated with *maleic anhydride*? Explain giving equation.
57. How could a Diels-Alder reaction be used to synthesis the following compound?



58. Write the IUPAC name of:

59. Write the structural formulae of the following compounds:
    (a) 2-Methylhex-1-en-5-yne
    (b) 3-Ethylpent-3-en-1-yne

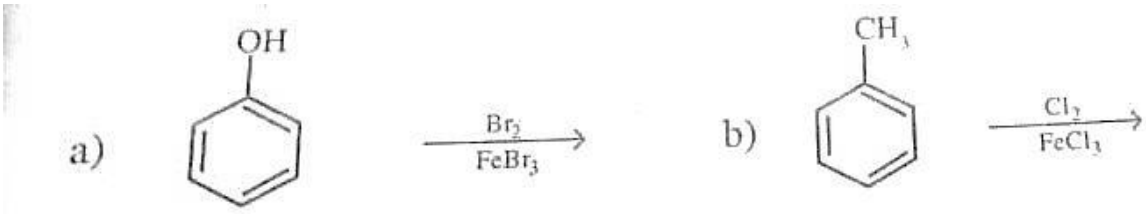
What is the product obtained when but-2-yne is treated with sodium in liquid ammonia at -77^0C? Comment of the stereochemistry of the product.

Module V

Section B (short answer)

1. Give the important resonance structure of benzene.
2. What is meant by an electrophilic substitution reaction? Give an example.
3. What happens when benzene is treated with chlorine in the presence of $FeCl_3$ at ordinary temperature in the absence of direct sunlight?
4. What is the product obtained when benzene undergoes nitration? Give the equation.
5. How does benzene undergo Sulphonation and what is the product obtained?
6. What is meant by the term Friedal-Crafts reactions? Give an example.
7. How can benzene be converted to toluene?
8. What does the term activating groups mean in connection with aromatic electrophilic substitution reactions? Give two examples for activating groups.
9. What are deactivating groups with regard to aromatic electrophilic substitution? Give two examples.

10. Give an example each for an ortho-para directing group and a meta directing group.
11. What is Etard reaction? Give an example.
12. Give the Kekule structures of naphthalene.
13. What is the major product obtained when naphthalene is heated with conc. HNO_3 at 60°C in the presence of con.sulphuric acid? Give equation.
14. What is meant by Sulphonation? What is the major product obtained when naphthalene undergoes Sulphonation at 60-80°C?
15. Name the electrophiles in (i) nitration and (ii) Sulphonation reactions of benzene.
16. Illustrate Friedel-Crafts alkylation reaction with a suitable example. Give equation and name the product.
17. Draw the products of each reaction.



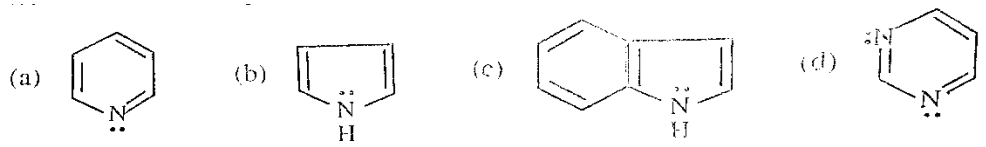
18. Explain the naphthalene can be converted to β-naphthalenesulphonic acid.
19. Name two polycyclic arenes that are potent carcinogen.
20. Draw the structures of a polycyclic aromatic hydrocarbon that is carcinogenic in nature.

Module VI

Section B ((Short answer)

1. What is meant by the term *aromaticity*?
2. State Huckel's Rule of Aromaticity.
3. What are *benzenoid aromatic compounds*?
4. Name and formulate two benzenoid aromatic compounds.
5. What are *nonbenzenoid aromatic compounds*?
6. Give the names and formulae of two nonbenzenoid aromatic compounds.
7. Explain according to Huckel's rule how *anthracene* becomes aromatic.
8. What is *tropylium ion*? Explain its aromaticity on the basis of Huckel's rule'

9. What are *antiaromatic compounds*?
10. Give two examples for *antiaromatic compounds*.
11. Which of the following compounds can be protonated without destroying its aromaticity?

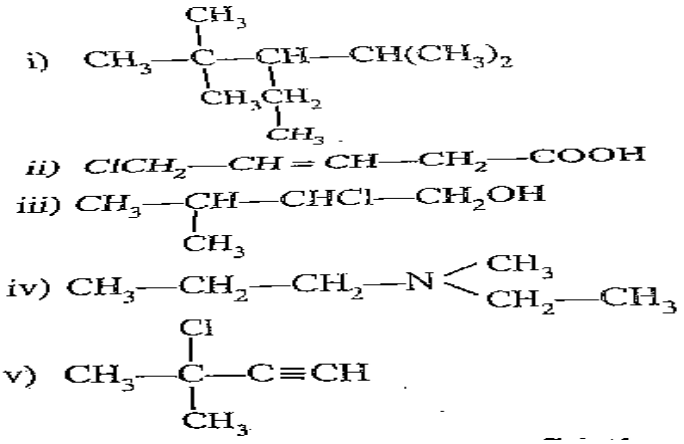


12. Which has a higher pK_b value – *pyrrole* or *pyridine*? What is the significance of your answer?

Module I

Section C (Paragraph)

1. What are the main reasons for the existence of missions of organic compounds?
2. Explain the general classification or organic compounds.
3. Explain with illustrative examples the following terms:
   a) *Chain isomerism;* b) *ring-chain isomerism .*
4. What is *structural isomerism*? Mention the different types possible and explain any one category with illustrative examples.
5. What are the important characteristics of a *Homologous series*?
6. Write the structural formulae and names of the isomers having molecular formulae C_5H_{12}.
7. Give IUPAC names of:

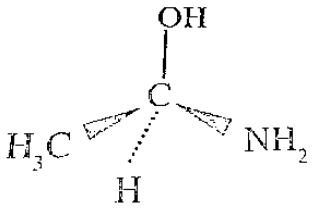


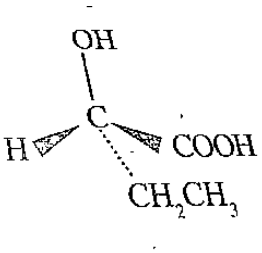
Module II

Section C (Paragraph)

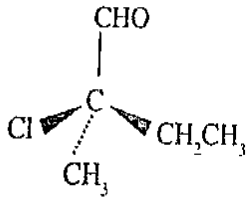
1. Distinguish between the terms conformation and configuration.
2. Discuss the reason for conformational isomerism in alkanes.
3. Describe the conformational isomerism with regard to ethane.
4. Draw and label (i)sawhorse, (ii)Newman and(iii) flying-wedge projections of the two extreme conformers of ethane.
5. Discuss the relative stability of the two extreme conformations of ethane.
6. Draw the Newman projections of the conformers of butane.
7. Discuss the relative stability of the conformers of butane.
8. The conformers of ethane cannot be isolated. Why?
9. Explain the term “dihedral angle” in respect of conformational analysis with illustrative examples.
10. Discuss the significance of the term “torsional strain” as related to conformational analysis with illustrative examples.
11. Discuss the conformational isomerism in ethylene glycol. Explain the relative stability.
12. What are the main postulates of Bayer’s strain theory?
13. What is meant by angle strain in cycloalkane rings? Calculate angle strain for cyclopentane and cyclohexane?
14. Discuss the merits and demerits of Bayer’s strain theory.
15. Explain the concept of strainless rings.
16. What are axial and equatorial bonds?
17. Draw the most stable and the least stable conformations of cyclohexane and comment on their relative stability.
18. Discuss the relative stability of the conformations of methylcyclohexane.
19. Draw the chair and boat conformations of cyclohexane and indicate the axial and equatorial bonds. Which is the more stable of the two? Why?
20. Explain the term ring flipping in respect of the conformational isomerism in cyclohexane.
21. Explain the conformational isomerism that arises in monosubstitutedcyclohexanes. illustratively.
22. What is optical activity? Which type of compounds exhibit this property?

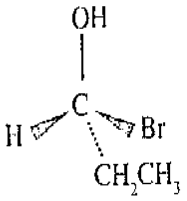
23. Explain the terms plane polarized light, optical activity and specific rotation.
24. Define the major symmetry elements.
25. Explain the terms chiral carbon atom and chirality.
26. Explain the term enantiomerism with a suitable example.
27. what is diastereomerism? explain with a suitable example.
28. Distinguish between the terms enantiomers and Diastereomers.
29. Discuss the optical isomerism of the lactic acid.
30. Write a short note on the optical isomerism of glyceraldehyde.
31. Which of the following compounds are optically active-(i)2-hydroxypropanoic acid;(ii)2-bromooctanol; (iii)tertiary-butyl alcohol? Justify your answer.
32. State whether the following compounds would be optically active or not: (a) tartaric acid; (b) 2-chlorobutane; (c) 2-methyl-2-chlorobutane. Explain your answer.
33. Briefly discuss the optical isomerism of the aldotetroses.
34. How many stereoisomers will be there with formula CH_2OH-CHOH-CHOH-CH_2OH? Give their plane formulae.
35. What is meant by racemization? Explain with example.
36. Discuss the chemical method for resolution of racemic mixtures.
37. Explain the biochemical method for the resolution of racemic mixtures. Mention the limitation of the method.
38. Explain the term enantioselective synthesis (asymmetric synthesis) with a suitable example.
39. Explain the term enantiomeric excess associated with the synthesis of enantiomers.
40. Assign the configuration R or S to the following compounds;



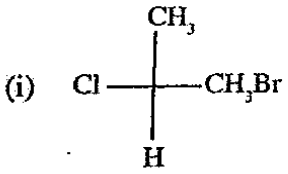


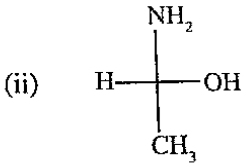
41. Assign the configuration R or S to the following compounds:

(i) 

(ii) 

42. Assign the configuration R or S to the following compounds:

(i) 

(ii) 

43. Discuss the optical isomerism of any one class of compounds having no chiral carbon atoms.
44. Draw the planar representations of dextro, laevo and mesotartaric acid and explain their optical activities.
45. Explain the significance of the terms enantiomers and Diastereomers with regard to the stereoisomers of tartaric acid.
46. What is a racemic mixture? How does it differ from a mesoform? explain illustratively in respect of the stereoisomerism exhibited by tartaric acid.
47. What are meso compounds? Explain with an example.
48. Discuss the optical isomerism that arises in allenes.
49. Explain illustratively how optical isomerism arises in biphenyls.
50. Describe geometrical isomerism taking but-2-ene.
51. Draw the geometrical isomers of $C_2H_2Cl_2$. Name them. How can they be distinguished from each other?
52. (a) write an account of cis-trans isomerism, taking an example.
    (b)which of the following structures will exhibit geometrical isomerism:
    (i) $CH(CH_3)=CCl_2$ (ii) CH_3-CH_2-CH=CH-COOH
    (iii)C_6H_5-CH(OH)-COOH (iv) CH_3-CH=CH-CH_3
53. Explain the method commonly used for the distinguishing cis-trans isomers with a suitable example.
54. Discuss the geometrical isomerism of but-2-ene-1,4-dioic acid.

55. Briefly explain two methods by which maleic acid can be distinguished from fumaric acid.
56. Explain how cyclisation reactions can be of use in distinguishing the geometrical isomers of a compound.
57. Discuss the significance of the values of the heats of hydrogenation in distinguishing the geometrical isomers of a compound.
58. Explain how the values of (i) melting points, and (ii) dipole moments of the cis-trans isomers of a compound can be of significance in distinguishing between them.
59. Which notation can be assigned to trans-1,2-dichloroethene (trans-CHCl=CHCl) E or Z? explain.
60. Draw the E and Z isomers of 2-bytene.
61. Write the E and Z isomers of 1-bromol-chloropropene.
62. Explain the significance of the syn and anti-isomerism with regard to the stereoisomerism exhibited by oximes.

Module III

Section C (paragraph)

1. Define the term reaction mechanism. Illustrate the usefulness of the curved arrow formalism in depicting reaction mechanisms.
2. What is resonance? Explain the utility of the curved arrow formalism in deriving resonance structures of a molecule.
3. Explain how the resonance energy of benzene can be calculated if the standard heats of hydrogenation for cyclohexene and benzene are experimentally found to be -120Kj mol^{-1} and -208Kj mol^{-1} respectively.
4. Explain the term inductive effect. Briefly explain its significance in determining the properties of molecule with an illustrative example.
5. Arrange the acids acetic acid, chloroacetic acid, dichloroacetic acid and trichloroacetic acid in the increasing order of their acidities. Justify your answer.
6. Arrange the acids formic acid, acetic acid and propionic acid in the decreasing order of their acidities. explain your answer.
7. Arrange fluoro, chloro, bromo and iodoacetic acids in the decreasing order of their acidities. Justify your answer on theoretical basis.

8. Arrange ammonia, methylamine, dimethylamine and trimethylamine in the decreasing order of their basicity. Explain the theoretical basis of your answer.
9. Explain the term Electromeric effect.
10. Bring out the distinguishing features of inductive effect and electromeric effect.
11. Explain the term resonance with suitable example.
12. What is meant by mesomeric effect? Explain with an example.
13. Mention the distinguishing features of inductive effect and mesomeric effect.
14. What is the order of stability for propene, but-1-ene and but-2-ene? Why?
15. Explain the term Hyperconjugation and its significance with illustrative examples.
16. Explain the role of steric effect in determining the order of basicity of methylamine, dimethylamine and trimethylamine.
17. Benzoic acid is esterified with ethanol very easily, but 2,4,6-trimethylbenzoic acid is not esterified even when heated under refux with ethanol for a very long time- why?
18. Explain the term steric hindrance with a suitable example.
19. Explain the different kinds of bond fission observed in organic reactions.
20. Explain the difference between the terms electrophile and nucleophile with suitable examples.
21. Give two examples for reactions involving the formation of carbocations.
22. Explain briefly the stability order of 1°,2° and 3° carbanions.
23. Discuss the stability order of primary, secondary and tertiary alkyl free radicals.
24. Explain the mode in which free radicals are formed.
25. Give an example each for (i) an addition reaction, (ii)a rearrangement reaction and (iii) an oxidation-reduction reaction in organic chemistry.
26. Distinguish between radical reactions and polar reactions.
27. Explain the stabilization of the benzyl cation.
28. Illustrate with two examples the rearrangement of a less stable carbocation into a more stable one.
29. What is the major product of dehydration of butan-1-ol? Explain your answer.
30. Explain how the benzyl anion attains stabilization.
31. Explain the stability of cyclopentadienyl anion.
32. Mention two type of reactions undergone by carbocations.
33. How are carbanions formed? Mention one kind of reaction that they undergo.

34. Give two examples for reactions in which carbenes are involved.
35. What are nitrenes? Explain with examples. Illustrate two reactions undergone by nitrenes.
36. Explain the characteristic difference between Hyperconjugation and resonance.
37. Draw the hyperconjugative structures of ethyl cation and ethyl free radical.
38. Explain how mesomeric effect influences the orientation of π-electron density in phenol.
39. Explain how the electron displacement effects influence the type product formed in electrophilic substitution reactions of toluene.
40. Explain how the electron density in benzene is altered when a nitro group appears as a nuclear substituent.
41. When chlorine gets attached as a substituent on the benzene ring, it acts as a slightly deactivating group but, at the same time, acts as an ortho-para director in electrophilic aromatic substitution. Explain this.
42. Give an example each for electrophilic, nucleophilic, and free radicals substitution reactions.
43. Give an example each for (i) a substitution reaction, (ii) α-elimination reaction and (iii) β-elimination reaction.
44. Give an example each for (i) a nucleophilic substitution reaction and (ii) an electrophilic substitution reaction.

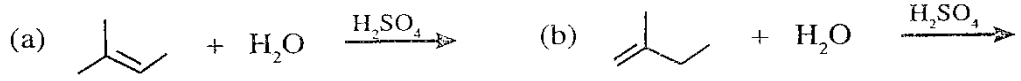
Module IV

Section C (Paragraph)

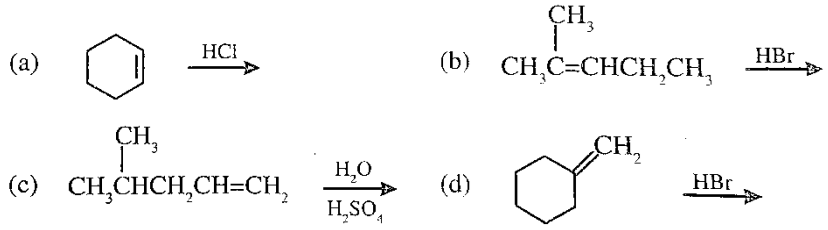
1. Name and formulate the structural isomers that have the molecular formula C_5H_{12}. What kind of structural isomerism do they illustrate.
2. Explain the mechanism of chlorination of methane.
3. What is an E1 reaction? Discuss the general mechanism.
4. Discuss E2 mechanism.
5. Write the mechanism for the dehydrohalogenation of ethyl bromide.
6. State and illustrate the Zaitsev's rule.
7. What happens when 2-bromobutane is heated with alcoholic KOH? Give the mechanism for the formation of the major product in the reaction.

8. What is the product obtained when ethanol undergoes dehydration with conc.H_2SO_4 at 170^0C? Give the mechanism for the reaction.
9. When *3,3-dimethylbutan-2-ol* undergoes dehydration, the major product is *2,3-dimethylbut-2-ene.* Explain this observation.
10. What is the major product of dehydration of *butan-1-ol*? Explain your answer.
11. Write the E and Z isomers of *1-bromo-1-chloropropene.*
12. State and explain *Markovnikov's rule*. Illustrate with an example.
13. State *Markovnikov's rule* and explain its mechanistic basis.
14. What is meant by *Kharasch effect*? Give an example to illustrate it.
15. What is *peroxide effect*? Explain why it is shown only by HBr.
16. Explain the reaction of propene with conc. Sulphuric acid and give the mechanism of the reaction.
17. Give the mechanism for the acid-catalysed hydration of *propene*.
18. Give equations for the following reactions and name the product: (a) 2-methylbutane-2,3-diol with HIO_4; (b) ethylene with cold ethereal solution of osmium tetroxide (OsO_4) and then with aq. Sodium bisulphite.
19. How can ethene be converted to (i) ethanol, (ii) 2-chloroethanol, and(iii) chloroethane?
20. Give the mechanism for the addition of H_2SO_4 to an alkene.
21. Explain two tests for unsaturation commonly carried out in the laboratory.
22. Explain what is meant by*ozonolysis*. Explain its significance in structural elucidation.
23. The ozonolysis of an alkene yields propanal and butanone as products. Write the structure of the alkene and gives its IUPAC name.
24. 1 mole of an alkene C_6H_{12} upon ozonolysis yields 2 moles of acetone as the product. Find the structure of original alkene and write its IUPAC name.
25. Explain the *hydroboration-oxidation* reaction of alkenes with a suitable example.
26. Explain a method (with equations) for the conversion of *propene to propan-1-ol.*
27. What happens when *but-1-ene* reacts with mercuric acetate in a mixture of tetrahydrofuran (THF) and water and then the product is treated with sodium borohydride in basic medium? What is the reaction known as?
28. Explain *oxymercuration-demercuration* reaction of alkenes with a suitable example.
29. Briefly explain the stereochemical aspects of the *dehalogenation* reaction.

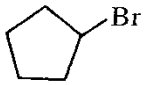
30. The standard heats of hydrogenation of but-1-ene, *cis*-but-2-ene and *trans*-but-2-ene are respectively –127, –120 and –115 kJ mol^{-1}. Asses the relative stability of the above compounds.
31. What is the product obtained when *cyclohexane*is treated with dilute alkaline $KMnO_4$solution at room temperature? Discuss the stereochemistry associated with the reaction.
32. Explain how*cis*dihydroxylation of an alkene be affected.
33. Discuss the chemistry of reactions involved when *propylene* reacts with peroxyacetic acid (CH_3 –CO –O –OH) in aqueous solution and the product is subjected to acid hydrolysis.
34. Explain how *trans*dihydroxylation of an alkene can be effected.
35. Propose structures for the alkenes that yield the following products on treatment with acidic $KMnO_4$: (a) $(CH_3)_2C=O + CO_2$; (b) 2 equivalents of $CH_3 –CH_2 –COOH$.
36. Draw the structural formula for the product of each of the following alkene hydration reaction.

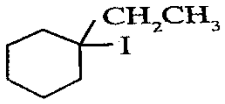


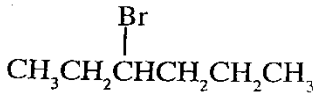
37. Give the mechanism for the addition of HBr to propene in the presence of an organic peroxide.
38. Explain the mechanism of addition of HCl to *propene*.
39. Write equations for the reactions of *hex-1-ene* with (a) cold dilute alkaline $KMnO_4$ and (b) hot acidic $KMnO_4$. Name the product in each case.
40. Neglecting *cis-trans* isomers, there are five substances with the formula C_6H_8. Draw and name them.
41. Complete the following equations and name the product in each case.



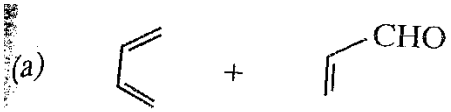
42. Write equations for reactions to show how the following can be obtained starting from suitable cycloalkane/alkene.

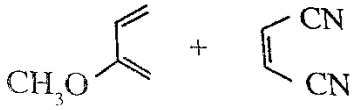
(a) 

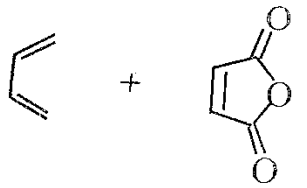
(b) 

(c) 

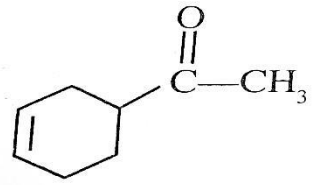
43. "The addition of halogens to an alkene is a *stereospecific reaction*." Explain this statement with a suitable example.
44. How are *dienes* classified? Illustrate the types with an example each.
45. Discuss how 1,4-addition to a conjugated diene is explained using *Thiele's theory of partial valency.*
46. Explain mechanistically the reaction between buta-1,3-diene and Br_2.
47. Predict the products of the following proposed Diels-Alder reactions:

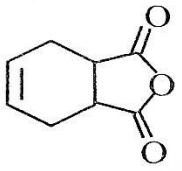
(a) 

(b) 

c) 

48. What dienes and dienophiles would react to give the following Diels-Alder products?

(a) 

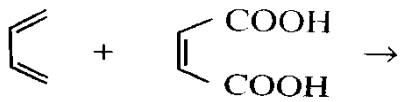
(b) 

49. Discuss the mechanism of the addition of hydrogen halide to buta-1,3-diene.
50. What are the products of the following reactions?

(a) $CH_2{=}CH{-}CH{=}CH_2 + HC{\equiv}C{-}C{\equiv}N \longrightarrow$

(b) $CH_2{=}CH{-}CH{=}CH_2 + CH_2{=}CH{-}NO_2 \longrightarrow$

(c)



51. Write equations with names of products for the reactions of *pent-2-yne* with: (a) cold dilute alkaline $KMnO_4$; (b) hot alkaline $KMnO_4$; (c) chromic acid.
52. Explain with equations what happens when but-1-yne is treated with sodium amide in liquid ammonia and the product is treated with ethyl bromide?
53. How can ethyne be converted into (i) propyne; (ii) but-2-yne?
54. Explain why alkynes are generally less reactive than alkenes in electrophilic addition reaction.
55. What are the major products obtained when propyne is treated with HBr (i) in the absence of a peroxide, and (ii) in the presence of a peroxide? Give equations.
56. Swhat is the product obtained when propyne is passed through dilute H_2SO_4 at 333 K in the presence of $HgSO_4$ catalyst? Give equation. What is the reaction known as and why?
57. What is meant by ozonolysis? Explain the ozonolysis of but-1-yne.
58. How can acetylene be converted to (i) acetaldehyde, and (ii) ethylidene chloride?
59. Give one method of preparation of ethyne. How can it be converted to methanoic acid?
60. Give two reactions to illustrate the acidity of ethyne. Give equations.
61. Why is acetylene more acidic than ethylene?
62. Draw structures for the three alkynes having molecular formula C_5H_8 and classify each as an internal or terminal alkyne.
63. Describe the alkyne you would start with and the reagents you would use if you wanted to prepare: (a) *cis*-but-2-ene; (b) *trans*-pent-2-ene; (c) hex-1-ene.
64. Show how you would convert: (a) oct-3-yne to *cis*-oct-3-ene; (b) pent-2-yne to *trans-pent-2-ene.*
65. predict the major product(s) of the following reactions: (a) 1 mole of hex-1-yne +2 moles of HCl; (b) 1 mole of hex-2-yne +2 moles of HCl.
66. Show how hex-1-yne might be converted to: (a)1,2-dichlorohex-1-ene (b) 1-bromohex-1-ene.
67. Show how but-1-yne might be converted to: (a) 2-bromobut-1-ene (b) 1,1,2,2-tetrabromobutane.
68. Give a chemical test each to distinguish between; (a) pent-1-yne and pent-2-yne; (b) pent-1-ene and pent-1-yne. Explain the reactions involved.
69. Explain with equations how the following conversions can be carried out:
    (a) 2,3-dimethylbut-2-ene to propanone; (b) but-2-yne to *trans*-but-2-ene?

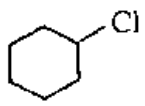
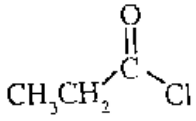
70. How can the following substances be obtained from propyne: (i) propene; (b) but-2-yne?
71. Discuss the chemistry behind the *Bayer's test for unsaturation* with suitable examples.
72. Explain the term *aromaticity*.
73. State and explain Hucke's rule.
74. Illustrate Huckel's rule taking examples of (i) a monocyclic homocyclic compound, (ii) a polycyclic homocyclic compound, and (iii) a heterocyclic compound.
75. Which among the following are aromatic compounds: (i) cyclopropenylcation; (ii) cyclopentadienyl anion; (iii) cyclopentadienylcation; (iv) pyridine? Explain your answer.
76. Explain according to Huckel's rule how the following become aromatic – (i) tropylium ion; (ii) indole; (iii) pyridine.
77. Which is more basic – *pyrrole* or *pyridine*? Justify your answer.
78. Compare the basicities of *indole* and *quinoline*. Explain.
79. State whether the following compounds are aromatic or not – furan, [18] annulene. Explain your answer.
80. What are *annulenes*? Give the names and structures of two annulenes that are aromatic.
81. Explain the term *antiaromatic compounds* with suitable examples.

MODULE V

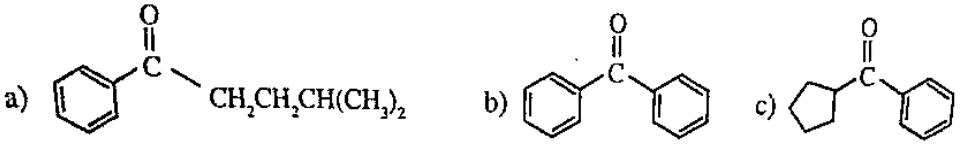
Section C (paragraph)

1. Name and formulate the structural isomers that have the molecular formula $C_6H_4Br_2$, what kind of structural isomerism do they illustrate?
2. Why is benzene less reactive towards electrophiles than an alkene, even though it has moreπ electrons than an alkene (six versus two)?
3. Explain the resonance concept of the structures of benzene and its stability.
4. How does the resonance theory explain the identical nature of all the bonds in benzene?
5. Discuss the electron delocalization in benzene.
6. Give the mechanism for the nitration of benzene.
7. Give the mechanism for the reaction of benzene with chlorine in the presence of $FeCl_3$ at ordinary temperature in the absence of direct sunlight.
8. Give the mechanism of bromination of benzene.
9. What is meant by Sulphonation? Give the mechanism of Sulphonation of benzene.

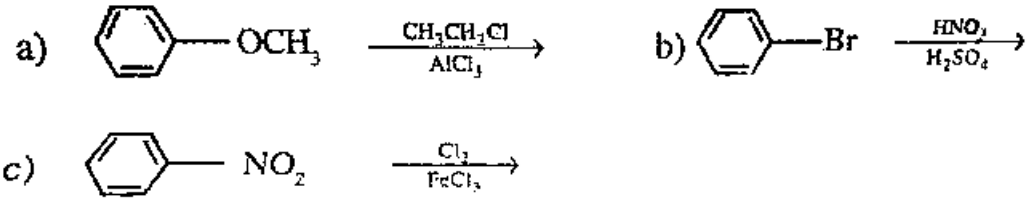
10. What happens when benzene is treated with (i) ethyl bromide in the presence of anhydrous $AlCl_3$, (ii) acetyl chloride in the presence of anhydrous $AlCl_3$, and (iii) nitrating mixture at 60°C? give equation.
11. Explain the mechanism of the reaction of benzene with methyl bromide in the presence of anhydrous aluminium chloride.
12. What is meant by Friedel-Crafts alkylation? Give an example and gives its mechanism.
13. Give an example for Friedal-Crafts acylation and gives its mechanism.
14. Explain the term directive influence of substituent groups in aromatic electrophilic substitution reactions.
15. What are ortho-para directors and meta directors? Give two example for each class.
16. What are the major products obtained when (i) phenol is treated with bromine water? (ii)toluene is treated with methyl chloride in the presence of anhydrous $AlCl_3$? (iii) benzoic acid is heated with fuming nitric acid in the presence of conc. Sulphuric acid?
17. Explain the ortho-para directive influence of the –OH group in aromatic electrophilic substitution reactions.
18. Explain the ortho-para directing influence of the- NH_2 group in aromatic electrophilic substitution reactions.
19. Explain the meta directing influence of the $-NO_2$ group in aromatic electrophilic substitution reactions.
20. Explain the term ortho-para ratio.
21. Give the mechanism of nitration of naphthalene.
22. What is the major product obtained when naphthalene undergoes Sulphonation at 60-80°C?
23. What is the major product obtained when naphthalene undergoes Sulphonation at 160°C?
24. What product is formed when benzene is treated with each organic halide shown below in the presence of $AlCl_3$?

(a) $(CH_3)_2CHCl$ b)  c) 

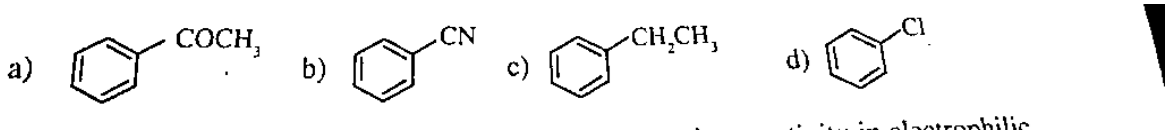
25. What acid chloride would be needed to prepare each of the following ketones from benzene using a Friedal-Crafts acylation?



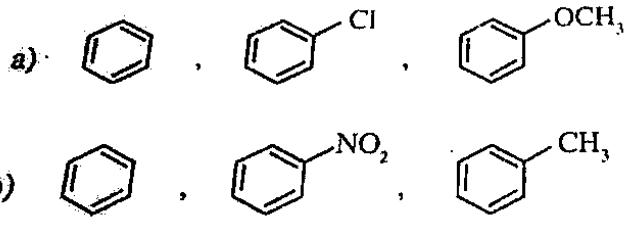
26. Draw the products of each reaction:



27. Draw the products formed when each compound is treated with a mixture of conc. HNO_3 and conc. H_2SO_4. Justify your answers



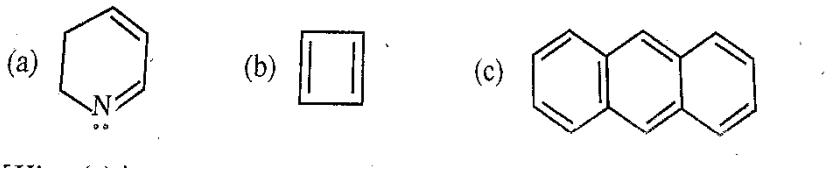
28. Rank the compounds in each set in the order of increasing reactivity in electrophilic aromatic substitution. Justify your answers.



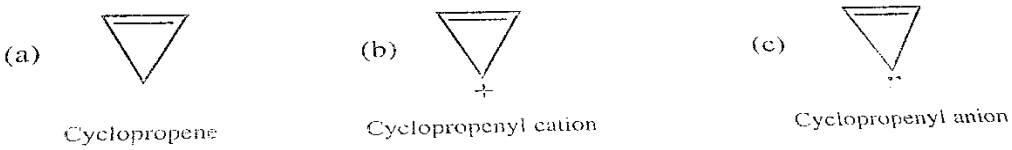
29. How can the following conversions be effected?
    (a) Benzene to chlorobenzene;
    (b) benzoic acid to m-nitrobenzoic acid;
    (c) Ethylbenzene to benzoic acid.

30. Discuss the products of Sulphonation of naphthalene under different conditions.
31. Explain with example the carcinogenicity of polycyclic aromatic compounds.

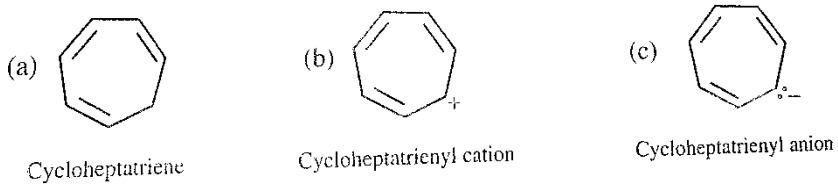
82. Name and formulate a bicyclic benzenoid aromatic compound and a bicyclic nonbenzenoid aromatic compound. Explain their aromaticity on the basis of Huckel's rule.
83. Classify the following as aromatic, antiaromatic and nonaromatic. Explain your answer.



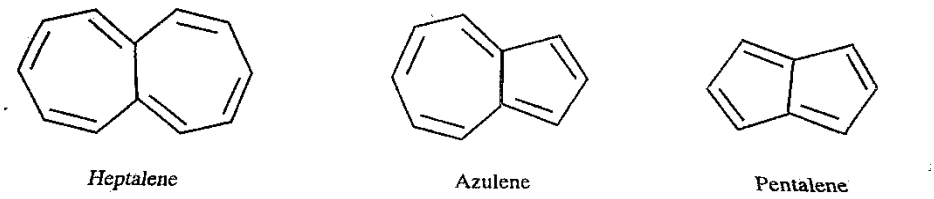
84. Which compound in the following set is aromatic? Explain your choice.



85. Which compound in the following set is aromatic? Explain your choice.[Assume all of them to be in their planar conformations.]



86. Name and formulate two heterocyclic compounds that are aromatic. Explain their aromaticity on the basis of Huckel's rule.
87. Classify each of the following as aromatic, antiaromatic, or nonaromatic. Explain your answer.



88. Name and formulate a fused ring homocyclic compound and a fused ring heterocyclic compound that are aromatic. Explain their aromaticity on the basis of Huckel's rule.

MODULE I

Section D (Essay)

1) Discuss the different kinds of structural isomerism exhibited by organic compounds.

MODULE 2

Section D (Essay)

1. Discuss the conformational isomerism in ethane and explain the relative stability of its conformers.
2. Write the structures of the conformations of butane. Discuss their relative stability.
3. Discuss Bayer's strain theory in detail.
4. Discuss the conformational isomerism in cyclohexane and explain the relative stability of the conformers.
5. (i) what is optical activity? Which types of organic molecules exhibit this property.
   (i) Discuss the optical isomerism of lactic acid.
6. Discuss the optical isomerism exhibited by tartaric acid. Explain the characteristic of meso compounds.
7. Explain the term resolution of racemic mixtures. Discuss the methods for the resolution.
8. Explain the term enantioselective synthesis with suitable examples and bring out the significance of the term enantiomeric excess.
9. Briefly discuss the optical isomerism observed among(i)allenes and (ii) biphenyls.
10. (a) explain the term cis-trans isomerism illustratively using those of 2-butene.
    (b)explain the term syn-anti isomerism illustratively with respect to those of a suitable oxime.
11. (a)discuss the geometrical isomerism of but-2-ene-1,4-dioic acid.
    (b)explain one physical method and one chemical method by which the above geometrical isomers can be distinguished.

MODULE III

Section D (essay)

1. Discuss and illustrate the significance of the various electron displacement effects in organic molecules.
2. Explain the term electrophiles, nucleophiles, and free radicals with suitable example.
3. Discuss the stability of the different kind of carbocations.
4. Explain the order of stability of t-butyl cation, isopropyl cation, ethyl cation and methyl cation.
5. Discuss the factors that affect the stability of different carbanions.
6. Discuss the aspects of hybridization and structures related to alkyl cations, alkyl anions and alkyl free radicals.
7. Explain the relative order of reactivity observed for toluene, ethylbenzene, isopropylbenzene and tert-butylbenzene in electrophilic aromatic substitution.
8. Explain how electron displacement effects influence the orientation of π-electron density in phenol and nitrobenzene as compared to that in benzene.

MODULE IV

Section D

1. Explain the reaction of methane with chlorine in the presence of light and give its mechanism
2. Discuss elimination reactions and the two kinds of operative mechanisms with illustrative examples.
3. State *Zaitsev's rule*. Illustrate the rule with an example and discuss the mechanistic significance.
4. What are electrophilic addition reactions? State and explain Markovnikov's rule with a suitable example and rationalize it on mechanistic grounds.
5. What is meant by peroxide effect? Explain it with an example and give the mechanism of the reaction. Explain why it is shown only by HBr, not by HCl or HI.
6. Give the products of reactions of propylene with (1) HBr in the presence of benzoyl peroxide, (2) ozone and then with zinc dust and water, and (3) cold dilute alkaline $KMnO_4$. Give equations for the reactions.

7. Explain the reactions of but-1-yne with the following: (i) HCl; (ii) Tollen's reagent; (iii) dil.H_2SO_4 in the presence of Hg^{2+}; (iv) H_2 in the presence of Pt; (v) ozone followed by water; (v) hot alkaline $KMnO_4$ and (vii) chromic acid.
8. Discuss the acidity of terminal alkynes. Illustrate their acidity with three suitable reactions.

MODULE V

Section D(essay)

1. Discuss (i) the resonance concept and (ii)the molecular orbital concept of the structures and stability of benzene.
2. What are electrophilic substitution reaction? Give two example for the electrophilic substitution reactions of benzene and explain their mechanisms.
3. Explain the term directive influence of substituent groups in aromatic electrophilic substitution reactions. How are the groups classified on the above basis? Explain the behavior of any one group from each class.
4. Explain with equations what happens when (i) toluene is heated with alkaline $KMnO_4$ solution and then acidified, (ii) toluene is heated with a solution of chromyl chloride in CCl_4 and then hydrolyzed, (iii) benzene vapours are mixed with hydrogen and passed over Ni heated at 150-250°C under pressure, (iv) benzene vapours are mixed with oxygen and passed over V_2O_5 at 500°C, and (v) benzene reacts with sodium in liquid ammonia in the presence of ethanol?
5. Explain with equations the Haworth's synthesis of naphthalene.
6. Discuss the Sulphonation of naphthalene under different conditions. Explain giving the mechanisms. Explain the orientation effect observed in the reactions.

MODULE VI

Section D (Essay)

1. Explain the term *aromaticity*. State Huckel's rule and discuss its significance on the basis of MO theory. Illustrate its applicability in explaining the aromaticity of the following ions: (a) cyclopropenylcation; (b) tropylium ion; (c) cyclopentadienyl anion

SDC3PC01 PHARMACEUTICS

Module 1

PART A

1. Posology deals in
2. Give clark's formula
3. Doses calculate in proportionate to ._____ of patient
4. An extra ordinary response to a drug which is different from its characteristic pharmacological action is _____
5. Ephedrine usually used for
6. A patient will normally buy medicine prescribed to him from
7. From the manufacturer or ware house ,medicines are delivered to
8. In pharmaceutics IPR stands for
9. Health care insurance is to
10. Indian pharmaceutical quality is comparison to Chinese is
11. In Indiapharma market, Low cost of innovation and English speaking labor of India is one of the biggest
12. RashtriyaSwasthyaBimaYojana is a
13. The procurement by government is generally done from various drug manufactures through inviting in,
14. To know about potential customers , a MSR should take information from
15. All the stakeholders of heath care ecosystem revolve around…….

Module 01 Answers

1. dose
2. dose forthechild= (childs weight in kg /70) adultdose
3. Age , body weight,surface area
4. idiosyncrasy
5. Release of nor adrenalin
6. retail or hospital pharmacy
7. CFA
8. Intellectual property right
9. reduce his financial burden at the time of health challenge

10. equal
11. strength
12. central govt. scheme
13. tenders
14. stocikst
15. patient

Module II

PART A

1. To calculate weight and capacity Indian pharmacopeia follows _____ system
2. 1 Lb =_____ oz
3. Avoirdupois system belongs to_____
4. Paratonic means
5. 57.1% v/v alcohol is_____
6. 1 centigram= …….gm
7. 8 drachms = ……pound
8. Any strength above proof strength is

Module 02Answers

1. matrics
2. 16 oz
3. Imperial method
4. Solutions which are not having the same osmotic pressure
5. Proof spirit
6. 0.1 gm
7. 1 ounce
8. Over proof

Module III

PART A

1. Give an example for solid dosage form
2. Dentifrices means
3. Example for internal liquid dosage form
4. Lotions are applied for
5. Example for semisolid dosage form
6. Shape of nasal suppository
7. Coca butter is suitable base for _____suppositories

8. Cachets are also known as_____
9. Syrup is an …… application
10. Ear drops used in
11. Powders are dispensed in bulk, when…… of dosage is not important
12. Dusting powders are dispensed in …….. containers
13. compression suppositories contain ……and……..drugs
14. in suppositories the drugs released either due to the ……of base or……its contents in …….fluid
15. cocoa butter is a mixture of ……..of fatty acid
16. suppositories are ……dosage form of drugs
17. suppositories are used to produce ……, ……and …… action

module03 Answers

1. Powder
2. Tooth powders
3. Syrup
4. External
5. Suppositories
6. Cylindrical
7. Nasal
8. Wafer capsules
9. External
10. Body cavity
11. accuracy
12. Sifter top containers
13. Thermo libaile, insoluble
14. Melting,dissolving, body cavity
15. Glyceryl esters
16. Unit
17. Local,systemic, mechanical

Module IV

PART A

1. Pharmacovigilencerelaing to ……..
2. ADRs defined as
3. Serious Adverse Event results in

4. Reporting of the adverse event is the responsibility of
5. Drugs are launched in the market when the get approval after showing evidence in
6. The elements of adverse event reporting are
7. Investigation of adverse event is the responsibility of
8. Name any organization play a key collaborative role in the global oversight of pharmacovigillence

9. If a doctor says a MSR about adverse event he should do

Answers

1. Lack of efficiency from a drug, any response to a drug which is noxious ,to a drug that is unintended
2. Requires hospitalization
3. PV team
4. Phase 4 trial
5. Identifiable patient,suspect drug,an adverse event
6. PV team
7. WHO
8. Take complete information for AE reporting
9. Assessment,collection etc..

Module V

Part A

1. 1.Give an eg. For protein deficiency disease
2. ..... are the complex substances that work as regulators.
3. 3.Give an Eg for water soluble Vitamin
4. 4.Give any function of folic acid
5. 5.write any two symptoms of snake bite
6. 6. RVF means
7. 7.....is the science of safeguarding health
8. 8. Give an eg for intestinal infection
9. 9. how many types of hepatits
10. 10. mode of transmission of Typhoid

Answers

1.Kwashiorkar

2.vitamins

3.Vitamin B1

4.protect against heart disease

5. swelling,blurred vision

6.Right ventricular failure

7. Sanitation

8.hepatitis

9. seven

10. faeco-oral

Module VI

Part A

1.write any diagnosing method of AIDS

2. HAART stands for

3. .....type leprosy in which good resistance of the body and hence lesions are localized

4. Give an eg for surface infection

5. Malaria spread by

6. RDI stands for

7.PEM stands for

8. any one feature of marasmus

9. fat soluble vitamin

10 give any function of Vitamin A

Answers

1.ELISA

2. highly active antiretroviral therapy

3. non-lepromatous

4.Rabies

5.anopheles mosquitoes

6. Recommended daily intake

7. Protein energy malnutrition

8. old mans face

9. Vitamin A

10 normal bone growth

Module I

PART B

1. Give the equation for calculating dose for child
2. How to calculate dose proportionate to age
3. Note on following
   a) Synergism b) antagonism
4. What is idiosyncrasy
5. What is the role of stockiest in pharmaceutical industry
6. Note on pharmaceutical distribution
7. what is retail pharmacy
8. what do you understand by CRAMS
9. name any 5 indian pharmaceutical company
10. what are 6 Ps for health system

ModuleII

PART B

1. Define allegation method
2. What is proof sprit
3. General principles to adjust isotonicity
4. Differentiate imperial and metric system
5. Note on isotonic solution

ModuleIII

PART B

1. Write the prescription for calamine lotion
2. Write the prescription for turpentine liniment
3. Differentiate the term monophasic and biphasic liquid dosage form
4. Advantages and disadvantages of suppositories
5. Note on types of suppositories
6. Note on lotion
7. Give any four disadvantages of suppository base
8. Advantages of powder
9. Define the term powder
10. What do you meant by cachets
11. What are the advantages of cachets
12. Example for semi liquid preparation
13. Give the prescription for turpentine liniment
14. Prescription for lotion
15.

ModuleIV

PART B

1. Note on patient counseling
2. Discuss dispensing of proprietary products
3. Maintenance of drug store
4. Write Nondiscrimination polices
5. Write policy against sexual harassment

ModuleV

PART B

1. Classify the communable disease on the basic of organism causing infection.
2. Write a note on modes of transmission of T.B.
3. What are the prevention and control of T.B?

4. What are the diagnostic test for TB?
5. What are the control measures of TB?
6. What are the first choice of drugs used for TB?
7. What are the second choice of drugs used for TB?
8. Write a note on types of Hepatitis.
9. Write a note on modes of transmission of Hepatitis.
10. Write a note on prevention and control of Hepatitis .
11. Write a note on types of Leprosy.
12. What are the modes of transmission of Leprosy ?
13. What are the prevention and control of Leprosy ?
14. What are the treatments available for Leprosy ?
15. Write a notes on modes of spread of syphilis.
16. What are the prevention and control of syphilis ?
17. Write the symptoms of AIDS .
18. What are the most important rules of First Aid ?
19. Write the symptoms of shock .
20. What are the prevention methods for shock?
21. What are the prevention methods for snake bite ?
22. What are the prevention methods for eye poisoning?
23. What are the treatment of eye poisoning?
24. What are slowedpoison?
25. What are inhaled poison?
26. What are the type of fractures?
27. What are the signs and symbol of fractures?
28. Write a note on dislocation.
29. What do you meant by surgery ?
30. What are the types of wounds?

ModuleVI

PART B

1. Write a note on nutrition.
2. Differentiate between malnutrition and undernutrition.
3. What are nutrition requirements?
4. Give a note on deficiency of Vitamin A.
5. Which are the Source of Vitamin A?
6. Give a note on deficiency of Vitamin D .
7. What are the functions of Vitamin K?
8. What are the functions of Folic acid?
9. What do you meant by demography?
10. What are the function of Vitamin B?
11. Write on objectives of family planning.

12. Write about rhythm method of contraception.

ModuleI

PART C

1. Discuss various routes of drug administration
2. Write various equations to calculate doses
3. Factors influencing dose
4. What is the contribution of retail pharmacy chains in total sales
5. Note on pharmaceutical distribution
6. What is stockiest
7. Note on retail pharmacy
8. What is IPR how it is important for companies
9. Note on health care eco system
10. Mention any two challenges faced by Indian pharmaceutical companies
11. Note RashtriyaSwasthyaBimaYojana
12. Note 6Ps in health care system

ModuleII

PART C

1. Calculate the volume of 95% alcohol required to prepare 600 ml of 70 % alcohol
2. Calculate the amount of 70%,60%,40% and 30% alcohol should be mixed to get 50% alcohol
3. Discuss isotonic solution
4. General priciples of isotonicity

ModuleIII

PART C

1. Differentiate between lotion and liniments
2. Classification of powders
3. Note on suppository bases
4. Differentiate fatty and emulsifying bases
5. Advantages and disadvantages of powder

6. Note on suppositories
7. Discuss the advantages and disadvantages of suppositories
8. Discuss fatty bases
9. Explain preparation of suppositories
10. Note on new trends of suppositories
11. Explain common policies regarding confidentiality
12. What are the policies related to the usage of illegal drugs at workplace
13. What are the company policies related against discrimination
14. Explain company policies regarding company asset
15. Maintenance of drug store

Module IV

PART C

1. Drug store
2. Retail and whole sale drug store
3. Community pharmacy
4. Inventory control types
5. stock

Module V

PART C

1. Write a note onTuberculosis.
2. Write a note on Hepatitis.
3. Which Vaccines are used for Hepatitis.
4. Write a note on Leprosy.
5. Write a note on sexually transmitted diseases.
6. What are Syphilis ?
7. Write a note on AIDS .
8. Write a note on Gonorrhea.
9. What are the treatment available for Syphilis?
10. What are the treatmentfor Gonorrhea.
11. What are the treatmentfor AIDS.
12. What are the prevention and control of AIDS?
13. What are theAims of First Aid?
14. What are the Emergency treatment of shock?
15. What are the treatment of electric shock?

16. What are First Aid treatment of snake bite ?
17. What are First Aid treatment of Burns?
18. What are First Aid treatment of poisoning?
19. Write a note on Back pressure arm left method.
20. Write a note on Mouth to mouth breathing method.
21. Write a note on external heart compression.
22. What are First Aid treatment of wounds?
23. Write a note on 1. Bandages 2. Adhesive Tape
24. Explain Primary wound dressing .

ModuleVI

Section c

1. Explain protein deficiency disease.
2. Explain Kwashiorkor.
3. Explain Marasmus.
4. Explain treatment for protein deficiency diseases.
5. Give a note on vitamins .
6. Source of Vitamin A,D,E,C
7. Explain about deficiency ofVitamin A,D,E,C.
8. Explain about deficiency of Vitamin C.
9. Explain about Balance diet.
10. Explain about Demography cycle.
11. Explain about Permanent method of contraception.
12. Scope of family planning.
13. Give a note on deficiency of B , K B_2.
14. What are the source of B , K , B_2?
15. ExplainFertility

ModuleI

PART D

1. What do you meant by posology discuss various factors influencing dose
2. Discuss about posology
3. Write a note on health careecosystem with SWOT analysis of Indianpharma sector
4. Note on health care ecosystem

ModuleII

PART D

1. Discuss soild dosage form

2. Discuss suppositories as semisolid dosage forms
3. Define the term powde what are advantages and disadvantages of powders
4. Define the term powder classify different types powders, discuss the bulk powders are meant for external use

ModuleIV

PART D

1.Role of community pharmacist in health care and education

Module V

PART D

1. Write a note on Resuscitation method on First Aid.
2. Explain the classification of dressing.
3. Write a note on Tuberculosis. Note on Hepatitis.
4. Write a note on sexually transmitted diseases.
5. Explain the emergency treatment of shock .
6. ExplainFirst Aid treatment of snake bite .
7. Explain First Aid treatment of Burns .
8. Explain First Aid treatment of poisoning.

ModuleVI

PART D

1. What are the factors causing for high fertility rate in India?
2. Give a note on family planning .
3. Define contraceptive methods.
4. Define demography cycle.

SDC3PIC01 ADVANCED PHARAMCEUTICAL OPERATION AND INORGANIC PHARMACEUTICAL CHEMISTRY

Module I

1. Magnesium hydroxide can be precipitated by the metathesis reaction between Magnesium salt and .....
2. ..... prepared by precipitation from solution of Magnesium Sulphate and Sodium Silicate.
3. The molecular formula of Disodium Hydrogen phosphate is ..... .
4. Aluminium Sulphate may be made by dissolving ..... .
5. The molecular formula for Kaolin is ..... .
6. An expectorant ..... bronchial secretions and nucolytics help ..... thick bronchial secretion.
7. Aluminium Chloride is prepared commercially by reacting ..... with ..... .
8. The substances, which inhibit oxidation of free radicals are called as .

Answers

1. Sodium, potassium or ammonium hydroxide
2. Magnesium trisilicate
3. Na2HPO4,12H2O
4. Aluminium hydroxide in sulphuric acid
5. . Al2Si2O5(OH)4
6. Increase, loosen
7. Ammonia, hydrogen chloride
8. . Antioxidant

Module II

Part A

1. α Rays are now known as ..... .
2. β Radiation are .....
3. γ Rays have …… Mass …… change
4. The unit of radioactivity called ..... .
5. I curie…….. D.P.S
6. Half-life of any radioactivity substance ……
7. Half-life is depend only on …… .
8. Geiger muller counter is efficient for…….

answers

1. Helium ions
2. Fast moving electrons
3. No mass, no charge
4. Curie 25. 3.7 × 1010 per second 26. 0.693/Lambda
5. Disintegration constant
6. Beta rays

MODULE III

PART A

1. Within the extracellular fluid the major cation is.....
2. Major cation in the intracellular fluid
3. Whatare the electrolytes maintain homeostasis
4. .....dissosiates in the solution
5.

Answers

1. Sodium
2. Potassium
3. Sodium and potassium
4. Electrolytes

Module IV

PART A

1. .....test measure the enzyme thet your release in response to damage
2. Bilirubin test measures .....
3. ..... evaluate bile duct syate
4. Name liver infections
5. ALP stands for
6. AST stands for
7. Name kidney test
8. Urine test is called

   Answers

   1. ALT,AST
   2. Dispose of bilirubin
   3. ALP test
   4. Hepatitis BorC
   5. Alkaline phosphate
   6. Aspartate aminotransferace
   7. ACR,GFR

8. ACR

Module i

PART B

1. What is Arrhenius theory of acid and base
2. Limitations of Arrhenius theory
3. Bronsted and LoweryTheory
4. Eg for Bronsted and LoweryTheory
5. Lewis theory acid and bases
6. Eg for soft acid and hard acids
7. Eg for soft and hard base
8. Differentiate P^H and p^{OH}
9. Acidphthalate buffer
10. Hydrochloric acid buffer
11. Alkaline borate buffer
12. Two uses of buffer
13. Buffer systems used in pharmaceutical buffer
14. How to select inorganicantioxidants
15. Note on redox property of water
16. Amphoteric character of water
17. What is efflorescence
18. Hardness of water
19. Define purified water BP

Module II

PART B

1. Define radiopharmaceutical compounds.
2. What are the classification of Isotopes ?Give example each
3. What is ϒ-ray?
4. What is β–ray?
5. What is the unit of radioactivity?
6. What are the instruments used to measure and detect radioactivity?
7. What are the functions of GM counter?
8. Give the example for biological effect of radiation.
9. Give the example for artificial radio nuclide.
10. What are stable isotopes? Give its examples.
11. What are radioactive isotopes? Give its examples.
12. What is α-particle?
13. What are the action and use of Barium Sulphate opaque medium?

Module iii

PART B

1. What is Sodium chloride injection USP XVIII?
2. What is Rings injection USP XVIII?
3. List out the official products of sodium replacement therapy.
4. Explain Solubility of potassium replacement therapy.
5. Explain Official products of potassium replacement therapy.
6. How Bicarbonate and sodium act as physiological ions?
7. How phosphate and chloride act as physiological ions?

Module iv

PART B

1. Noteon ALT
2. Note on AST
3. Note on ALP
4. Reneal test
5. GFR

Module I

PART C

1. Explain different acid base theory
2. HSAB principle
3. Buffer solution
4. MoA of antioxidants
5. Sodium sulphate BP as antioxidant
6. Chemical property of water
7. Ion exchange resin in softening of water
8. How to produce purified water
9. Wrte the test for following to purify water

- Chloride
- Sulphate
- Microbial contamination
- Acidity

10.Note onwater for injection BP

Module II

PART C

1. What are natural Radio nuclides?
2. What are artificial Radio nuclides?
3. Define GM counter.
4. What are the applications of Radio nuclides?
5. Explain the storage and handling of radioactive materials.
6. Explain the biological effect of Radiation?
7. Radio opaque contrast media.
8. Explain the Barium sulphate as Radio opaque contrast media.
9. Note on rate of decay.
10. Give a note on the history and development of Radiopharmaceuticals.

Module III

PART C

1. What are the major physiological ion?
2. What is sodium replacement therapy?
3. What is potassium replacement therapy?
4. Explain the solubility of sodium chloride USP XVIII.
5. Explain the buffer system present in body.
6. What are the steps involving in acid excretion in the kidney?

Module IV

PART C

1. RIA test
2. Fluroesin dye
3. Mercurochrome dye
4. Acrydine dye
5. What are radioopeques

ModuleI

PART D

1. Dissociation constant of acetic acid is $1.75X10^{-5}$ at25^0C. Calculate its P^{ka} value

2.Dissociation constant of NH_2 is 1.80×10^{-5} at 25^0c calculate the p^H of a buffer solution prepared with 0.05Mammonia and 0.05M ammonium chloride

3.Methods of softening of hard water

Module II

PART D

1. Explain the types of Radio nuclides.
2. Explain Radio opaque contrast media and how Barium sulphate as Radio opaque contrast media.

MODULE III

PART D

1. Electrolytes used for replacement therapy
2. Explain Physiological acid – base balance.

MODULE IV

Part D

1.Explain briefly ELISA test

2. discuss liver function test

SEMESTER IV

GEC4PHY03 PHYSICS

Module 1

PART A

1. In the case of reflection by spherical mirrors, light rays passing between two points takes a path of_____time
2. in an interference pattern produced by two identical slits the Intensity at the centre is I. If one of the slits is closed the intensity at the centre becomes____. (4I, I/4, I, 2I)
3. in double slit experiment, second dark band is formed on the screen at a distance of 0.3 cm from the central band. the distance of fourth bright band from the centre is _____.
4. Two light beams of Intensity ratio 1:4 interfere with a phase difference $\pi/2$ at a point A and with the phase difference π at a point B. The ratio of intensities at A to B is____.
5. The intensity at the Central maximum in double slit experiment is I. what is the intensity at a point where the path difference is $\lambda/4$.
6. The phenomenon of light involved in holography is___.
7. when sunlight falls on a soap bubble, different colours are seen. this is due to___.
8. In double slit experiment , the slit separation is halved and the slit- screen distance is doubled. The fringe width becomes____.
9. when white light is used in double slit experiment, the colour of the central fringe is_____.
10. the resolving ability of optical instruments depend on the phenomenon ____ of light.
11. For a grating with N number of lines, the number of secondary minima possible in between any two principal Maxima are__
12. In grating spectrum, for a given order, the number of principal Maxima corresponds to (grating element, angle of diffraction, number of wavelengths in the incident light, number of lines per centimetre on the grating)
13. when the source and the screen are at a finite distance, the diffraction pattern corresponds to_____
14. A compact disc show different colours in white light. This is due to___
15. For a point source of light, the wavefront is__
16. For a linear source the wave front is___
17. When the source lies at a very large distance, the wavefront is____
18. In ___ diffraction, the source and screen are at a finite distance from the diffracting aperture.
19. In __ diffraction, the source screen distance is infinite
20. The wavefront getting diffracted in Fraunhofer diffraction is___.

Answer key

1. Maximum
2. I/4
3. 0.8cm
4. 5 :1
5. I/2
6. Interference

7. Interference
8. Quadruple
9. White
10. Diffraction
11. N-1
12. number of wavelengths in the incident light
13. fresnel diffraction
14. diffraction
15. spherical
16. cylindrical
17. plane
18. fresnel diffraction
19. Fraunhofer diffraction
20. Plane wavefront

Module II

PART A

1. A transistor has ...._number of PN junction dodes.

2. For a transistor, if the value of α=0.9, then value of β=_____.

3.Efficiency of a halfwave rectier is _____.
4. maximum efficiency of a full wave rectiferis

5. in a forward biased conduction a diode behave like

6. when used as voltage regulator a zener diode must be …….. biased

7. the forward voltage drop across a silicon diode is absent

8. current gain in a CB configuration

Answers

1. **2**
2. **.**
3. **.**
4. **81%**
5. **Conductor**
6. **Reverse**
7. **0.7v**
8. **CE**

Module III

PART A

1. On an equipotential surface, the electric field lines are _____ to the surface.

2. .Total normal electric lines of force passing through a given area is _____
3. The distance between two charges is halved, force becomes _____.

4. Trajectory of a charged particle in a uniform electric field is _____

5. Work done in moving a charge between two points on equipotential surface is _____

a) positive b)negative c) zero d)one

Answers

1.
2.electric flux
3. 2 times
4.
5. zero

Module IV

PART A

1. A wire of resistance R is stretched to reduce its diameter to half its initial value. The new resistance is
   a. a) R/4 b) 4R c) R/16 d) 16R
2. At super conducting state, the material becomes _____
3. 3.The temperature coefficient of resistance of a semiconductor is _____
4. The drift velocity of electron in a conductor is of the order of
   a. a) 10^{-5} ms^{-1} b) 10^{5} ms^{-1} c) 10^{6} ms^{-1} d) 10^{-14} ms^{-1}
5. 5.The thermal velocity of electrons in a conductor is of the order of ____ m/s.
6. The resistance is inversely proportional to
   a) Length b) Area of cross section c) Density d) Volume
7. 7.The internal resistance of a cell can be measured by
   a. a) voltmeter b)potentiometer c) ammeter d) ohmmeter
8. A wire of resistance R is stretched to reduce its diameter to half its initial value. The new resistance is
   a. a) R/4 b) 4R c) R/16 d) 16R
9. At super conducting state, the material becomes _____
10. 10.The resistance of mercury reduces to zero at a temperature below _____

Module V

PART A

1. Intensity of magnetization is small and negative for _____ materials.
2. Dip at magnetic poles of earth is
   a) 90° b) zero c) 45° d) 30

3. The value of dip at poles is

   a) 0^0 b)90^0 c) 180^0 d) 45^0

4.In a Diamagnetic material magnetic susceptibility is _____.

5.Which of the given devices works on the principle of tangent law
a)moving coil galvanometer b) vibration magnetometer c) deflection magnetometer d) dip circle

Module VI

PART A

1. What are nucleons?
2. What is atomic mass number?
3. What is atomic number of an element?
4. Which is the lightest nucleus?
5. The energy equivalent of 1 amu is---

ModuleV II

PART A

1. Which of the following is a lepton? (Proton, neutron, pion, muon)
2. Hadrons are divided into (baryons and leptons, baryons and mesons, Mesons and leptons, protons and neutrons)
3. For baryons, baryon number is ---
4. The lightest meson is---
5. The lightest baryon is ___
6. Which is the only hadron stable in free space?
7. The stability of proton is a consequence of---.

   Answers
   1. Muon
   2. .
   3. +1
   4. pion
   5. .
   6. .

Module VIII

PART A

1.In radio transmission , the medium of transmission is

a)cable b)optical fibre c)space d)an antenna

2.In amplitude modulation, which parameter of the carrier wave varied with the signal.

a)Amplitude b) phase c) frequency d) velocity

3.Bandwidth of AM wave is the difference between its side band frequencies, it is ___

Module IX

PART A

1.Which laser is suitable for optical communication

a) ruby laser b) He-Ne laser c) Semiconductor laser d) Carbondioxide laser

2The lifetime of an atom in a metastable state is _____
3.Write an example for a gas laser.
4.Expand LASER.

answers
1.ruby laser
2.10^{-6} to 10^{-3}
3.carbon dioxide laser, He-Ne lasor
4.lightamplification by stimulated emission of radiation

Module I

PART B

1. Define optical path
2. State fermat's principle of least time
3. State fermat's principle of stationary time
4. State laws of reflection
5. State laws of refraction
6. An oil film on the surface of water shows continuously changing colours. Explain.
7. is the law of conservation of energy violated in interference phenomenon?
8. What are the factors on which fringe width depend in double slit experiment?
9. Two independent sources cannot produce interference. why?
10. What is constructive interference? What is the condition for it?
11. What is destructive interference? What is the condition for it?
12. Two coherent sources of Intensities in the ratio 1:4 are superposed. what is the ratio of maximum to minimum intensity in the interference pattern?
13. What is the shape of the interference fringes formed on the screen in young's double slit experiment?
14. Define wavefront.
15. Explain Huygens principle of secondary, What is meant by diffraction?
16. Distinguish between fresnel diffraction and Fraunhofer diffraction.
17. What are the two categories of diffraction phenomenon?
18. Grating spectrum is called a normal spectrum. why?

19. mention any two differences between interference and diffraction of light.
20. How is the angular dispersion of grating related to the grating element?
21. State the principle underlying in theory of diffraction
22. Define resolving power of a grating
23. Define polarisation of light
24. State brewster's law
25. Distinguish between plane of polarization and plane of vibration

Module II

PART B

1. What is meant by ripple factor of a rectifier?
2. Draw the three transistor connections.
3. What is the leakage current in CB transistor?
4. What is a zener diode? Give its application.
5. Draw the circuit diagram of a CE and CB amplifier

Module III

PART B

1. What is electrostatic shielding?
2. .State and prove Gauss's law.
3. Explain the properties of electric lines of force.

Module IV

PART B

1. What is Meissner effect?

2. A potentiometer is better than a voltmeter in measuring potential difference. Why?

3. State differences between thermal velocity and drift velocity of electrons?

Module V

PART B

1. What are the magnetic elements of earth ?
2. Give some properties of ferromagnetic substances.
3. Distinguish between paramagnets and ferromagnets
4. Define terms retentivity and coercivity of a magnetic material.

Module VI

PART B

1. What are isotopes? give examples.
2. Define atomic mass unit.
3. Why nuclear magnetic smaller than bohr magneton?
4. Why neutrons have magnetic moment?
5. Explain larmor frequency
6. What are the main features of nuclear force?
7. What is mass defect?
8. What is enriched uranium?
9. What is the function of moderator in a nuclear reactor?
10. Define half Life

ModuleV II

PART B

1. Explain why protons does not decay on the basis of baryon number conservation law.
2. What are leptons? Give two examples.
3. What are baryons? Give two examples
4. What are hyperons? Give two example.
5. What are hadrons?
6. What are fermions?
7. What are bosons?
8. What are quarks?
9. Write a short note on colour of quarks.
10. Write a short note on flavour of quarks.
11. Write a short note on resonance particles.

ModuleVI II

PART B

1.What is population inversion?

2.What is meant by stimulated emission

Module I

PART B

1.What are the limitations of amplitude modulation?
2.Sketch the block diagram of communication system
3.Explain Bandwidth of AM wave.
4.What are the limitations of amplitude modulation?

Module I

PART C

1. Deduce the laws of reflection from fermat's principle
2. Derive snell's law of refraction using fermat's principle
3. Define interference of light. Deduce the conditions for constructive and destructive interference.
4. Light of wavelength 5500Å produces interference pattern on a screen at a distance 2m away from a double slit. The overall separation of fringes is 1 cm. Calculate slit separation and fringe width.
5. a soap film of thickness $5x10^{-5}$ cm is viewed at an angle of 35° to the normal. Find the wavelengths of light in visible region which are absent in the reflected light. refractive index of soap film is 1.33.
6. White light is used in young's double slit experiment. the path difference between light from the slits reaching at a point on the screen is $3x10^{-4}$ cm. find the missing wavelength in visible region at this point.
7. Define resolving power of a grating. derive an expression for it.
8. How many orders will be visible if the wavelength of the incident radiation is 5000 Å and the number of lines on the grating is 2620 lines per inch?
9. Examine if two spectral lines of wavelength 5890Å and 5896Å can be clearly resolved in first order by diffraction grating of width 2 cm and having 425 lines per centimetre.

Module II

PART C

10. Find the ripple factor of a fullwave rectifier.
11. . Find the ripple factor of a halflwave rectifier.
12. . Write a note on different kinds of filter circuits with examples.
13. . The applied input a.c. power to half wave rectifier is 100watts. The D.C. output power obtained is
14. a) Calculate the rectifier efficiency b) What happends to remaining 60watt?
15. 5.A Zener diode is used to convert 12V d.c. input to 9V stabilized output. The series resistance
16. R=120Ω. If the load current is 15mA,What is the current through the zener diode?
17.
18. 6.A centre tap full wave rectifier makes use of a 12-0-12V transformer. The forward resistance of each diode
19. is 10Ω. Load resistance=2000 Ω. Find the dc load current (I_{dc}) and efficiency of the rectifier (η).
20. 7.A crystal diode having internal resistance r_f=20Ω is used for half-wave rectification. If the applied voltage
21. V=50sinωt and load resistance R_L=800Ω, find I_m, I_{dc}, I_{rms}, V_{dc}
22. 8.A centre-tap full-wave rectifier is connected to a transformer secondary of the type 6-0-6V.If the forward
23. resistance of each diode is 4Ω and load resistance is 400Ω,find the d.c.load current and efficiency of the rectifier

Module III

PART C

24. 1.Show that the curl of an electric field in a region is always zero.

25. 2.Find the electric force on a proton placed in an electric field of $2*10^4$N/C along positive X-direction.
26. 3.Show that electric field is negative gradient of potential.
27. 4.An oil drop of radius 9.81×10^{-4} mm and density of oil 1.26 g/m^3 is held stationary under a constant electric field of 5.1×10^4 N/C. Find the number of electrons present in excess on oil drop.
28. 5.The electric potential V_x in a region along X axis varies with distance x (in m) according to relation $V_x = 4x^2$.Calculate the force experienced by 1μC charge placed at a point x=1m.

Module IV

PART C

29. 1.What is drift velocity? Derive the expression for it.
30. 2.What is mobility? Derive the expression for it; explain why electrical conductivity of electrolyte is lesser than that of metals.
31. 3.Explain the temperature dependence of resistivity of metals and semiconductors

Module V

PART C

32. 1.Write a short note on magnetic elements of earth.
33. 2. Find the earth's magnetic field at a place where the angle of dip is 60^0 and horizontal component of earth's field is 0.3G.

Module VI

PART C

1. Explain the stability of A nucleus in terms of proton and neutron numbers
2. Explain fission and Fusion from the binding energy curve
3. explain nuclear fission on the basis of liquid drop model of nucleus
4. With the help of a diagram explain chain reaction
5. What is radioactivity?

Module VII

PART C

1. What are resonance particles?
2. What are quarks? Write a note on colour and flavour of quarks.
3. Write a note on fermions.
4. Write a note on baryons
5. Write a note on bosons

Module VIII

PART C

1. Explain population inversion? How it becomes basic requirement for lasing action?
2.What is the difference between stimulated emission and spontaneous emission 3.Explain the working principle of LASER

Module IX

PART C

1. Compare amplitude and frequency modulation.

2. Obtain an expression for the instantaneous voltage of modulated wave

Module I

.PART D

1. Explain the superposition of two sinusoidal waves. Deduce expressions for resultant amplitude and intensity.
2. Explain young's double slit experiment. Deduce an expression for interference bandwidth.
3. Explain the phenomenon of interference by plane film and hence account for the colours in thin films.
4. Discuss the theory of diffraction grating. Describe the method of determining wavelength of light using grating.

Module II

PART D

1. Explain the working of a fullwave rectifier.Find the efficiency and ripple factor.

2. Find the efficiency and ripple factor of a bridge rectifier.

3.Explain the working of a halfwave rectifier. Derive the expression for efficiency and ripple factor of a half wave rectifier.

4.Draw the CB,CE and CC configurations and draw their output characteristics.Define α and β and obtain their relationship between them.

5.Briefly outline the working of an npn transistor. Discuss the different transistor connections using neat diagram mentioning current amplification factor in each case.

Module III:

PART D

1. State and explain Gauss's law. Apply this law to find the electric field due to two parallel plane sheets of equal and opposite surface charge densities

Module IV

PART D

1.Explain the theory of Carey Foster bridge. How can we determine the temperature coefficient of resistance of a material using this bridge.
2.Explain the principle and working of a potentiometer.Describe an experiment to determine the resistance of a wire using potentiometer.

Module V

PART D

1. Explain the theory of vibration magnetometer.With the help of Searl's vibration magnetometer how can be find the magnetic moment of a magnet.

Module VI

PART D

1. With the help of a diagram explain the working of a nuclear reactor.
2. Explain radioactivity. What is mean life and how mean life is determined?

Module VII

PART D

1. Explain the classification of elementary particles.

Module VIII

PART D

Nil

Module IX

PART D

1.Explain amplitude modulation and obtain an expression for the instantaneous voltage of modulated wave. What are side bands

GEC4IC04 INORGANIC CHEMISTRY –III CHE5B06

Module I

PART A

Fill in the blanks

1. The precipitation of an substance occurs when its ionic product ..... its solubility product.
2. Addition of sodium acetate suppresses the dissociation of acetic acid. This is an example for phenomenon called.....
3. In inorganic qualitative analysis, group lll cations are precipitated as their.....
4. In inorganic qualitative analysis, group.....cations are precipitated as their carbonates.
5. For $PbCl_2$, if $[Pb^{2+}]$ and $[Cl^-]$ represent the ionic concentrations of Pb^{2+} and Cl^- respectively in a saturated solution of it, expression for solubility product is: K_{sp}=.....
6. Concordance between the observed value of a determination and the true or most probable value is termed.....
7. The ratio of the absolute error in a determination to the most probable value of the quantity measured is called.....
8. Among *fluoride, oxalate* and *phosphate,* that which can be eliminated before cation analysis by strong heating is.....
9. Upon repeatedly boiling and evaporating and conc. HCl, borate in a mixture gets eliminated as volatile.....
10. The process in which substances that are normally soluble become incorporated into a precipitate during its formation is known as.....

Questions with one-word answers

11. State whether the addition of ammonium chloride to ammonium hydroxide increases or decrease the extent of dissociation of ammonium hydroxide.
12. Among CH_3COONa, HCl, HNO_3 and NaCl, which will not suppress the dissociation of acetic acid?
13. Among the halides ions (fluoride, chloride, bromide and iodide) which interferes in cation analysis and hence must be eliminated to ensure correct analysis?
14. What is the name given to the process by which an impurity gets deposited on the surface of the desired precipitate after its formation?
15. The irregularities associated with an instrument or apparatus, which lead to errors in measurement, can be eliminated by correlating its reading with that of a standard; what is this process called?

Section A: key

1. Exceeds
2. Common ion effect
3. Hydroxides
4. V
5. $[Pb^{2+}][Cl^{-}]^2$
6. Accuracy
7. Relative error
8. Oxalate
9. Boric acid
10. Coprecipitation
11. Decreases
12. NaCl
13. Fluoride
14. Postprecipitation
15. Calibration

Module II

FILL IN THE BLANKS

1. The radioactive isotope of hydrogen is.....
2. The isotope of hydrogen that deos not contain a neutron in its nucleus is.....
3. The form of dihydrogen in which the spins of the 2 nuclei are parallel is called.....
4. The alkali metal with the lowest density is.....
5. The alkali metal theat has the most negative standard reduction potential ($E^{\circ}_{M^+/M}$) is....
6. Among the alkali metal carbonates, that with the least thermal stability is.....
7. The oxidation state shown by alkali metal in their compounds is.....
8. The alkali metal that can combine directly with nitrogen is.....
9. The gas liberated when an alkali metal reacts with water is.....
10. The alkali metal halide which shows the highest covalent character is.....
11. The alkali metal which forms only its monoxide and no other oxide is.....
12. The alkaline earth metal having the highest first ionization energy is.....
13. The alkaline earth metal that imparts a pale green colour to a non –luminous flame is.....
14. The alkaline earth hydroxide which shows amphoteric behaviour is.....
15. Plaster of paris has the formula.....
16. If `n' represents the principal quantum number for the outermost shell,the outer electronic configuration of Group 13 element is.....

17. The most electronegative element among the Group 13 elements is.....
18. In the heavier element of a Group of the p-block elements, there is an increasing reluctance for the `ns' pair to participate in bonding. This is called.....
19. Among the Group 13 elements, has the least electronegativity .
20. Among the Group 13 elements.....has the highest melting point.
21. The density..... on moving down Group 13.
22. Boron reacts with steam at red heat to yield ..... and dihydrogen.
23. Boron forms a number of hydrides which are referred to as.....
24. Boron shows diagonal relationship with.....
25. The formula of *diborane* is.....
26. The state of hybridisation of boron in *diborane* is.....
27. ..... is sometimes called inorganic benzene .
28. The most electronegative element of Group 14 is.....
29. The element which shows the highest tendency for catenation is.....
30. The state of hybridisation of carbon in graphite is.....

QUESTION WITH ONE- WORD ANSWERS

31. Which isotope of hydrogen contains one neutron in its nucleus?
32. By what name is the form of dihydrogen in which the spins of the two nuclei are antiparallel known?
33. Which stable alkali metal has the highest melting point?
34. Which alkali metal imparts a lilac colour to a non-luminous flame?
35. Name the alkali metal which forms its peroxide but does not form its superoxide.
36. Which alkali metal carbonate has the least solubility in water?
37. Which alkali metal hydroxide has the least basicity?
38. With which element does Li show diagonal relationship?
39. What is the formula of *washing soda?*
40. Which alkaline earth metal has the lowest melting point?
41. Among Be ,Mg,Ca and Sr, which forms a dioxide ?
42. What oxidation state is shown by an alkali earth metal in each compounds?
43. Which is the least basic alkaline earth metal hydroxide?
44. What is the formula of *gypsum*?
45. Which number among Group 13 elements has the highest first ionization energy?
46. What is the oxidation state of boron in metallic borides?
47. Which element of Group 13 has the lowest melting point?
48. Which is the most electropositive element of Group 13?
49. Which of the Group 13 elements exist in its liquid state on a hot day?
50. What is the product of hydrolysis of boron trichloride?
51. What is the formula of *borazine*?

52. What is the product obtained when a 1:2 molar mixture of diborane and ammonia is heated at 300°c?
53. If `n' represent the principle quantum number for the outermost shell, what will be the outer electronic configuration of Group 14 elements?
54. Which is the more stable crystalline isotope of carbon –diamond or graphite?
55. Which is the hardest substance known?

SECTION A: KEY

1. Tritium
2. Protium
3. Ortho-hydrogen
4. Lithium
5. Lithium
6. Li_2CO_3
7. +1
8. Lithium
9. H_2
10. Lithium iodide (LiI)
11. Li
12. Be
13. Ba
14. $Be(OH)_2$
15. $CaSO_4.1/2H_2O$[Or $(CaSO_4)_2.H_2O$]
16. $ns^2\ np^1$
17. Boron
18. Inert pair effect
19. Al
20. B
21. Increases
22. Orthoboric acid (H_3BO_3)
23. Boranes
24. Silicon
25. B_2H_6
26. sp^3
27. Borazine(or Borazole or $B_3N_3H_6$)
28. Carbon
29. Carbon
30. sp^2
31. deuterium

32. para-hydrogen
33. Lithium
34. Potassium
35. Sodium
36. Li_2CO_3
37. LiOH
38. Mg
39. $Na_2CO_3.10H_2O$
40. Mg
41. Sr
42. +2
43. $Be(OH)_2$
44. $CsSO_4.2H_2O$
45. B
46. -3
47. Ga
48. Al
49. Ga
50. Orthoboric acid [H_3BO_3 or $B(OH)_3$]
51. $B_3N_3H_6$
52. Borazine(or Borazole or $B_3N_3H_6$)
53. $ns^2\ np^2$
54. Graphite
55. Diamond

Module III

PART A

FILL IN THE BLANKS

1. If n represent the principal quantum number of the outer most shell, the valence shell electronic configuration a group 15 element is ……
2. The element having highest first ionization energy in group 15 is……..
3. The most metallic group 15 element is …….
4. The most common oxidation state of group 15 element is……..
5. The value of the P-P-P in a P_4 molecule is ……
6. All the group 15 hydrides (EH_3) are ……in shape
7. The H-N-H bond angle In NH_3 is ……than the H-P-H bond angle in PH_3
8. The oxidation state of N in N_2O_4 is ……

9. The formula of "laughing gas is……
10. The formula of phosphinic acid is ……
11. The basicity of H_3PO_4 is ……
12. Ammonia gas is dried by passing it through a tower packed with……..
13. ……. Gas is produced when magnesium nitride is treated with water
14. The formula of oxoacid which contain phosphorus in +1 oxidation state is ……..
15. Copper when treated with dilute nitric acid reduces nitric acid to ……..
16. Conc. HNO_3 oxidieses sucrose to ……..
17. The number of valence shell electrons in an atom of a group 16 element is ……
18. The most electronegative element in group 16 of the periodic table is ……..
19. The element having the highest tendency for its atom to form pπ-pπ bond with other atoms is …….
20. Among the binary hydrides (H_2E) of group 16 elements , the one having the highest boiling point is……..
21. The H-O-H bond angle in H_2O is …… Then the H-S-H bond angle in H_2S
22. The state of hybridisation of S in SO_2 is …….
23. The formula of disulphuric acid is ……
24. The formula of caro's acid is ……..
25. $H_2S_2O_6$ is named ……
26. Ozone oxidizes blace lead sulphide to white ……
27. In acidic medium, hydrogen peroxide oxidizes iodide (I^-) to ……..
28. The 30% solution of H_2O_2 is marketed as ……. Volume of H_2O_2
29. The reddish brown gas evolved when potassium bromide is heated with conc. H_2SO_4 IS ……..
30. The gas evolved when dilute sulphuric aci is added to sodium sulphide is ……
31. Among the halogens, the one having the highest first ionization energy is ……..
32. The most common oxidation state that all the halogens exhibit in their compounds is ……..
33. The oxidation state of Cl in chlorous acid is ……
34. The oxoacid of iodine in which it exhibits an oxidation state of +7 is ……
35. Of the hydrohalic acids ,…….. is the weakest in aqeous solution.

36. Among the hydrogen halides, ……. has the highest boiling point.
37. Among the oxides of chlorine,…….. is an odd –electron molecule.
38. The state hybridisation of Cl in perchloric acid is ……
39. The molecular geometry of triiodide ion (I_3^-) is ……..
40. Among the fluorides of xenon, the molecular geometry of …… is squar planar
41. The shape of XeO_4 is …….
42. The state of hybridisation of Xe in XeF_2 is …….
43. The molecular geometry of XeF_6 is ……..
44. An oxofluoride of xenon that has a squar pyramidal shape is ……
45. Xenon hexafluoride undergoes slow hydrolysis with atmospheric moisture to yield …….. which is a highly explosive solid.

Questions with one –word answers

46. How many valence shell electrons are there in an atom of a group 15 element?
47. Which is the most electro negative element In group 15 of the periodic table?
48. Which is the most reactive allotropic form of phosphorus under normal conditions?
49. Among NH_3, PH_3 and AsH_3 ,which has the highest boiling point?
50. Write the formula of the oxide of nitrogen in which nitrogen is in the +1 oxidation state.
51. Among NO, NO_2 and N_2O_4 ,which is diamagnetic?
52. What is the oxidation state of nitrogen in nitrous acid ?
53. What is the basicity of H_3PO_2?
54. What gas is produced when ammonium chloride is heated with sodium hydroxide solution?
55. Which gas is produced when manganese react with very dilute HNO_3?
56. Write the formula of the compound of phosphorus which is obtained when conc. HNO_3 oxidises P_4
57. If n represents the principal quantum number of the outer most shell, what is the valance shell electronic configuration of group 16 element?
58. Which is the element having the highest first ionization energy in group 16?
59. Which has the lowest boiling point among the group 16 elements?

60. Among the binary hydrides (H_2E) of group 16 elements, which has the highest H-E-H bond angle?
61. What is the formula of oleum?
62. What is the formula of Marshall's acid ?
63. What isd the name of $H_2S_2O_4$?
64. What is the product obtain when ozone oxidizes moist phosphorus ?
65. If n represents the principal quantum number of the outermost shell,what is the valence shell electronic configuration of a halogen?
66. Among the halogens, which has the highest electron affinity?
67. In which binary oxide of chlorine does it show n oxidation state of +7?
68. Among F_2,Cl_2 and Br_2,which possesses the weakest bond?
69. Among the hydrogen halides,which possesses the highest reducing character?
70. Which gas is produced when sodium chloride is heated with conc.H_2SO_4?
71. Among HOCl,$HClO_2$,$HClO_3$ and $HClO_4$ which is the least acidic?
72. Among the iodine pentafluoride ,chlorine trifluoride and iodine trichloride,which is dimeric in the solid state?
73. What is the shape of $[ICl_4]^-$?
74. Among the fluorides of xenon ,which has a linear shape?
75. What is the state of hybridization of Xe in XeO_4 ?
76. Name an oxofluoride of xenon that has a T-shape?
77. What is the shape of XeO_2F_2 ?
78. What is the state of hybridization of Xe in XeF_4 ?
79. Which inert gas is used in filling balloons for meteorological observations?
80. Which noble gas is used in the radiation therapy of cancer?

Answer key

1. ns^2np^3
2. nitregen
3. BI
4. +3
5. 60^0
6. Pyramidal
7. Greater

8. +4
9. N_2O
10. H_3PO_2
11. 2(two)
12. Quick lime(CaO)
13. Ammonia(NH_3)
14. H_3PO_2
15. Nitric oxide(NO)
16. Oxalic acid
17. 6(six)
18. Oxalic acid
19. Oxygen
20. H_2O
21. Greater
22. Sp^2
23. $H_2S_2O_7$
24. H_2SO_5
25. Dithionic acid
26. Lead sulphade($PbSO_4$)
27. Iodine(I_2)
28. 100
29. Bromine(Br_2)
30. H_2S
31. Fluorine
32. -1
33. +3
34. HIO_4
35. HF
36. HF
37. ClO_2
38. SP^3
39. Linear
40. XeF_4
41. Tetrahedral

42. SP^3d
43. Distorted octahedral
44. $XeOF_4$
45. Xenon trioxide(XeO_3)
46. 5(five)
47. Nitrogen
48. White P
49. NH_3
50. N_2O
51. N_2O_4
52. +3
53. 1(ONE)
54. NH_3
55. Hydrogen
56. H_3PO_4
57. ns^2np^4
58. oxygen
59. oxygen
60. H_2O
61. $H_2S_2O_7$
62. H_2SO_5
63. Dithionous acid
64. Phosphoric acid(H_3PO_4)
65. ns^2np^5
66. chlorine
67. Cl_2O_7
68. F_2
69. HI
70. HCl
71. HOCl
72. Iodine trichloride
73. Square planar
74. XeF_2
75. SP^3

76. $XeOF_2$
77. See-saw shape
78. SP^3d^2
79. Helium
80. Radon

PART A

FILL IN THE BLANKS

1. Organosilicon polymers containing repeated R_2SiO units held together by Si-O-Si linkages are known as…….
2. Structures possessed by the class of silicates called …… are known as island structures.
3. Structurally, asbestos forms an example for a ……. Silicate.
4. …….constitute a calss of aluminosilicates used as molecular sieves,ion-exchangers, and shape-selective catalysis.
5. Heating PCl_5 with NH_4Cl above 100°C yields a mixture of cyclic and linear …….
6. S_4N_4 tend to detonate with decomposition into nitrogen and …… on heating or on shock.
7. Passing…… vapours over silver wool at 300°C at low temperature yields disulphurdintride(S_2N_2).
8. Polymeric sulphur nitride[$(SN)_x$] is known as ……
9. The nitride of sulphur that has a tendency to undergo spontaneous polymerization at room temperature is …….
10. Solvent which can donate as well as accept a proton are referred to as…….. solvents.
11. Autoionisation of ammonia yields the ammonium ion and the ……ion amide.
12. In liquid ammonia, the strengths of different acids are leveled to that of the…… ion.
13. Solvents with…… dielectric constants have a greater capability of dissolving ionic solutes.
14. Reaction between solutions of AgCl and KNO_3 in liquid ammonia results in the precipitation of……
15. According to the solvent system theoty of acids and bases, compounds capable of increasing the concentration of SO_3^{2-} anions when dissolved in liquid SO_2 may be regarded as…….

QUESTIONS WITH ONE WORD ANSWERS

16. Among silicones,silicas,silicates and alumino silicates, which are called polysiloxanes?
17. Which class of silicates contains discrete SiO_4^{4-} tetrahedral?
18. Which common anion is contained by pyrosilicates?
19. Among silicone fluids ,silicone rubbers,silicone oils and silicone resins, which class belongs to the category of silicone elastomers?
20. Among polyphosphazene, cyclotriphosphazenes,polythiazil and sodium silicate, which is a covalent polymers that displays metallic properties?
21. Name of formulate a nitride of sulphur that has a nearly square planar structure.
22. What name (term) is used to represent solvents that do not have any proton-accepting or proton-donating tendency?

23. Among HCN,HF,C_6H_6 and CH_3COOH, which is an aprotic solvent?
24. In acetic medium, the different bases are of strength equal to that of the acetate ion.What property of the solvent does this illustrate?
25. What magnetic property does a solution of an alkali metal in liquid ammonia exhibit?

SECTION A:KEY

1. Silicones
2. Pyrosilicates
3. Chain(or double chain)
4. Zeolites
5. Chlorophosphazenes(phosphonitrilic chlorides)
6. Sulphur
7. Tetrasulphur tetranitride(S_4N_4)
8. Polythiazil
9. Disulphurdinitride(S_2N_2)
10. Amphoteric(amphiprotic)
11. (NH_2^-)
12. (Ammonium,NH_4^+)
13. Greater(higher)
14. KCl
15. Bases
16. Silicones
17. Orthosilicates
18. $Si_2O_7^{6-}$
19. Silicone rubbers
20. Polythiazil
21. Disulphur dintride(S_2N_2)
22. Aprotic solvents
23. C_6H_6
24. Levelling effect
25. Paramagnetism

Module V

Section A

Fill in the blanks

1. The outer mantle of solid earth is called ……..
2. The lowermost layer of atmosphere is the ……
3. Any undesirable material that enters into the environment by natural sources or due to human activity is called a ……..

4. Among the oxides of carbon, nitrogen and sulphur, the formation of photochemical smog is caused by the oxides of …….
5. Carbon monoxide combines with haemoglobin of red blood corpuscles to form ……..
6. The earth is protected from harmful UV radiations by the stratospheric……layer
7. Among CO_2, CO,SO_2,and the chlorofluorocarbons, stratospheric ozone depletion is caused by ……
8. The most serious impact of ozone deletion on human health is that it causes cancer of the ……
9. Acid rain is caused chiefly due to the pollution by the oxides of nitrogen and ……..
10. Among CO,CH_4,$O_3$and H_2O vapour, the gas which is not a greenhouse gas…….
11. The earth absorbs solar energy as radiations in the visible region and gives off bulk of it as radiations in the ……..region
12. The oxygen equivalent required for the oxidation of organic matter in water determined with the help of a strong oxidant gives the value called……
13. The infamous Minamata Disease was caused from water polluted by the compounds of the metal……
14. Nutrient-enrichment resulting in algal blooms in water bodies is referred to as ……..
15. ……pollution in a water body occurs through the discharge of warm water into the water body from a thermal power plant

Questions with one-word answers

16.What is that segment of environment that includes all types of water resources called?

17.What is the region of atmosphere that contains the ozone umbrella called?

18.Which among the following can be considered a greenhouse gas- CH_4,SO_2,O_2 ,and N_2

19.Other than sulphuric acid, which acid is the major constituent of acid rain?

20.Among CO_2, CO,NO_2 and O_2, which has the highest affinity for haemoglobin?

21.Oxides of which element cause London smog?

22. Which substance is known by the short form PAN?

23.Which kind of smog is produced by the action of sunlight on a mixture of volatile hydrocarbons and nitrogen oxides?

24.What is the ozone-depletion potential of a hydrofluorocarbon refrigerant?

25.What is the global warming potential of carbon dioxide?

26.Which compound was the main constituent of the gas that caused the Bhopal disaster?

27.Which water pollutant ions cause blue baby syndrome?

28.Which fissile nuclide was used in the atom bomb that was dropped over Hiroshima?

29.What was the pet name of the atomic bomb that was dropped over Nagasaki?

30.Name the lady leader who led the save Narmada Movement.

Section A: Key

1**.**Lithosphere

2.Troposphere

3.Pollutant

4.Nitrogen

5.Carboxyhaemoglobin

6.Ozone

7.Chlofluorocarbons

8.Skin

9.Sulphur

10.CO

11.Infrared (or IR)

12.COD(or Chemical Oxygen Demand)

13. Mercury

14.Eutrofication

15.Thermal

16.Hydrosphere

17.Stratosphere

18.CH_4

19.Nitric acid(or HNO_3)

20.CO

21.Sulphur

22.Peroxyacetyl nitrate (CH_3 –CO-ONO_2)

23.Photochemical smog (or Los Angeles Type Smog)

24.0(Zero)

25.1(One)

26.Methyl isocyanate (MIC)

27.Nitrates

28.U-235

29.Fat Man

30.Medha Patkar

Module VI

Section A

Fill in the blanks

1. The solid wastes from manufacturing process come under the category of ..... wastes.
2. Wastes that can be decomposed from complex to simpler compounds by the action of microorganism are said to be .....
3. ..... wastes are those which pose substantial or potential threads to public health or the environment.
4. The use of ..... plastics is one way of reducing plastic pollution.
5. .....is the process of planned bioconversion of organic matter to manure by microorganism under controlled conditions.

question with one-word answers

6. What is expansion of MSW?
7. What term denotes wastes which can not be composed by microorganism?
8. What is the term used to denote controlled combustion of the combustible ingredients of solid waste in air with a view to reducing the volume of waste?
9. What is the major fluid ingredient of *biogas*?

10. What term represents the process by which waste materials are processed and remanufactured into re-usable forms?

Section A: key

1. Industrial
2. Biodegradable
3. Hazardous
4. Biodegradable
5. Composting
6. Municipal solid waste
7. Non-biodegradable wastes
8. Incineration
9. Methane
10. Recycling

Module I

PARTB

1. What is meant by 'solubility product' of a sparingly soluble salt? Write an expression to show relationship between solubility and solubility product of calcium phosphate.
2. What is meant by common ion effect?
3. What happens when NH_4Cl is added to an aqueous solution of ammonia?
4. What are the conditions for the precipitation of a substance (salt) from solution during a reaction?
5. Copper(ll) is precipitated as CuS in dil. HCl medium while Co(ll) is precipitated as CoS in ammoniacal medium. Explain.
6. Name the cations in group ll of inorganic qualitative analysis. How are they precipitated?
7. Why is it necessary to add NH_4Cl prior to adding NH_4OH for precipitating group lll cations as their hydroxides in qualitative analysis?
8. How is solubility product principle effected in the separation of group ll cations and group lV cations in inorganic qualitative analysis?
9. How is borate in a mixture eliminated?
10. Give one method of eliminating oxalate from a sample for cation analysis?
11. How can chromate be eliminated from a mixture?
12. What is meant by micro analysis?
13. Mention two advantages of micro analysis.
14. What is meant by gravimetric analysis?
15. What is coprecipitation? How can it be minimised?
16. What is postprecipitation?
17. Explain the term accuracy with regard to an analytical result.

18. What does the term precision mean with respect to an analytical determination?
19. Discuss the meaning of the term most probable value related to an analytical result.
20. What do the terms absolute error and relative error mean with regard to an analytical determination?

Module II

PART B

1. Name the isotope of H and mention how they differ from each other.
2. Distinguish between *ortho*-hydrogen and para-hydrogen.
3. How does *atomic size* vary among the alkali metal?
4. Which among the alkali metal is the most powerful *reducing agent* .Explain on the basis of reduction potential?
5. Which has a higher density – Na or K? Why?
6. In any period of the periodic table, the alkali metal has the lowest ionization energy .why?
7. Why do alkali metals have very high second ionization energies?
8. Why are the melting and boiling points of alkali metals low?
9. Comment on the melting points of alkali metals and explain the variation down the Group.
10. How does *electropositive character* vary among the alkali metals? Justify the variation.
11. Comment on the variation of *hydration enthalpy* of alkali metal ions.
12. How does Na react with water?
13. Which among the alkali metals forms *superoxides*?
14. What are the products obtained when Li reacts with air? Give equations.
15. Comment on the thermal stability of alkali metal carbonates and explain the variation down the Group.
16. Which alkali metal carbonate has the least solubility?Comment on the variation of alkali metal carbonates down the Group.
17. Comment on the thermal stability of sulphate of GROUP 1.
18. Explain the variation of the basicity of alkali metal hydroxide.
19. Mention two points of similarity in behaviour between Li and Mg.
20. Explain with equation what happens when sodium hydrogen carbonate is heated.
21. Give two uses of sodium carbonate.
22. How does atomic size vary among the alkaline earth metals?
23. Explain why an alkaline earth metals possesses higher density than the neighbouring alkali metal?
24. Why do alkaline earth metals have very high first ionization energies?
25. Explain the variation of first ionization energies among the alkaline earth metals.
26. Explain the variation of metallic character among the alkaline earth metals.
27. Why does an alkaline earth metal have its second ionization energy less than its first ionization energy?

28. Account for: calcium chloride can easily form its hexahydrate ($CaCl_2.6H_2O$) but potassium chloride does not form such a hydrate.
29. Which among the alkaline earth metals can impart characteristic colours to a non – luminous flame?
30. Why do alkaline earth carbonates have very low solubilities in water?
31. Mention two points of similarity in behaviour between Be and Al.
32. Explain the equation what happens when gypsum is heated at 120^oc.
33. How is gypsum converted to plaster of paris? Give equation.
34. Plaster of paris possesses the remarkable property of "setting" with water. Explain the statement.
35. Comment on the electropositive character of the Group 13 elements.
36. What is meant by inert pair effect?
37. Explain the statement: "TI^{3+} salt act as strong oxidants ".
38. Explain the reaction of thallium with water under different conditions.
39. Explain with equations the hydrolysis of boron tri fluoride.
40. While Aluminium can form the ion $[AlF_6]^{3-}$, boron is unable to form $[BF_6]^{3-}$ ion. Explain.
41. Thallium trihalide (TIX_3) are relatively unstable but TI forms quite stable monohalides (TIX).Explain this statement.
42. Arrange the trihgalide of Group 13 elements—BX_3, AlX_3, GaX_3, InX_3— in the increasing order of Lewis acidity.
43. Name and formulate the simplest hydride of boron.
44. Give one method of preparation of diborane.
45. What is hydroboration? Give an example.
46. Draw the structure of diborane.
47. Mention the important uses of diborane.
48. How is diborane converted to boron nitride?
49. Mention the important uses of boron nitride.
50. Name and formulate the compound known as inorganic benzene. Why is it called so?
51. How is diborane converted to borazine?
52. Mention the important uses of borazine.
53. Why does orthoboric acid behave as a weak monobasic acid?
54. "Boric acid is not a protonic acid but acts as a Lewis acid ".Justify this statement.
55. What is the boron compound that is produced when orthoboric acid is heated with calcium fluoride and concentrated sulphuric acid? Give the relevant equation for the reaction.
56. Mention the important uses of boric acid.
57. Explain the variation of density for Group 14 elements on moving down the Group.
58. Discuss how the density for catenation varies among the Group 14 elements.
59. Graphite is used as a lubricant in machines.Why?
60. What are fullerenes? Give two examples.

Module III

PART B

1. Explain the trend In the variation of atomic size on moving down group 15
2. Explain the trend in the variation of ionization energy as we move down group 15
3. Which has a higher first ionizastion energy-C or N? Explain
4. Explain the variation of electronegativity among the group 15 elements.
5. Explain why nitrogen is a gas while phosphorus is a solid at ordinary conditions.
6. Which is a stronger oxidizing agent , Bi(V) or Sb(V)? why?
7. Which has a higher ionization energy, N or O? why?
8. The ionization energies of the group 15 elements are much greater than those of group 14 elements in the corresponding periods. Why?
9. How does metallic character vary as move down group15?
10. While P is able to form its pentahalide, N is not able to form its pentahalide. Why?
11. Name and formulate (a) an oxide of N in which N exhibits +4 oxidation state;(ii)an oxoacid of nitrogen in which N exhibits +5 oxidation state.
12. Account for the fact that bismuth is a strong oxidizing agent in pentavalent state.
13. Explain why the chemical reactivity of nitrogen is much less than that of phosphorus.
14. Why is phosphorus stored under water?
15. Explain why white phosphorus is more reactive than red phosphorus.
16. Which has a higher boiling point – NH_3 or PH_3? Why?
17. Why does NH_3 act as a Lewis base?
18. Which is more basic-NH_3 or PH_3 ?why?
19. Which is a stronger reducing agent-SbH_3 or BiH_3? Why?
20. Draw the structure of NO_2.
21. Why does NO_2 dimerise?
22. Name and formulate an oxide of phosphorus and draw its structure.
23. What is the basicity of H_3PO_3? Explain your answer?
24. Name and formulate an oxyacid of phosphorus and draw its structure.
25. What is diphosphoric acid? Draw its structure.
26. Name and formulate two dibasic oxoacids of phosphorus.
27. Explain a method by which ammonia can be prepared in the laboratory.
28. Can conc. H_2SO_4 be used to dry ammonia gas? Explain.

29. What happens when silver chloride is treated with NH_4OH solution?
30. Complete and balance the following equations:
    (i) $NH_3 + O_2$
    (ii) $NH_3 + Cl_2$(excess)
31. Illustrate the basic nature of ammonia.
32. Mention the important uses of ammonia.
33. Give a reaction by which nitric acid can be prepared in the laboratory.
34. Explain the action copper with concentrated nitric acid.
35. Illustrate a reaction of conc. HNO_3 with a metalloid.
36. Mention the important uses of nitric acid.
37. Explain the trend in the variation of atomic size on moving down group 16.
38. Explain the trend in the variation of ionization energy as we down group 16.
39. Which has a higher second ioization energy-N or O? explain.
40. Explain the variation of electronegativity among the group 16 elements.
41. Explain why oxygen is a gas while sulphur is a solid at ordinary conditions.
42. How does electropositive character vary among the elements of the oxygen family?
43. Name and formulate a compound each :(i) one in which oxygen shows +1 oxidation state and (ii) one in which oxygen shows +2 oxidation state.
44. Explain why Po(VI) is a strong oxidizing agent.
45. The boiling point of H_2O is much higher than those of the other group 16 hydrides. Why?
46. Water is a liquid at ordinary temperatures while H_2S is a gas. Why?
47. The first ionization energy of a group 16 element is lower than that for the corresponding group 15 element in the same period.why?
48. Draw two resonance structures of the SO_2 molecule.
49. Concentrated sulphuric acid is a strong dehydrating agent. Explain why?
50. Name and formulate any two oxoacids of sulphur.
51. Draw the structure of pyrosulphuric acid.
52. Give he formulae of (i) thiosulphuric acid and(ii) dithionic acid.
53. Draw the structure of peroxodisulphuric acid.
54. Give the formulae of (i) Marshall's acid and (ii) Caro's acid.
55. Draw the structure of peroxomonosulphuric acid.
56. The covalency of oxygen rarely exceeds 2 while the other elements of group 16 can show covalency of 4 or >4.

57. Draw the resonance structures of the ozone molecule.
58. Discuss the laboratory preparation of ozone.
59. Explain the commercial preparation of ozone .
60. Explain the phenomenon commonly referred to as the tailing of mercury.
61. What is the action of ozone on lead sulphide?
62. Describe a quantitative method for estimating O_3 gas .
63. Explain the action of ozone on ferrous sulphate in the presence of sulphuric acid.
64. Mention three uses of ozone.
65. What happens when peroxydisulphuric acid reacts with water?
66. What is perhydrol?
67. Discuss the acidic nature of hydrogen peroxide.
68. Give an example for the oxidising action of hydrogen peroxide with equation.
69. Explain the action of hydrogen peroxide on ferrous sulphate in acid medium.
70. Mention the three uses of hydrogen peroxide.
71. Write chemical equation for the coversion of oleum to sulphuric acid.
72. Give a reaction which indicate dehydrating property of conc.H_2SO_4.
73. "water should never be added in to concentrated sulphuric acid for diluting it". justify this statement.
74. Give an example for the oxidizing action of conc.H_2SO_4 with equation.
75. What happens when pottasium chlorate($KClO_3$) is heated with conc. H_2SO_4?
76. Write any two uses of sulphuric acid.
77. Explain the variation of atomic size among the halogens.
78. Fluorine does not exhibit any positive oxidation state . why?
79. Explain the following observation giving appropriate reason: halogens are strong oxidizing agents.
80. Which has a higher electon affinity : F or Cl?justify your answer.
81. Name and formulate an oxoacid of chlorine in which it shows its highest positive oxidation state.
82. Account for: bond dissociation energy of F_2 is less than that of Cl_2.
83. Why is fluorine is the most reactive among the halogens?
84. How does electropositive character vary among the halogens?
85. Name and formulate a compound each in which Cl shows an oxidation state of (i)+1 and(ii)+5.
86. Mention the uses of hydrogen chloride.

87. Draw structures of hypochlorous acid and chlorous acid
88. Which is the most acidic oxoacid of chlorine? Draw its structure.
89. Arrange HOCl,$HClO_2$,$HClO_3$ and $HClO_4$ in the increasing order of the acid strength.
90. What are the interhalogen compounds?give the formulae of two.
91. How does iodine monochloride react with alkali?
92. Give an example(with equation) for the hydrolysis of an inter halogen compound.
93. Name (i) the state of hybridisation of the central atom and (ii) shape of the molecule in each of the following compounds: (i)IF_5; (ii) ClF_3.
94. Draw the structure of iodine trichloride molecule .
95. "In general, interhalogen compound are more reactive than halogens (except fluorine)".explain the statement.
96. Explain why :ClF_3 molecule has a T shaped structure and not a trigonal planar one.
97. Why is ICl more reactive than I_2 ?
98. Give reason: "fluorine does not play the role of a centeral atom in interhalogen compounds".
99. What are pseudohalides? Given two examples .
100. What are the pseudohalogens? Give two examples.
101. What are polyhalide ions? Give two examples.
102. Why do noble gases have very low boiling points?
103. The majority of non noble gas compound are those of xenone. Why?
104. Formulate two xenone fluorides and draw their structures.
105. What are the shape of XeF_2, $XeOF_4$, XeO_2F_2 and XeO_3?
106. What happen when XeF_4 reacts with water?
107. Mention the important uses of helium.
108. What are the uses of xenon?
109. Mention a use each for each of the noble gases.
110. Explain why helium is used in diving apparatus as a diluents for oxygen.

Module IV

SECTION B

1. What are inorganic polymers? Give an example for one kind.
2. What are silicones?
3. Give the general structure of a silicone.
4. Name three different kinds of silicone polymers.

5. What are silicates?
6. Give the name and formula of an orthosilicate.
7. What are called island structures?
8. What are zeolites?
9. Mention an ion-exchange application of a zeolite.
10. What are molecular sieves?
11. What are phosphazenes?
12. What is the general structure of an acyclic polyphosphazenes?
13. How are polyphosphazenes prepared?
14. Give the structure of two cyclochlorophosphazenes.
15. Give the structural formulae of two linear phosphonitrilium chlorides.
16. How can the cyclic trimer of phosphonitrilic chlorides be converted to the acyclic phosphonitrilic polymers?
17. How can cyclic$(NPCl_2)_3$ be converted into cyclic$[NP(CH_3)_2]_3$?
18. How can the chlorine atoms of cyclic $(NPCl_2)_3$ be replaced by phenyl groups?
19. How can the chlorine atoms of a polychlorophosphazenes be replaced by methoxy group?
20. Give one method of preparation of tetrasulphur teranitride.
21. Depict the structure of tetrasulphur tetranitride.
22. What happens when S_4N_4 is heated ?
23. Give the important use of tetrasulphur tetranitride.
24. How is disulphur dintride prepared?
25. Depict the structure of disulphur dintride.
26. Is disulphur dintride aromatic or not? Explain your answer.
27. Give an example for a covalent polymer that exhibits metallic properties.Mention two uses of the polymer.
28. What is polythiazil?How is it prepared?
29. Distinguish between protic and aprotic solvents.
30. What are protonic solvents?Explain with examples.
31. Distinguish between the terms ionizing solvents and non-ionising solvents.
32. How is the dielectric constant of a solvent related to its capability of dissolving ionic solutes?
33. How is the dipole moment of a compound related to its capability for acting as a solvent for ionic or polar solutes and for non polar solutes?
34. Explain the term autoionization of solvents with an example.
35. Explain the self ionization of liquid sulphur dioxide.
36. Mention the important properties of dilute solutions of alkali metals in liquid ammonia.
37. Explain the high conductivity exhibited by a solution of an alkali metals in liquid ammonia.
38. Why are solutions of alkali metals in liquid ammonia paramagnetic ?
39. Explain the blue colour exhibited by solutions of alkali metals in liquid ammonia.
40. What is ammonolysis?Give an example for such a reaction.

41. Explain the ammonolysis of PCl_5.
42. Explain the reaction that occurs and the nature of products obtained when AgCl is treated with $Ba(NO_3)_2$ in liquid ammonia .
43. Explain how potassium iodide dissolves in liquid sulphur dioxide.
44. Explain the nature of the products obtained when aluminium chlorides reacts with sodium iodide in liquid SO_2.
45. Give an example with equation for a solvolysis reaction taking place in liquid sulphur dioxide.

Module V

PART B

1. Name the four segments of the environment

2. Define: (i) Pollution: (ii) Pollutant

3. Name the different types of pollution

4. What kind of pollutants are referred to as persistent pollutants? Name two types

5. What is an air pollutant? Name two gaseous air pollutants

6. Name three sources of air pollution

7. How do automobiles cause air pollution?

8. What are the major pollutants present in automobile exhaust?

9. Explain the toxic effect of CO

10. How does CO_2 become a pollutant?

11. What are the major sources of pollution by the oxides of nitrogen?

12. Mention to detrimental effects of the pollution by the oxides of nitrogen

13. Name the major sources of pollution by the oxides of sulphur.

14. Mention two harmful effects of the pollution by the oxides of sulphur.

15. What is smog? Name two types of smog

16. Which pollutants are responsible for (i) photochemical smog and (ii) reducing smog?

17. Explain the term acid rain.

18. Name two important acid components of acid rain.

19. Name two pollutant gases that cause acid rain.

20. What are the adverse effects of acid rain?

21. What is greenhouse effect?

22. Name two greenhouse gases.

23. Explain the major detrimental consequence of enhanced greenhouse effect.

24. What is meant by global warming? What is it due to?

25. How can we reduced abnormal greenhouse effect?

26. What is the importance of ozone layer?

27. Why is the stratospheric ozone layer called ozone umbrella?

28. Explain the term ozone holes.

29. Which are the major culprits for stratospheric ozone depletion?

30. What are the consequences of ozone depletion?

31. How can we reduce ozone depletion and protect ozone layer?

32. What are CFCs? What are they used for?

33. How do CFCs cause ozone depletion?

34. Explain the use of hydrofluorocarbons. Mention an environmental aspect in which they are superior to CFC.

35. Name two alternative refrigerants which have very low GWP and ODP.

36. Name and formulate the main constituent of the gas that leaked from the Union Carbide Factory at Bhopal with disastrous consequences.

37. What are the chief causes of water pollution?

38. Write briefly on the water pollution caused by sewage.

39. How do industrial effluents pollute water?

40. How is water polluted by soaps and detergents?

41. Write briefly on the pesticide pollution of water.

42. Indicate two adverse effects caused by the pollution of water by fertilizers.

43. What is meant by eutrophication?

44. Name two toxic heavy metal ions causing water pollution.

45. Name a heavy metal ion causing water pollution and mention the consequences.

46. Briefly explain the dire consequences of lead pollution of water.

47. How does mercury pollution of water arise? Mention its adverse consequences.

48. What are the toxic effects of cadmium?

49. Explain the significance of determining the DO in a water sample.

50. What is meant by BOD of a sample of water?

51. What does the term COD meant with respect to the quality of a sample of water?

52. What is meant by BOD? How does it differ from COD?

53. What is meant by thermal pollution?

54. Explain the most important source of thermal pollution.

55. Mention two adverse consequences of thermal pollution.

56. What is meant by noise pollution? What are its consequences?

57. What is meant by radioactive pollution?

58. Mention two important anthropogenic sources of radioactive pollution.

59. Give the names of the two atomic bombs dropped in Japan during Second World War and name the fissile material used in each to bring about a nuclear fission chain reaction.

60. What is known as the Chernobyl disaster?

Module VI

PART B

1. What are *solid* wastes?
2. Explain the term *house hold* wastes?
3. Explain the what the term *MSW* denote?
4. What are *industrial wastes?*
5. Distinguish between *biodegradable* and *non-biodegradable* solid waste.
6. Explain the term *hazardous* wastes with suitable examples.
7. Distinguish between the *hazardous wastes* and *non-hazardous wastes*

8. What is sanitary landfill?
9. What are composting?
10. What does the term vermicomposting means?
11. Explain the term biogasification
12. Mention two uses of biogas.
13. What does recycling mean in the context of solid waste management?
14. Explain the term biomedical wastes.
15. Explain one method of on-site decontamination of medical wastes.
16. Explain the term e-wastes.
17. What is meant by syngas? What is its significant?
18. Explain one method by which utilisable energy can be derived from solid wastes.

Module I

PART B

1. Describe how solubility product principle and common ion effect are applied in qualitative inorganic analysis.
2. Explain the application of solubility product in the group separation of cations.
3. Explain the principle of eliminating fluoride and borate from a sample for cation analysis.
4. Give a method for the elimination of phosphate present in an inorganic mixture.
5. Explain how the interference of arsenite and arsenate in cation analysis is eliminated.
6. Discuss the advantages of micro scale experiments in inorganic and inorganic qualitative analysis.
7. Give an accout of precipitation gravimetry.
8. What is coprecipitation? By what methods can it be minimised?
9. Explain how coprecipitation occurs during precipitation gravimetry.
10. Discuss the term postprecipitation as applied to gravimetry.
11. Distinguish between coprecipitation and postprecipitation.
12. Distinguish between accuracy and precision relating to analytical results.
13. What are the different types of errors that arise in analytical experiments?
14. Distinguish between determinate errors and indeterminate errors.
15. Discuss the different types of systematic errors.
16. Discuss the different type of random errors.
17. Briefly discuss how errors in analytical experiments can be minimized.
18. Write a brief note on sampling.
19. Distinguish between the terms gross sample and laboratory sample.
20. Briefly explain the types of sampling steps.

Module II

PART B

1. Give two similarities and two differences that hydrogen shows with alkali metals.
2. Give two similarities and two differences that hydrogen shows with halogens.
3. Discuss the two nuclear isomers of dihydrogen.
4. Discuss the variation of atomic and ionic sizes among the alkali metals.
5. Explain the variation of ionization energy on moving down Group 1.
6. Explain why alkali metals are strong reducing agents.Which is the most powerful reducing agent among them?luminous Bunsen flame ".Explain the statement.
7. "The alkali metals and their salts impart characteristic colour to a non –luminous Bunsen flame ".Explain the statement.
8. Discuss the thermal stability of alkali metal carbonates.
9. Explain the variation of solubilities of the carbonates of Group 1 elements.
10. Explain the variation of solubilities of the alkali metal sulphates.
11. Discuss the anomalous behaviour of Li among the alkali metals.
12. Discuss the diagonal relationship that Li shows with Mg.
13. Discuss the principle and reactions involved in the manufacture of sodium carbonate by the solvay process.
14. Discuss the variation of atomic and ionic sizes among the alkaline earth metals.
15. Explain why the alkaline earth metals possess higher melting and boiling points that the corresponding alkali metals.
16. Explain by the first ionization energies of alkaline each metal are higher than those of the corresponding alkali metals while their second ionization energies are lower than those of the corresponding alkali metals.
17. Discuss the variation of the hydration enthalpies of alkaline earth metal ions.
18. Explain, on the basis of electrode potentials, why alkaline earth metals are good reducing agents?
19. Explain the principle behind identifying calcium salts by flame test.
20. Discuss the reactivity of Group 2 elements towards air.
21. How do alkaline earth metals react with water? Mention how the reactivity varies down the Group.
22. Explain the action of heat on alkaline earth metal carbonates.Explain how the thermal stability of the carbonates vary down the Group.
23. Discuss the thermal stability of the sulphates of alkaline earth metals and the variation of thermal stability down the group.
24. Discuss the solubility trend of the sulphates of Group 2 elements.
25. Explain the variation of the basic character of alkaline earth hydroxides.
26. Discuss the anomalous behaviour of Be among the alkaline earth metals.
27. Discuss the diagonal relationship that Be shows with Al.

28. Explain the structures of beryllium chloride in the vapour phase and in the solid phase.
29. How is plaster of paris prepared?Discuss its major uses.
30. Discuss the variation of atomic size among the Group 13 elements.
31. Discuss how metallic character varies among the boron family of elements.
32. Explain the term inert pair effect.
33. Which has higher first ionization energy—Al or Ga? Why?
34. Comment on the trend in the stabilityof the +1 oxidation state down the Group 13.Explain.
35. Which is more stable in aqueous solution Tl^{+} or Tl^{3+} ? Justify your answer.
36. Why do boron trihalides act as Lewis acids? Illustrate their Lewis acidity with an example.Comment on the order of Lewis acidity shown by different boron trihalides.
37. Discuss the anomalous behaviour exhibited by boron among the Group 13 elements.
38. Discuss the diagonal relationship that exists between boron and silicon.
39. How is diborane prepared? What is its action with (i)oxygen and (ii) water ?
40. Explain with suitable equations how diborane reacts with ammonia under different conditions.
41. Discuss the important properties of diborane.
42. Explain the structure of diborane.
43. How is borazine prepared? Explain its reactions with (i)HCl and (ii) water .
44. Discuss the structure of borazine.
45. How is boric acid prepared? Explain with suitable equations the action of heat on boric acid under different conditions.
46. Discuss the structure of boric acid.
47. Discuss the acidic nature of boric acid.
48. Explain the preparation and significant properties of boron nitride.
49. Discuss the dimeric structure of aluminium chloride.
50. Explain the variation of atomic size down Group 14.
51. Although there is a sharp decrease in ionization energy from C and Si , such a significant decrease is not seen further down the Group.Why?
52. Explain why compounds having Pb in +4 states are strong oxidising agents.
53. Discuss the variation of metallic character among the Group 14 elements.
54. Explain the term inert pair effect with regard to the properties of Group 14 elements.
55. $SiCl_4$ can be easily hydrolysed by water while CCl_4 cannot be hydrolysed.Why?
56. Discuss the structure of diamond on the basis of the concept of hybridization.
57. Discuss the structure of graphite on the basis of the concept of hybridization.
58. Write 3 differentiating aspects of diamond and graphite.
59. Explain why graphite is a good conductor of electricity while diamond is a poor conductor.
60. Write a short note on fullerenes.
61. Discuss thr amorphous allotropes of carbon.
62. Discuss the anomalous behaviour of carbon among the Group 14 elements.

Module III

PART B

1. Explain the significance of inert pair effect among group 15 elements.
2. Explain the variation of ionization energy down the group 15. The ionization energies of group 15 element are greater than those of group 16 elements in the corresponding periods.why?
3. Draw the structures of white phosphorus and red phosphorus. Which of these two types of phosphorus is more reactive and why?
4. Explain the general structure the group 15 trihydrides(EH_3) and explain variation of H-E-H bond angles among them.
5. Explain the variation of boiling points among the trihydrides of group15 elements.
6. Which among the trihydrides of group15 elements has the highest reducing character? Explain the variation of reducing property among them.
7. Compare the basic strengths of the trihydrides of the group 15 elements and explain the variations.
8. Draw the structures of N_2O_3 , N_2O_4 and N_2O_5 .
9. Name and formulate the oxides of phosphorus, one in which P is the +3 oxidation state and the other in which P is the +5 oxidation stare, and draw their structures.
10. Name and formulate three oxoacids of nitrogen and draw their structures in the vapour phase.
11. Draw the structures of hypophosphorous acid , phosphoric acid and phosphorous acid. what are their basicities? Explain the basis of their structures.
12. Explain the Haber process for the manufacture of ammonia. Present a critical discussion on the condition used in the process on the basis of Le Chatelier principle.
13. Explain the Ostwald's process for the manufacture of nitric acid.
14. Explain the equation how Mg reacts with (i) cold vary dilute HNO_3 , (ii) cold dilute HNO_3, (iii)hot dilute HNO_3 and (iv) concentrated HNO_3 .
15. Give three reaction (with equations) which illustrate the oxidising action of conc. HNO_3 .
16. Explain the action of copper with nitric acid under different concendration conditions.
17. What is aqua regia? Explain how it dissolves gold.

18. Explain the action of aqua regia on platinum.
19. Illustrate how nitric acid react with metals under three suitable reactions.
20. Explain the action of nitric acid on no metals with three suitable examples.
21. Explain the action of (i) dil. HNO_3 and (ii) conc. HNO_3 on hydrogen sulphide.
22. Explain the action of nitric acid on SO_2.
23. Discuss the reaction of iron with nitric acid .
24. Explain the reaction of conc. HNO_3 with (i) carbon and (ii) sulphur.
25. Explain the variation of boiling points among the hydrides (H_2E) of the group 16 elements.
26. Explain the significance of inert pair effect among group 16 elements.
27. Discuss the atomicities in the elemental state for the group 16 elements and explain the significance of atomicities o the physical properties of the elements.
28. Explain the variation of ionization energy down group 16.
29. Explain the order in which the oxidising power of Se (VI), Te(VI) and Po(VI) vary.
30. Discuss the structures of the binary hydrides (H_2E) of the group 16 elements and make a comparison of the H- E-H bond angles in them.
31. Write an explanatory note on the variation of the bolining points on the hydrides(H_2E) of the group 16 elements.
32. Name and formulate two peroxoacides of sulphur and draw their structures.
33. Name and formulate two oxoacids of sulpher that contain S-S linkage and draw their structures.
34. Draw the structures of the following molecules: (a) $H_2S_2O_7$; (b) $H_2S_2O_8$ and (c) H_2SO_3 .
35. Explain why SO_2 is reducing while TeO_2 is an oxidizing agent.
36. How is pure ozone isolated from ozonised oxygen?
37. Explain with equations three reactions two illustrate the oxidizing action of ozone.
38. Explain the action of ozone on the following: (i) mercury;(ii) iodine .
39. What is the action of ozone on(i) potassium ferrocyanide and (ii) hydrogen peroxide? Explain with equation.
40. Explain any one preparation of hydrogen peroxide.
41. Explain the electrolytic method for the manufacture of hydrogen peroxide.
42. How is a dilute solution of hydrogen peroxide concentrated to get pure hydrogen peroxide?

43. How is a sample of hydrogen peroxide stored? Justify the condition required for the storage.
44. Illustrate the oxidising action of hydrogen peroxide in acid medium with three examples. Give equations too.
45. Illustrate the equations the oxidizing action of hydrogen peroxide in basic medium.
46. Explain a reaction each with equation to illustrate the reducing action of H_2O_2 in acid medium and in basic medium.
47. Explain the equation in the basis of using hydrogen peroxide to restore the white colour of lead paintings that have blackened due to action of the atmosphere.
48. Complete and balance following equations:
    (i)$MnSO_4 + H_2O_2 + KOH$
    (ii)$[Fe(CN)_6]^{4-} + H^+ + H_2O_2$
49. Write down the main three steps involved in manufacture of H_2SO_4 by contact process.
50. Outline the principle of the contact process for the manufacture of sulphuric acid.
51. Draw the structure of sulphuric acid molecule. Explain the reason for its relatively high viscosity and boiling point.
52. Illustrate the dehydrating action of conc. H_2SO_4 with three examples.
53. Illustrate the oxidising action of conc. H_2SO_4 with three example.
54. Explain the action of conc. H_2SO_4 on each of the following:
    (i)cane sugar;(ii)KI; (iii) Zn.

55. complete and balance the following chemical reaction equations:

(i) $SO_3 + H_2SO_{4(CONC.)}$

(ii) $C + H_2SO_{4(CONC.)}$

(iii)$CaF_2 + H_2SO_{4(CONC.)}$

56. Explain the role of selenium in xerography.
57. Discuss the variation of first ionization energy among the halogens.
58. How do the following properties vary among the halogen family:(i) electron affinity; (ii) electronegativity?
59. Account for the following: the electron affinity for fluorine is less than that of chlorine, still fluorine is a stronger than chlorine.

60. Explain the order in which bond energy varies among the halogens.
61. Explain why fluorine has the highest positive reduction potential among the halogens.
62. Explain the variation of acidic strengths of hydrogen halides in aqueous solution.
63. Arrange HF, HCl, HBr and HI in the increasing order of reducing character . explain the variation.
64. Which hydrogen halide has highest boiling point? Why?
65. Explain how hydrogen chloride is manufactured.
66. Discuss the structure of chlorine dioxide.
67. Discuss the electropositive character of iodine with suitable examples.
68. Discuss the anomalous behavior of flurorine among the halogens .
69. Arrange HOCl,$HClO_2$,$HClO_3$ and $HClO_4$ in increasing order of acid strength . explain the order.
70. What are interhalogen compounds?give an example each for two methods of preparation of interhalogen compounds.
71. Illustrate with an example each for the (i)action with alkali and (ii)action with water for interhalogen compounds .
72. Discuss the structure of ClF_3 molecule.
73. Explain the structure of iodine trichoride molecule .
74. Discuss the structure of iodine pentafluoride .
75. Name an interhalogen that has T shaped structure. Explain how the structure is attained .
76. Explain the following terms with example :(i)pseudohalogens;(ii)polyhalide ions .
77. Make a comparison of the properties of cyanogens and the halogens.
78. Discuss the structure of the triiodide anion.
79. Explain the shape of $[ICl_2]^-$
80. Discuss the structure of $[ICl_4]^-$
81. Explain the structure of $[ICl_2]^+$
82. Explain the steps involved in the Rayleigh and Ramsay's method for the isolation of noble gas mixture from dry air .
83. Explain the structure of XeF_2 molecule on the basis of the concept of hybridization.
84. Explain the following situation : XeF_2 has a straight linear structure, not a bent angular structure.
85. What is the geometry of XeF_4? Explain using the concept of hybridization.

86. Discuss the structure of xenon hexafluoride.
87. Why is XeF_6 molecule considered fiuxional?
88. What is the shape of XeO_3 molecule? Arrive at the structure on basis of hybridization.
89. Discuss the structure of xenon tetroxide.
90. $XeOF_2$ has a T- Shape. Explain this on the basis of hybridization concept.
91. Discuss the structure of xenon oxotetrafluoride.
92. Name and draw the structure of three oxofluorides of xenon. Mention the state of hybridisation of xenon in each.
93. Explain how the different fluorides of xenon react with water.
94. Discuss three important use of helium, highlighting the advantage of helium in each use.
95. Discuss the important use of noble gases.

Module IV

PART B

1. What are silicones? How are they prepared?
2. Discuss the classification of silicones.
3. Mention the uses of the different classes of silicones.
4. Distinguish between orthosilicates and pyrosilicates.
5. Name two industrially important silicates and discuss their applications.
6. What are zeolites?Mention one important application of class.
7. Draw and discuss the structure of cyclotriphosphonitrilic chloride.
8. How are cyclic and acyclic polyphosphonitrilic chlorides prepared ?
9. Discuss properties and uses of polyphosphazenes.
10. How is S_4N_4 prepared? Depict its structure and mention one application.
11. How is S_2N_2 prepared ?Depict its structure and mention one application.
12. How is polymeric sulphur nitride prepared? Comment on its structure.
13. Mention the important applications of polymeric sulphur nitride.
14. Discuss the classification of solvents on the basis of the proton concept.
15. What are non-aqueous solvents? Discuss their classification.
16. Write a noe on autoionization of solvents with suitable examples.
17. Explain the term levelling effect of solvents with suitable examples.
18. Discuss the general properties of ionizing solvents.
19. Explain why liquid ammonia is a better solvent for covalent compounds than for ionic solutes.
20. Explain the self –ionisation of liquid ammonia and explain the terms ammonoacid and ammonobase.

21. Explain , with proper reasoning, the colour,conductivity and magnetic property of dilute solutions of alkali metal in liquid ammonia.
22. "Liquid ammonia act as a levelling solvent for those substances which behave as acids in water."- Explain this statement.
23. Give an example each for the following kinds of reactions taking place in liquid ammonia: (1) Acid –base reaction; (2) Metathetical reaction resulting in the precipitation of a product; (3) Ammonolytic reaction.
24. Illustrate with three examples the reducing properties the solutions alkali metals in liquid ammonia.
25. Explain the term ammonolysis with three suitable examples.
26. Discuss the merits and demerits of liquid ammonia as a solvent.
27. Discuss the self-ionisation of liquid SO_2 and the acid-base reaction taking place in liquid SO_2.
28. Give an example each for the following kinds of reactions taking place in liquid sulphur dioxide: (1) Acid-base reaction; (2) Metathetical reaction resulting in the precipitation of a product; (3) Redox reaction.
29. Discuss the complex –formation reactions taking place in (1)Liquid ammonia, and (2) liquid sulphur dioxide.
30. Explain why liquid SO_2 is a poor solvent for ionic solutes and a better solvent for covalent solutes. Mention the advantages and disadavantages associated with the use of liquid SO_2 as a solvent.

Module V

PART c

1. Define the terms: (i) pollution; (ii) pollutant. What are the different types of pollution?
2. Present a general discussion on the air pollution caused by the oxides of carbon.
3. How does carbon monoxide pollute air? Explain the toxic effects of carbon monoxide.
4. Discuss the air pollution caused by the oxides of nitrogen.
5. Write a note on the air pollution caused by the oxides of sulphur.
6. Explain the cause for photochemical smog and classical smog.
7. Discuss the formation and detrimental effects of photochemical smog.
8. Explain how the reducing smog is formed and discuss its detrimental effects.
9. Explain the detrimental effects of the pollution caused by the oxides of nitrogen and sulphur.
10. What is acid rain? Explain how it is produced.
11. What are the adverse effects of acid rain?
12. Explain the term greenhouse effect. What are the greenhouse gases?
13. Explain what is meant by global warming and how it arises.
14. Discuss how greenhouse effect can be controlled.
15. What are the adverse consequences of enhanced greenhouse effect?
16. Explain the consequences of global warming.
17. What is the importance of ozone layer? What are the causes of depletion of ozone layer?
18. How do CFCs cause stratospheric ozone depletion?

19. Discuss how the ozone hole is formed over Antarctica.
20. Discuss the dire consequences of the stratospheric ozone depletion.
21. Discuss the term alternate refrigerants and their benefits.
22. Discuss the cause and consequences of the Bhopal gas tragedy.
23. Discuss the steps necessary for the control of air pollution.
24. Discuss hoe sewage and industrial effluents pollute water.
25. Explain the consequences of water pollution caused by soaps and detergents.
26. Discuss how agricultural runoffs pollute water bodies.
27. How does pesticide pollution of water arise? What are its adverse effects?
28. Discuss the sources and consequence of pollution of water by fertilizers.
29. What is eutrophication? What are its adverse consequences?
30. Discuss the pollution of water by heavy metals and its adverse effects with illustrative examples of pollution resulting from two metals.
31. Explain the cause and consequences of Minamata disease.
32. Briefly discuss the effects of water pollution.
33. Briefly explain three parameters by which the quality of a water sample can be assessed.
34. Discuss how DO of a water sample is measured and explain the significance of the DO value.
35. Distinguish between BOD and COD. Explain what their values for a sample of water signify.
36. What is meant by BOD? Explain how BOD of a water sample is determined.
37. What is COD? How is the COD of a water sample determined?
38. Discuss the need to protect the freshwater bodies on the Earth.
39. What does the term thermal pollution mean? Explain how it arises.
40. What are the undesirable effects of thermal pollution?
41. What is thermal pollution? How can it be controlled?
42. “Noise is an environmental pollutant.”- Justify this statement.
43. What is meant by radioactive pollution? What are its hazards?
44. Discuss the sources of radioactive pollution.
45. What is radioactive pollution? How can it be controlled?
46. Explain the two incidents during Second World War when nuclear energy was directly used for destructive purposes.
47. Write a short note on the Chernobyl disaster.
48. Discuss the Save Silent Valley Movement.
49. Explain what is known as the Plachimada Movement.
50. Write a short note on the Save Narmada Movement.

Module VI

PART c

1. Explain the term municipal solid waste and the sub-classes that falls under this category of wastes.

2. Explain the term household wastes and industrial wastes.
3. What are biodegradable wastes? Mention their characteristics.
4. Explain the characteristics of biodegradable wastes.
5. Discuss the class of wastes that come under the category of hazardous wastes.
6. Explain the adverse consequences of plastic pollution.
7. Discuss landfilling method of solid waste disposal.
8. What are the characteristics of a sanitary landfill.
9. Discuss the advantages and disadvantages of sanitary landfills.
10. Explain how solid wastes are disposed of by the process of incineration .
11. Discuss the advantages and disadvantages of disposal solid wastes through incineration.
12. Explain the term composting.
13. What is composting? Discuss the advantages of method.
14. Discuss anaerobic digestion method of disposing solid wastes.
15. What is biogas? How is it produced? Discuss its advantages.
16. Explain the term recycling and discuss its significant in the context of solid waste management.
17. What is biomedical wastes? Discuss their adverse impacts.
18. Write a short note on the disposal of biomedical wastes.
19. What are electronic wastes? Discuss their impacts.
20. Explain how e-waste can be disposed of.
21. Write the short note on deriving usable energy from solid wastes.
22. Explain the significance of biogas and syngas with regards to energy production from solid wastes.

Module I

PART D

1. Discuss briefly the principles underlying the separation of cations into groups in inorganic qualitative analysis.
2. (a) briefly outline the use of the principles of solubility product and common ion effect in the separation of cations in qualitative analysis.
   (b) a solution contains Cu^{2+} and Ba^{2+} ions. How would you separate the ions and identify them?
3. Discuss coprecipitation. How can it be minimised in gravimetric methods?
4. (a) Explain the different types of errors that arise in analytical experiments. Discuss the classification of each type further.
   (b) discuss the methods of minimization of errors in quantitative analysis.

Module II

PART D

1. Discuss the position of hydrogen in the periodic table.
2. Explain with equations of the steps involved in the manufacture of sodium carbonate by solvay process.Discuss the uses of sodium carbonate.
3. Give any 6 points each to highlight the (i)anomalous behaviour of Li among the alkali metals and (ii)diagonal relationship between Li and Mg.
4. Give any 6 points each to highlight the (i)anomalous behaviour of Be among the alkaline earth metals and (ii) diagonal relationship between Be and Al.
5. (a)Explain the origin of Lewis acidity in boron trihalides.
   (b)Give the order of Lewis acidity of BF_3, BCl_3, BBr_3, and BI_3.Explain the order on the basis of structure and bonding.
6. Give any 6 points each to highlight the (i)anomalous behaviour of B among the Group 13 elements, and (ii)diagonal relationship between B and Si.
7. Explain the structure of diborane and discuss it on the basis of the concept of hybridization.
8. Discuss the preparation, properties and structure of borazine.
9. Explain the structure of (a)hexagonal boron nitride and (b) cubic boron nitride.
10. Present a discussion making a comparison of the structures and properties of diamond and graphite.

Module III

PART D

1. Discuss the trihydrides of group 15 elements with regard to the variation in their boiling points, reducing property and basic strength.
2. Name and formulate three oxoacid of phosphorus. Discuss their structures and basicity.
3. Discuss the anomalous behavior of nitrogen in comparison with the other members of group 15.
4. Discuss the manufacture of ammonia by Haber process. Explain the action of aqueous ammonia on (i)copper sulphate solution and (ii)Nessler's reagent
5. Discuss the ostwald's process for the manufacture of nitric acid. Explain the action of Zn with (i)gold dilute HNO_3, (ii) hot dilute HNO_3 and (iii) conc. HNO_3.
6. Discuss the structure of SO_2 molecule on the basis of hybridization and explain the bond lengths.
7. Discuss the structure of SO_3 molecule on the basis of hybridization.
8. Discuss the anomalous behavior of oxygen in comparison with the other members of group 16.

9. Explain one method of preparation of hydrogen peroxide. Explain two reactions each with equations to illustrate the (i) oxidizing action of H_2O_2 and (ii) the reducing action of H_2O_2.
10. Explain one method of commercial preparation of hydrogen peroxide. Explain two reactions each with equations to illustrate the reducing action of H_2O_2 in (i) acid medium and (ii) base medium.
11. Discuss the manufacture of sulphuric acid using contact process. Justify the selection of the conditions adopted for the process.
12. Explain the variation of the following in the case of hydrogen halides(i) the acidic strength; (ii) reducing character ;(iii) boiling points.
13. (a) Name and formulate four oxoacids of chlorine and draw their structures.
    (b) Arrange the above in the increasing order of acid strength and explain the variation.

14. What are inter halogen compounds? Give for examples. Discuss the structure of IF_5.

15. Make a comparison of the properties of pseudohalogens and halogens.

16. Discuss the structures of (a) a polyhalide anion and (b) a polyhalide cation.

18. briefly discuss the discovery of different noble gases.

19. Explain the steps involved in the Dewar's method for the separation of the noble gas mixture obtained from dry air.

20. (a) Discuss the structure of XeF_6 molecule.

(b) Explain the action of water on XeF_6.

Module IV

PART D

1. What are silicones? How are they classified?Mention the application of each class.
2. Discuss the classification of silicates with special reference to their structures.
3. Discuss the preparation, structure ,and applications of cyclotriphosphonitrilic chlorides.
4. Discuss the preparation, structure and applications of polymeric sulphur nitride.
5. a) Wha are the general properties of the solutions of alkali metals in liquid ammonia?
   b)Give three reactions to illustrate the reducing properties of such solutions.

6. a) Give an example each for the following kinds of reactions in liquid ammonia medium: (1)precipitation reactions; (2)complex-formation reactions ; (3) neutralization reaction (4) redox reaction; (5)ammonation reactions.
   b) Explain the term levelling effect of solvents taking liquid ammonia as the example.
7. a) Explain with example the following kinds of reactions taking place when liquid SO_2 is used as the solvents: (1) acid- base reaction; (2) precipitation reaction; (3) redox reaction;(4) complex-formation reaction; (5) solvolytic reaction
   b) Discuss the capability of liquid SO_2 as a solvent for ionic compounds and covalent compounds.Justify your opinions.

Module V

PART D

critically the factors responsible for air pollution and suggest remedial measures.

1. Explain the formation and adverse effects of the two types of smog found over some of the cities of the World.
2. (a) Discuss the pollution of air by oxides of C, S and N.

(b) What are the control measures to check air pollution?

4. (a) Discuss in detail the water pollution caused by agricultural discharges.

(b) Explain the control measures to check water pollution.

5. (a) Explain the water quality parameters represented by DO, BOD and COD.

(b) Write a short note on the quality of drinking water with special reference to the Indian Standards and the WHO standards.

6. What is thermal pollution? Explain the causes, consequences and control measures of Thermal pollution.

7. Discuss nature, sources, effects and control measures of radioactive pollution.

8. Explain the term noise pollution. Discuss its sources, adverse effects, and control measures.

9. Explain the cause, course and consequences of the Save Silent Valley Movement and the Plachimada Movement.

11. Discuss the duties and responsibilities of the Central Pollution Control Board and the State Pollution Control Boards.

Module VI

PART D

1. Discuss the classification of solid wastes on the basis of biodegradability and discuss the characteristics of each class.
2. Discuss the term plastic pollution, the associated adverse effects, and its control measures.
3. Explain two methods for solid waste disposal, discuss the advantages and limitation of each method.
4. (a) What is recycling? Explain its significance as well as advantages and limitation with regards to solid waste management.
   (b) Explain the term biogasification and the advantages of the process.
5. (a) Explain the adverse impact of medical wastes.
   (b) Discuss the methods for the disposal of medical wastes.
6. (a) Discuss the adverse impacts of e-wastes.
   (b) Explain the method of e-waste disposal.
7. Discuss the various methods of producing utilisable energy from solid wastes

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SDC4DP01 DRUG DESIGN AND PHARMACOLOGY

Module I

Part A

1. study of harmful effects of chemicals
2. Identification of botanical resources of drugs is
3. Any two routes of administration of drugs
4. ADMEmeans
5. IV stands for
6. IM stands for
7. BBB is
8. Block effect produces in the receptor by
9. Biological catalysis are
10. 100% bioavailability produces by……..type of administration
11. Give an example for type of drug applied through rectum
12. Prophylactic drug means

Answers

1. Toxicology
2. Pharmacognosy
3. Oral,sublingual etc..
4. Absorption, distribution ,metabolism and execration
5. Intravenous
6. Intramuscular
7. Blood brain barrier
8. Antagonist
9. Enzyme
10. Intravenous
11. Suppositories
12. For disease precaution

Module III

1. Limit test are qualitative …….. test designed to identify and control small quantities of impurities.
2. Limit test for chloride has been based open Rx b/w…… and …….. to obtain silver chloride.
3. . Limit test for sulphate has been based upon the ppt of sulphate with …… in the presence of …… .
4. . In limit test for sulphate to prevent the supersaturation of BaSO4 a small amount of ……has been added in the reagent.
5. . In limit test for chloride …….. prevent production of opalescence due to presence of Ag2CO3, CO2.

6. . Limit test for iron is based upon reaction of Fe with …….. in of a solution buffered with ammonium citrate.
7. . Limit test for iron purple color is due to formation of ..... .
8. . In limit test for iron …… prevent the precipitate of iron as Fe(OH)3NH3 solution.
9. . In limit test for iron Ferrous thioglycolate has stable pink to reddish purple colour in …… medium.
10. . Limit test for Pb has been based upon Rxn b/w …… and …….. to form complex.
11. . The structure of dithiazone …… .
12. . The limit test for Arsenic is based upon …….. test.
13. In limit test for Arsenic ..... is converted into Arsenous acid/Arsinegas.
14. Anemic is general term for a condition in which ……. are deficient in number.

15 .Orally administered…… is treatment of choice for iron deficiency.

16 .Ferrous gluconate which contains ..... iron.

17 .Parentaral administration of iron is indicated in ..... .

18 .Ferrous gluconate is used as ..... .

19 …… is also a component of tyrosines.

20 ……. is only transition metal blero the first series that is known to be essential in living system.

21 .Manganese containing protein called …… .

22 ……. found in photosynthetic apparatus chloroplast.

23 ……. toxicity can lead to symptoms like parleinscns disease.

24 .Iodine is essential constituent of …… hormone.

25 .Antidote is an agent that counteract ……

26 .Sodium nitrate which concert H6 into ……..to bind cyanide.

answers

1. Quantitative
2. AgNO3 soluble chloride
3. BaCl2 and HCl
4. . Alcohol
5. . HNO3
6. . Thioglycolic 2

7. . Ferrous mercaptoacetate
8. . Citric acid
9. . Alkaline
10. Pb and dithione
11. structure
12. Guizet test
13. Arsine
14. RBC
15. FeSO4 14. 12%
16. Emergency surgery
17. Haematinic
18. Copper
19. Molybednum
20. Lectins
21. Manganese
22. Mn
23. Thyroid
24. Poison
25. Methmoglobin
26. Calcium chloride

Module IV

Part A

Name the following

1. Most important alkaloid present in Coffee seeds. (Caffeine)
2. Important alkaloid present in Tea leaves. (Theophylline)
3. Most abundant alkaloid present in Cocoa seeds .(Theobromine)
4. 1,3, 7 Trimethyl xanthine .(Caffeine)
5. 1, 3 Dimethyl xanthine .(Theophylline)
6. 3, 7 Dimethyl xanthine .(Theobromine)
7. Devine food.(Theobromine)(Theobroma cacao)
8. Devine leaf .(Tea leaf)
9. Native place of coffee .(Kaffa in Ethiopia)
10. Xanthine alkaloids with CNS stimulant action.(Caffeine, Theophylline, Theobromine)
11. Two chronobiotics . (Theophylline, Pentobarbitone)
12. One drug used to test Morphine addict. (Nalorphine)
13. Chemicals used to synthesize barbituric acid . (Urea & Melonic acid)
14. Few sources of caffeine . (Coffee seeds,,Guarana,Cola nuts)
15. Botanical name of Tea plant . (Thea sinensi)

16. Scientific name of Cocoa plant. (Theobroma cacao)
17. Plant from which Ephedrine is obtained. (Ephedra senica)
18. Plant from which theobromine is obtained. (Theobroma cacao)
19. Chinese name of plant from which ephedrine is obtained. (Mahuang)
20. Botanical name of Mahuang plant.(Ephedra senica)
21. The most specific antagonist of Morphine. (Naloxone)
22. The antagonist of Droperidol + Fentanyl. (4 Aminopyridine + Naloxone)
23. The antagonist of Xylazine + Ketamine . (4 Aminopyridine +Yohimbine)
24. Antagonist of Xylaxine sedation in cattle . (4 Aminopyridine +Doxapram)
25. A CNS depressant gas which will stimulate respiration in small doses.(Carbon dioxide)
26. Soldified Carbondioxide .(Dry ice)
27. Two reflex medullary stimulants . (Ammonium carbonate, Aromatic spirit of ammonia)
28. One reflex medullary stimulant alkaloid (Lobeline)
29. Alkaloids present in Strychnos nuxvomica.(Strychnine. Brucine, Strychnicine,Vomicine)
30. The reflex we look for to judge the depth of pentobarbitone anesthesia. (Pedal)

Moule V

Part A

1. Nitrous oxide is stored in ……coloured cylinders.(Blue)
2. Cyclopropane was introduced in surgery in……(1929)
3. 106. Halothane was introduced in surgery in…… (1956)
4. 107. Nitrous oxide is ……soluble in blood and so rapid induction and ….recovery. (Slightly, Rapid)
5. 108. Nitrous oxide is a …….smelling gas.(Sweet)
6. 109. Prolonged administration of nitrous oxide cause the oxidation of …….atom in Vit. B12. (Cobalt)
7. Nitrous oxide alone will produce anesthesia only in ……condition.(Hyperbaric))
8. Tricaine methane sulfonate is mostly used for inducing anesthesia in…… (Cold blooded animals)
9. Meditomedine is .....adrenoceptor agonist.(Alpha 2)
10. A withdrawal period of ……days must be given before consuming fishes immobilized with Tricaine methane sulfonate.
11. Cyclopropane is a highly potent gas which is supplied in ……coloured cylinder (Orange)
12. Orally dilute chloroform is ……..in action and it is still used in tympany. (Carminative)
13. Chloroform is a …….smelling liquid. (Sweet)
14. As a pre anesthetic atropine is used at a dose rate of ……..mg/Kg. (0.045) ..
15. Among xanthines ……..is an example for chronobio5
16. Haloperidol is a ……..derivative tranquilizer. (Butyrophenone)
17. Thiopentone was introduced in surgery in……(1935)
18. . Malignant hyperthermia is seen in animals like……(Pigs, Horse, Dogs and Cats)

19. . Xenon is less soluble in blood and so induction and recovery is ……(Fast)
20. In ruminants especially……..and…….metabolism of pentobarbitone is very rapid.(Sheep and Goats)
21. . Detomidine is an …….. adrenoceptor agonist(Alpha 2)
22. The first inhalation anesthetic agent Nitrous oxide was discovered by.....(Priestely)
23. . Deficiency of ..... in the CNS is manifested as Parkinson's disease.(Dopamine)

MODULE 1

PART B

1. Note on target identification in the new drug discovery.
2. Note on target validation in the new drug discovery.
3. What do you meant by lead identification in the new drug discovery.
4. What do you meant by lead optimisation in the new drug discovery.
5. How to isolate bioactive compound from natural source.
6. Note on discovery of Penicillin.
7. Note on discovery of Insulin.
8. How to increase lipid solubility of design by molecular modification.
9. How to alter the metabolism by molecular modification.
10. How to produce orally active compound using molecular metabolism.
11. What is lead and how it is modified.

Module II

Part B

1. What are BBB
2. Important fetures of drug – protein binding
3. Note on active transport
4. Differentiate pharmacology and pharmaco dynamics
5. Write about distribution of drug
6. Define a drug
7. Define a poison
8. Pharmacokinetics deals in
9. What is bioavailability
10. Define biological lag
11. Drug synergism is
12. Drug addiction

13. Drug tolerance
14. Define pharmacodynamics
15. Define pharmacotherapeutics
16. Discuss about drug on the basis of sources
17. What is felicitated diffusion
18. Write active transport
19. Differentiate hydrophobic and hydrophilic drugs
20. Cardinal effects of drug protein bind
21. What is phase 2 metabolism
22. Describe drug tolerance.
23. Describe drug allergy .
24. Write about hypersensitivity.
25. What is bioavailability.
26. What are the factors affecting bioavailability.
27. Write about any two factors influencing drug absorption.
28. Write two advantage and disadvantage of oral route and Intravenous roué of administration.
29. What is BBB.
30. What is synergism.
31. Note on antagonism.
32. Write about idiosyncrasy.
33. Explain drug dependence

Module III

PART B

1. Note on physiological role of iron
2. Note on physiological role of copper
3. Note on physiological role of zinc
4. Note on physiological role of ferrous fumerate
5. Preparation of Ferrous Sulphate BP
6. Identification test of Ferrous Sulphate BP
7. Action and uses of Ferrous Sulphate BP
8. What is ferrous fumerate BP
9. Description of ferrous fumerate BP
10. Category and storage of ferrous fumerate BP

11. TFP of ferrous gluconate BP
12. Description of ferrous glconate BP
13. Identification test of ferrous sulphate tablet
14. Preparation of dried aluminium hydroxide
15. Category of yellow mercuric oxide

Module IV

Part B

1. What are the Stages of Anaesthesia.
2. Give the advantage and disadvantage of nitrogen oxide as inhaled anaesthetic.
3. Give the advantage of intra venous anaesthetics .
4. Give the advantage and disadvantage of nitrogen oxide and halothane .
5. Explain the term anxiety, anxiolytic , sedation ,and hypnotics .
6. What are the clinical use of phenytoin .
7. Give the classification of seizure .
8. What are the adverse effects of Benzodiazepines .
9. Describe the synthesis of levodopa .
10. Give the synthesis of enflurane and diazepam .

Module V

PART B

11. What is phenacetin .
12. Structure of aspirin and paracetamol .
13. Write about COX I and COX II .
14. Give the adverse effect of morphine .draw the structure .
15. What are the clinical use of aspirin and paracetamol .
16. What is the difference between morphine and pethidine .
17. Explain synthesis of diclofenac .
18. Write the general pharmacokinetic properties of NSAIDs

Module I

PART C

1. Briefly explain how are new drugs are discovered.
2. What are the procedures follow in drug design.
3. Note on the search for the lead compound.
4. Note on the molecular modification of lead compound.
5. Note on exploitation of side effects of drugs.
6. Explain random screening of drug discovery.

7. How is a drug approved for Marketing.
8. Give a short note on lead identification via side effect exploitation.
9. Note on discovery of penicillin.
10. Note on discovery of Insulin.

Module II

PART C

1. what is the mechanism of drug tolerance.
2. Note about Ferguson's principle.
3. Note on mechanism of drug action.
4. Describe about adverse drug reaction.
5. Note on drug interaction.
6. Explain about pharmacokinetics.
7. Advantage and disadvantages of systemic routes of administration.
8. Note on synergism and antagonism.
9. Write about ADME.
10. Explain factors influencing dose of drugs.
11. Discuss various routes of administration
12. How the drug metabolized
13. Discuss type of diffusion
14. Factors influencing drug absorption
15. Steps for biotransformation
16. Discuss various types of receptors
17. Explain pharmacodynamics
18. Explain briefly pharmacokinetics
19. How the drug absorb from the GI tract

Module III

Part C

1. Note on ferrous sulphate BP
2. Assay and preparation of ferrous sulphate BP
3. Assay and storage of ferrous gluconate BP
4. Assay and label ferrous sulphate tablet
5. Assay of dried aluminium hydroxide BP
6. Note on heavy $MgCO_3$
7. Note on light $MgCO_3$

8. Preparation of yellow mercuric oxide
9. Roles of copper

Module IV

PART C

1. Note on centrally acting muscle relaxants .
2. Note on intravenous and inhalation anaesthetics .
3. Rite about ether , halothane ,nitrogen oxide ,ketamine ,thiopentone sodium .
4. Note on neurodegenerative disease .
5. Write about anxiolytic agent .
6. Note on types of epilepsy .
7. Write about synthesis of ethinamide
8. Write about synthesis of,chlorodiazepoxide ,
9. Write about synthesis of etonidate ,
10. Write about synthesis of topiramate .

Module V

PART C

1. What is analgesics .give classification and describe about narcotic analgesics .
2. Note on morphine .
3. What are the difference between morphine and pethidine .
4. Write about COX I and COX II .
5. Write about NSAIDs drugs .
6. Note on Allopurinol .
7. Give the synthesis of pethidine ,
8. Write about synthesis of methadone ,
9. Write about synthesis of diclofenac ,
10. Write about synthesis of piroxicam .
11. Discuss about paraminophenol .

Module I

PART D

1. Rational drug design? Write the advantages over conventional method.
2. Give a note on accidential drug discovery.
3. Briefly explain the drug discovery process.
4. Briefly explain how are new drugs are discovered.
5. What are the procedures follow in drug design.

Module I

Part D

1. Explain pharmacokinetic principles
2. How the drug absorbed from GI tract
3. Discuss pharmacodynamics

MODULE III

PART D

1. Describe about pharmacokinetics.
2. Describe briefly about biotransformation of drug.
3. Note on route of administration of drug.
4. Explain pharmacodynamics.
5. What is the advantages and disadvantages of various route of administration of drugs
6. Write a note on study of biochemical and physiochemical effects of drugs.

MODULE IV

PART D

1. Note on general anesthetics and intravenous anesthetics .
2. Note on inhalation anesthetics and . write about nitrogen oxide , ether and halothane .
3. Write about sedative ,hypnotic ,and anxiolytic agents .
4. Note on types of epilepsy and antiepileptic agents .
5. Write about Parkinson's disease and the drugs which are used .
6. Write about the synthesis of the following
   Enflurane ,diazepam ,ketamine ,buspirone .
7. Write about the synthesis of the following
   Buspirone ,nikethamide ,levodopa ,Phenobarbital ,tacrine .

MODULE V

PART D

1. Note on opiod analgesics
2. Note on NSAIDs .
3. Discuss about aspirin and paracetamol .
4. Note on phenylbutone ,oxyphenbutazone ,indomethacin ,ibuprofen, oxxicam .
5. Write about drugs used for gout .
6. Explain synthesis of pethidine , methadone , phenylbutazone , diclofenac , allopurinol , flufenamic acid , piroxicam ,celioxib .

Module I

Part D

1. Explain pharmacokinetic principles
2. How the drug absorbed from GI tract
3. Discuss pharmacodynamics

MODULE III

PART D

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SDC4DR01 INDIAN DRUG REGULATORY GUIDLINE AND PHYSICAL PHARMACY

Module I

PART A

1) A source or situation that poses danger to property , to the environment or to the life ,health and well being of human and other4 organism is referred to as .....
2) An information bulletin of a chemical that describes the properties , hazards ,precautions for safe handling ,emergency and first aid procedures , and control measures is called a .....

Answers

1) Hazard
2) Material safety data sheet or MSDS
3) Water
4) Fume hood
5) Adsorption
6) R phrases

Module II

Part A

1. NDA
2. DCGI
3. DTAB
4. IND

3) Portion of skin effected by acid burn should immediatlely be flushed with lots of .....
4) Systems involving volatile or flammable or toxic or odorous contents or products should be heated in a .....
5) The active mechanism involved in its function of silica gel as desicant is .....
6) Hazards codes and associatd phrases used toindicate the nature of special risks attributed to dangerous substances and preparations are called .....

Answers

1. New drug application
2. Drug controller general of india
3. Drug technical advisory board
4. Investigational new drug

Module III

Part A

1. HSE stands for
2. ICOH stands for
3. Example for occupational infection
4. CNRD stands for

Answers

1. HEALTHY AND SAFETY EXCECUTIVE
2. INTERNATIONAL COMMISION ON OCCUPATIONAL HEALTH
3. Hepatitis B
4. Chronic non specific respiratory diseases

Module IV

Part A

1. Wildlife Protection Act in
2. Drugs Rule under the Drugs Act of 1940 was established.
3. First Edition of Indian Pharmacopoeia was published
4. in relation to any other drug or cosmetic, an Inspector appointed by
5. Medicinal and Toilet preparations (Excise duties) Act
6. Poison act on
7. Define drug according to Drugs and magical remedies Act in
8. Prevention of cruelty of Act in
9. Insecticides Act in
10. AICTE Act in

Part A answers

1. 1972
2. 1954

3. 1955
4. the Central Government or a State Government under section 21
5. 1955
6. 1919
7. 1954
8. 1960
9. 1968
10. 1987

Module **V**

Part A

1. Very fine powder is the one which…..
2. Sieve number indicates the number of mashes in a length of …….. in each transverse direction parallel to the wires
3. Sieve number of coarse powder is……
4. Sieve number of moderately coarse powder is ….
5. Sieve number of fine powder is……
6. Sieve number of moderately fine powder is……
7. Sieve number of very fine powder is…….
8. Cutter mill works on the principle of …….
9. Hammer mill works on the principle of ……
10. Ball mill works on the principle…….
11. Fluid energy mill works on the principle of ……
12. The efficiency of the ball mill is maximum at…….of its speed
13. Particle size reduction…..the surface area of solid substance

Answers

1. All the particles must pass through sieve number 120
2. 2.54cm
3. 10
4. 22
5. 85

6. 44
7. 120
8. Cutting
9. Impact
10. Attrition and impact
11. Attrition and impact
12. 2/3
13. Increases

Module I

PART B

1) what is hazard ?
2) " chemicals should be stored such that incompatible chemicals are separated '' . Justify the statement .
3) Mention two important points with regard to safe storage and safe handling of laboratory chemicals .
4) What is the correct procedure for diluting a concentrated acid ?
5) What is the first step of first aid when parts of skin or eyes come in to contact with a hazardous chemical?
6) Mention the first aid that should be administered for a minor cut by glass .
7) What first aid would you administer to a person who has suffered a major cut from a glass apparatus ?
8) Is it advisable to apply alkali to a portio of body that has suffered a burn from acid contact ? why?
9) Suggest the first aid for a victim who has suffered a chemical burn from an acid or alkali.
10) What is the first aid for a minor heat burn ?
11) What is the step to be taken when phenol comes in to skin contact
12) What is to be done when bromine comes in to skin contact
13) What first aid should be given to a person who has inhaled a hazardous gas in the laboratory ?
14) Explain the procedure for disposal of sodium that has spilled in the laboratory .
15) What is desiccant ? Give an example
16) How does anhydrous calcium chloride function as a desiccant ?
17) Explain the action of silica gel as a desiccant
18) What is the significance of the indicating type of silica gel with regard to its use as desicant ?
19) Explain the term MSDS ?
20) What is an R phrase ?
21) What are S phrases ?
22) What is the simplest method to ensure eye safety in a chemical laboratory ?
23) What is the purpose of fume cupboards in a laboratory ?

24) Describe the symbols used for(a) poisonous material alert and (b) compressed gas alert ,without drawing them .
25) What does the pictograms depicting (a)a flame over a circle and (b) exploding bomb indicate ?
26) Which laboratory safety sign depict (a) an exclamatory mark and (b) leafless tree and dead fish?

Module **II**

Part B

1. What are the responsibilities of DCGI
2. Role of DTAB
3. What are the regulatory agencies that are involved in drug regulation in India
4. What is ISO 9000
5. What is ISO 9000:2000

Module**III**

Part B

1. What are the examples on ILO instruments concerning specific risk
2. Note on occupational hygine
3. Note on chemical hazards
4. Role of engineering controls in controlling hazards
5. What is occupational disease
6. Primary prevention of occupation diseases
7. Safe handling of pesticides
8. Write any four tasks for trainees

Module **IV**

SECTION-B

1. Type of drug trade.

2. Duties of drug inspector.

3. Role of drug inspector.

4. What are cosmetics?

5. Note on CDL.

6. Qualification of drug inspector.

7. Explain the following

(i)AYUSH

(ii)NIPER

(iii)MHRA

(iiii)MTP

9. Classification of intellectual property Rights.

Module **V**

SECTION- B

1. Kick's Law.

2. Bonds Law.

3. Principle of Hammer mill.

4. Principle of Ball mill.

5. Advantages of Ball mill.

6. Principle of fluid energy mill.

7. Principle of disintegrator.

8. Mention the various methods used for size separation.

9. Advantages of sieving method.

10. Principle of cyclone separation.

11. Draw the diagram of cyclone separator.

12. Advantages of cyclone separator.

13. Disadvantages of cyclone separator.

14. User of cyclone separator.

15. Fine powder.

16. Very fine powder.

17. Coarse powder.

18. How rate of feeding affect the efficiency of sieving system.

19. How rate of feeding affect the efficiency of sieving system (particle size).

20. Explain stake's Law explain the terms.

21. Main parts of cyclone separator.

Module I

PART C

1) State the important aspect to be considered with regard to safe storage of laboratory chemicals .
2) What are the rules to be followed while handling chemicals?
3) Explain the first aid to be administered to a victim of electric shock
4) Explain the first aid procedures when a person suffers (a)skin contact and (b)eye contact with an acid or alkali
5) Write a note on the first aid steps should be administered to a victim of heat burn
6) What are the first aid treatment for a person who suffers (a) skin contact and (b) eye contact with phenol ?
7) What first aid would you administered to a person who has sufferd (a) skin contact and(b) eye contact with bromine ?
8) Explain procedure for disposal of sodium that has spilled in the laboratory
9) Write a note on the disposal of waste sodium metal
10) Explain the steps to dispose of the mercury spilt on the laboratory floor
11) Explain the use of anhydrous calcium chloride in laboratory desiccator
12) Write a short note on the function of silica gel as a desiccant in desiccator
13) Explain the significance of material safety data sheets of chemicals
14) Explain what the term 'R' phrases means with simple examples
15) Mention some of the important good practices to maintain laboratory hygiene
16) Explain the significance of 's' phrases on the MSDSs of chemicals
17) Write ashort note on laboratory safety practices
18) " carry out dilution of an acid by adding acid carefully to water " .Explain this statement
19) Justify the following statement ;(a) never resort to mouth-suction to fill a pipette ;(b) avoid wearing gold jewellery while involved in an experiment dealing with mercury metal .
20) Write a short note on laboratory safety signs with suitable examples .(A pictorial representation of any sign is not expecte

Module II

Part C

1. Note on New drug application
2. What are the phases of clinical trials
3. What are the rules and guidelines should follow the regulation of drugs in India
4. Different types in Investigational New drugs
5. What are the main divisions in IND application
6. What do you meant by GMP
7. Is GMP is necessary in quality control lab
8. Can manufactures afford to implement GMP
9. How GMP helps to export pharmaceutical opportunities

Module III

Part C

1. Note on scope and purpose of OSH standards
2. Note on major ILO instruments concerning occupational safety and health in general
3. Write any four principles of OSH
4. Note on Govt. duties in work place safety
5. Note on employers right in work place
6. Note on features of National Policy on occupational safety and health
7. Note on National Profile on occupational safety and health
8. Explain biological hazards
9. Note on chemical hazards
10. Note on Physical hazards
11. Note on controlling hazards

Module **IV**

SECTION-C

1. What are the procedures to important drug?

2. Conditions to release the imported drug.

PART C

the drugs an prohibited to manufacture.

4. Procedures to get manufacturing license.

5. Condition labelling and packing of drugs.

6. Conditions distribution and sales of drugs.

7. Role and dectes of drug inspector.

8. Standards of ASU medunies.

9. Condition to import ASU medunies.

10. Central drug laboratory for ASU drugs.

11. Standards of cosmetics.

12. What are the inventions aren't patentable?

13. Patening procedure.

14. What are the govt through provision of patent to promote research and innovations?

15. Innovations are patentable.

16. Patent Act.

17. Trade mark.

18. What are the criteria to meet an invention become patentable.

19. Copy right.

20. Objectives of IPR.

21. Rights related to copyright.

Module **V**

SECTION-C

1. Importance of particle size reduction.
2. Factors affecting size reduction.
3. Construction and working of Hammer mill.
4. Advantages and Disadvantages of Hammer mill.
5. Advantages and Disadvantages of Ball mill.
6. Features of fluid energy mill.
7. Uses of fluid energy mill.
8. Construction and working of fluid energy mill.
9. Advantages and Disadvantages of cyclone separator.
10. Uses of cyclone separator.
11. Verify fine powder, very fine powder and coarse powder.
12. How rate of feeding affect the efficiency of sieving system (particle size).

13. Sieving.
14. Official standards for powders.
15. Official standards for sieves.
16. What are the factors affecting the efficiency of a sieving system.
17. Sedimentation.
18. Stake's Law.
19. Gravitational sedimentation of particle in a liquid.
20. Construction and working of cyclone separator.
21. Agitation and Brushing method

Module I

PART D

1) Discuss the safe laboratory practices
2) Explain the simple first-aid procedure that have to be administered to victim if they suffer burns from heat ,acid ,alkali ,phenol and bromine .

Module**II**

Part D

1. What are the stages of drug approval

Module **III**

Part D

1. Explain briefly about the workers duties and right
2. Explain briefly about Potential health hazards
3. Explain biological hazards and chemical hazards

Module **IV**

SECTION-D

1. Conditions to release the imported drugs.

2. Condition labelling and packing of drugs.

3. Conditions distribution and sales of drugs.

4. Patening procedure.

5. What are the govt through provision of patent to promote research and innovation?

6. Explain patent Act, trade mark, and copyright.

Module V

.**SECTION-D**

1. Factors affecting size reduction.

2. Official standards for powders.

3. Official standards for sieves.

4. What are the factors affecting the efficiency of a sieving system.

SEMESTER V

GEC5OC02 ORGANIC CHEMISTRY-II

Module I

PART A

Fill in the blanks

1. The structural formula of 4-chloro-3-methylpent-1-ene is .....
2. Propene reacts with HI to yield .....
3. *n-propyl* bromide when heated with alcoholic silver cyanide predominantly yields .....
4. The rate of an s_N1 reactions between an alkyl halide and a nucleophile depends only on the concentration of the .....
5. For a given substance(alkyl halide),the reactivities of nucleophiles.....in the order of increasing nucleophilicities.
6. In the *tert-butyl* cations ,the positive charged carbon is .....hybridised.
7. The major product of the dehydrobromination of 2-bromobutane ($CH_3CH_2CHBr\text{-}CH_3$) is .....
8. The reaction between tert-butyl bromide and hydroxide ion to yield *tert*-butyl alcohol is a typical example for a nucleophilic substitution reaction taking place by the .....pathway.
9. The order of reactivities of alkyl halides 3°>2°>1°>methyl for nucleophilic substitution reaction adopting the .....pathway.
10. Dehydohalogenation of an alkyl halide is an example for a/an .....reaction.
11. *primary* alkyl halides generally undergo elimination by .....mechanism.
12. .....alkyl halides do not undergo dehydrohalogenation by the E1 mechanism.
13. Benzenediazonium chloride on treatment with CuCl/HCl yilds .....
14. In the elimination-addition mechanism of nucleophilic aromatic substitution,the intermediate formed is called .....
15. In chlorobenzyne,chlorine is attached to an .....hybridised carbon.

Question with one-word answers

16. Among ,$CH_3\text{-}CH_2Cl$,$CH_2=CH\text{-}Cl$,$C_6H_5\text{-}CH_2\text{-}Cl$and $CH_2=CH\text{-}CH_2Cl$,which is an *allylic halide?*
17. $CH_3\text{-}CHOH\text{-}CH_2\text{-}CH_3 \rightarrow$A(the product).What is the product A?
18. $CH_3\text{-}CH_2Br \rightarrow CH_2=CH_2$.What can be the reagent?
19. Among $(CH_3)_3C\text{-}Br$,$(CH_3)_2CH\text{-}Br$,$CH_3\text{-}CH_2\text{-}Br$ and $CH_3\text{-}Br$,which shows highest S_N1 reactivity?
20. Write the formula of 2,2-d−−−imethyl-1-chloropropane.
21. In which type of nucleophilic substitution reaction does the formation of an intermediate carbocation take place?
22. CH_3-CH_2-OH +Reagent$\rightarrow CH_3—CH_2—Cl+H_2O$.What is the reagent?
23. Among $(CH_3)_3C\text{-}Br$,$CH_2=CH\text{-}Br$ and $CH_2=CH\text{-}CH_2Br$,Which does not undergo nucleophilic substitution reaction?
24. What kind of pathway is predominantly adopted in the alkaline hydrolysis of methyl bromide?
25. What is the IUPAC name of $CH_3\text{-}CH_2\text{-}CH(CH_2CH_3)\text{-}CH(I)\text{-}CH_2\text{-}CH_3$?

26. To which kind of substitution reaction does the following relation hold:Rate=k[Alkyl halide][Nucleophile]
27. An alkyl halide reacts with sodium alkoxide in dry ether solution to give an ether.By what particular name is the reaction known as?
28. Name the reaction in which an alkyl halide reacts with metallic sodium in dry ether solution to give a higher alkane.
29. What is the formula of freon-12?
30. Which substance carries the industrial name *pyrene*?

Section A:Key

1. CH_3-CH(Cl)-CH(CH_3)-CH=CH_2
2. 2-idopropane
3. n-propyl isocyanide
4. alkyl halide
5. increase
6. sp^2
7. but-2-ene
8. S_N1
9. S_N1
10. 1,2-elimination
11. E2
12. Primary
13. Chlorobenzene
14. Benzyne
15. Sp^2
16. CH_2=CH-CH_2Cl
17. CH_3-CHBr-CH_2-CH_3
18. Alcoholic KOH
19. $(CH_3)_3$C-Br
20. $(CH_3)_3$C-CH_2-Cl
21. S_N1
22. HCl
23. CH_2=CH-Br
24. S_N2
25. 3-Ethyl-4-iodohexane
26. S_N2
27. Williamson's synthesis
28. Wurtz reaction
29. CCl_2F_2
30. CCl_4

Module II

PART A

Fill in the blanks

1. The IUPAC name of acetone is .....
2. The name of the straight chain metamer of pentan-2-one is .....
3. ..... is the IUPAC name of CH_2=CH-CH_2-CHO.
4. The formula of benzene carbaldehyde is .....
5. IUPAC name of ethyl isopropyl ketone is .....
6. A reagent suitable for the oxidation of CH_2=CH-CH_2OH to CH_2=CH-CHO is .....

7. The state of hybridisation of carbonyl carbon is .....
8. The reaction of C_2H_5MgCl with C_6H_5-C=O followed by acidification gives .....

9. When ethanol vapours are passed over copper at 573 K, the product obtained is .....
10. ..... upon oxidation with PCC yields butanal.
11. Dry distillation of calcium acetate yields .....
12. Toluene is treated with chromyl chloride and the product obtained is subjected to acidic hydrolysis. The final product is .....
13. Benzoyl chloride upon hydrogenation in the presence of palladium supported on $BaSO_4$ yields .....
14. Aldehyde react with excess of alcohols in the presence of an acid catalyst to produce compounds called .....
15. Acetaldehyde reacts with ..... in the presence of a catalytic amount of acid to yield acetaldoxime.

16. Reduction of a >C=O group to >CH2 group by heating a carbonyl compound with ..... followed by heating with KOH in a hgh boiling solvent such as DEG or DMSO is called *Wolff-kishner reduction*.
17. Acetopenone when heated with zinc amalgam and conc.HCl gives .....
18. When benzaldehyde is heated with *hydrazine*,followed by heating with potassium *tert*-butoxide at 170°C in diethylene glycol solvent gives .....
19. When cyclohexanone is heated with aluminium isopropoxide in propan-2-ol, ... and acetone are produced.
20. Propanal when heated with *Benedict's solution* yields a red brown precipitate; the precipitate is .....
21. Aldol condensation product of ..... is but-2-enal
22. Acetone when warmed with iodine and sodium hydroxide yields tallow crystals of .....
23. Among methanal, ethanal, propanal and butanal, only .....yields iodoform when warmed with iodine and alkali.
24. Formaldehyde when treated with concentrated NaOH yields..... and sodium formate.
25. 4-hydroxy-3-methoxybenzaldehyde is commonly called .....

26. Among benzaldehyde, acetaldehyde actone and acetophenone, the compound that gives the precipitate of red cuprous oxide when warmed with *Fehling's reagent* .....

Questions with one-word answers

27. Give the structural formula of the ketone having molecular formula C_4H_8O.
28. What is the structural formula of pent-1-ene-3-one?
29. Give the IUPAC name of the aldehyde having molecular formula C_3H_6O.
30. Write the structural formula of 3-bromobut-2-enal.

31. What product is obtained when butan-2-ol is heated with acidic dichromate?
32. Suggest a reagent suitable for the oxidation of CH_3-CH=CH-CH_2OH to CH_3-CH=CH-CHO.
33. CH_3-CHOH-CH_3 →? What is the product?
34. What product is obtained upon the dry distillation of *calcium formate* ?
35. Toluene is treated with chromyl chloride and the product obtained is subjected to acidic hydrolysis. What is the reaction called?
36. What is the product obtained when benzene reacts with benzoyl chloride in the presence of anhydrous $AlCl_3$?
37. A→B→2-Methylbutan-2-ol.What is A ?
38. Which aldehyde reacts with a Grignard reagent to form an adduct which upon hydrolysis yields a primary alcohol ?
39. Among CH_3CH_2CHO,$(CH_3)_3C$-CHO and $CH_3CH_2COCH_3$,which reacts with CH_3MgI to form an adduct that yields a *tertiary* alcohol upon acidic hydrolysis?
40. What type of alcohol is obtained when a ketone reacts with Grignard reagent to form an adduct and it is hydrolysed?
41. By what name are the products of reaction between aldehyde and primary amines generally known?
42. Write the formula of the products obtained when acetaldehyde reacts with ethyl amine in the presence of small amount of acid.
43. By what name are the product of condensation of aldehydes or ketones with hydrodylamine known?
44. What reagent can convert cyclohexanone to cyclohexanone hydrazone?
45. Name the product obtained when propanal is heated with amalgamated zinc and conc.HCl?
46. What is the product obtained when acetone is heated with *hydrazine* and then withKOH in dimethylsulphoxide solvent?
47. Name the complex hydride that can be used to reduce CH_3-CH=CH-CHO to CH_3-CH=CH-CH_2OH.
48. Name the reaction in which >C=O group of carbonyl compound is reduced to $>CH_2$ group by heating zinc amalgam and conc.HCl.
49. What is the final product obtained when benzaldehyde is subjected to heating with alkaline $KMnO_4$ followed by acidification?
50. By what name is the reverse reaction of MPV reduction knowns?
51. Give the IUPAC name of aldole produced from the base-catalysed aldol reaction of acetaldehyde.

52. What product other than sodium benzoate is obtained when benzaldehyde is treated with concentrated NaOH?
53. Among tollen's test , benedict's test and iodoform test,which can be used to distinguish from formaldehyde and acetaldehyde?

Section A:Key

1.Propanone 2.Pentan-3-one 3.But-3-enal 4.C_6H_5-CHO

5.2-Methylpentan-3-one 6.Propanedial 7.PCC or Collins reagent
8. 9.Sp^2 10.2-phenylbutan-2-ol
11.acetaldehyde(ethanal) 12.Butan-1-ol 13.acetone(propanone)
14. benzaldehyde(C_6H_5-CHO) 15 .benzaldehyde(C_6H_5-CHO)
16. 17.C_6H_5-CHO 18.acetals 19.CH_3-CH=NH-C_6H_5
17.hydroxylamine(NH_2OH) 21.H_2N-NH_2 22.hydrazine
23.ethylbenzene(C_6H_5-CH_2-CH_3) 24.toluene(C_6H_5-CH_3)
25.cyclohexanol 26.cuprous oxide(Cu_2O)
27.CH_3-CH_2-CH_2-COOH 28.C_6H_5-CO-CH_3
29.acetaldehyde(ethanol or CH_3-CHO) 30.C_6H_5-CH=CH-COOH
31.Iodoform(CHI_3) 32.ethanal 33.methanol
34.vanillin 35.acetaldehyde 36.3-Methylbutanal
37.CH_3-CO-CH_2-CH_3 38.CH_2=CH-CO-CH_2-CH_3
39.Propanal 40.CH_3-CBr=CH-CHO
41.Pentane-2,4-dione 42.Butanone(CH_3-CO-CH_2-CH_3)
43.PCC(or Collins reagent) 44.CH_3-CO-CH_3(Acetone or propanone)
45 Formaldehyde(or Methnal or H-CHO) 46.Etard's reaction
47.Benzophenone(or C_6H_5-CO-C_6H_5) 48.Acetone(propanone)
49.Formaldehyde(Methanal) 50.$CH_3CH_2COCH_3$ 51.Tertiary(3°)
52.Schiff's bases (Imines or Aldimines) 53.CH_3-CH=N-CH_2-CH_3
54.Oximes 55.Hydrazine 56.propane 57.propane
58.Sodium borohydride($NaBH_4$) 59.Clemmensen reduction
60.Benzoic acid(C_6H_5-COOH) 61.Oppenauer oxidation
62.3-Hydroxybutanal 63.Perkin's reaction (perkin condensation)
64.Benzyl alcohol 65.Iodoform test

Module III

PART A

Fill in the blanks

1) In allylic alcohols ,the –OH group is attached to a ..... hybridised carbon next to the carbon –carbon double bond .

2) A mixture of conc.HCL and anhydrous $ZnCl_2$ is known as ..... reagent .
3) On passing vapours of 2-methylpropan-2-ol over copper at 573 K ,the product is .....
4) In the fermentation of sugar ,the enzyme that catalyses the oxidatation of glucose to ethanol is .....
5) IUPAC name of neopentyl alcohol is.....
6) Hydroboration-oxidation of propene gives .....
7) IUPAC name of glycerol is .....
8) Among primary ,secondary and tertiary alcohols ,dehydration is the fastest with ..... alcohols .
9) It is often difficult to esterify 3^0 alcohols .This is due to .....
10) The esterificaton of an acid and an alcohol by passing dry HCL gas through their mixture is known as ..... esterification .
11) Dehydration of butan -1-ol gives a mixture of but -1- ene and .....
12) A reagent suitable for the oxidation of CH_3 –CH=CH-CH_2OH to CH_3 –CH=CH-CHO is .....
13) Any aldehyde other than formaldehyde reacts with a Grignard reagent to form an adduct which upon hydrolysis yield a ..... alcohol .
14) 95.6 % solution of ethanol is called .....
15) The process of rendering ethanol unfit for drinking by adding poisonous or nauseating substance is called .....
16) Ethanol when used as an addictive to the fuels for automobile or other internal combustion engines is referred to as ..... alcohols.
17) A solution of chromic acid [H_2CrO_4] in aqueous sulfuric acid is known as the “..... reagent “.
18) PCC oxidises butan -2-ol to .....
19) Phenol is ..... acidic than p – nitrophenol.
20) When sodium phenoxide is treated with ..... gas under pressure and the product is acidified ,salicylic acid is obtained.
21) Heating phenol with CCl_4 and aq. NaOH and subsequent acidification gives .....
22) The white precipitate obtained on the reaction orf phenol with bromine water is.....
23) The increasing order of acidity for [1] benzoic acid ,[2] hexan -1-ol and [3] phenol is .....
24) Among the three isomeric nitrophenols , the ..... isomer has intra molecular hydrogen bonding .
25) Phenol is ..... acidic than o-methoxyphenol

QUESTIONS WITH ONE WORD ANSWERS

26) Give the IUPAC name of the 2^0 alcohol that has the molecular formula C_3H_8O .
27) Write the structural formula of propane -1 ,2-diol .

28) Which aldehyde reacts with a Grignard reagent to form an adduct which upon hydrolysis yield a primary alcohol ?
29) Among 2-methylpropan -2-ol and propan -1-ol , which reacts the fastest with a mixture of conc. HCL and anhydrous $ZnCl_2$?
30) CH_3 –CH =CH_2 reacts in presence of 1.B_2H_6 and H_2O_2 ;OH^- ? What is the product?
31) Among $CH_3[CH_2]_3CH_2OH$,$CH_3[CH_2]_2CH[OH]CH_3$,$CH_3CH_2CH(CH_3)CH_2OH$ and $(CH_3)_2C(OH)CH_2CH_3$,which is dehydrated most easily ?
32) What type of alcohol is obtained when a ketone reacts with a Grignard reagent to form an adduct and it is hydrolysed?
33) What is the percentage of ethanol in absolute alcohol?
34) What is the addictive used for denaturing ethanol to get methylated spirit?
35) Among ethanol,propan-2-ol and 2-methylpropan-2-ol,which is the least acidic?
36) Among $NaHCO_3$ solution, $NaHSO_3$ solution and Tollen's reagent,which solution can be used to distinguish a carboxylic acid from phenol

37) What is the product obtained when phenol is heated with chloroform and aq.NaOH and then followed by acidification?
38) Among the phenolphthalein, fluorescein and alizarin,which is used as an indicator in argentometric titrations?
39) Among tert-butyl alcohol, p-cresol and benzoic acid , which will yield a violet colour with neutral ferric chloride solution ?
40) What is the systematic name for picric acid?
41) Which has a higher boiling point –o-nitrophenol or p-nitrophenol ?

45)When sodium phenoxide is treated with CO_2 gas under pressure and the product is acidified,salicylic acid is obtained; what is the reaction called?

Answers

1) Sp^3
2) Lucas
3) 2-methylpropene
4) Zymase
5) 2,2-dimethylpropan-1-ol
6) Propan-1-ol
7) Propane -1,2,3-triol
8) Tertiary
9) Steric hindrance
10) Fischer-Speier
11) But-2-ene
12) Pyribiniumchlorochromate (PCC)

13) Secondary (2^0)
14) Rectified spirit
15) Denaturation
16) Power
17) Jones
18) Butanone
19) Less
20) CO_2
21) Salicylic acid
22) 2,4,6 –tribromophenol
23) (2) <(3) <(1)
24) Ortho
25) More
26) 2-chlorobutan-1-ol
27) Propan -2-ol
28) CH_3 –CHOH –CH_2OH
29) 2-bromoethanol
30) Formaldehyde (methanal,HCHO)
31) 2-methylpropan -2-ol
32) Propan -1-ol (CH_3-CH_2-CH_2OH)
33) $(CH_3)_2C(OH)CH_2CH_3$
34) Tertiary (3^0)
35) 100
36) Methanol
37) 2-methylpropan- 2-ol
38) $NaHCO_3$
39) Benzene -1,2-diol
40) Salicylaldehyde
41) Fluorescein
42) p-cresol
43) 2,4,6 – trinitrophenol
44) p-nitrophenol

Module IV

PART A

Fill in the blanks

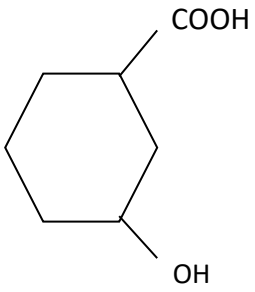
1. The IUPAC name of acetic acid is.....
2. the structural formula of 4-methoxybutanoic acid is.....

3. The IUPAC name of oxalic acid is.....
4. The acid which is a functional isomer of ethyl formate (H-COO-CH_2-CH_3) has the structural formula.....
5. Acidic hydrolysis of ethyl cyanide yields ..... acid.
6. Phenyl magnesium halide reacts with a stream of dry CO_2 in dry ether solution to yield an adduct which upon hydrolysis yields.....acid.
7. The gas produced when benzoic acid is treated with sodium hydrogen carbonate solution is.....
8. The acid obtained by the carbonation of n-propyl magnesium bromide is.....
9. Among ethanoic acid, chloroethanoic acid, dichloroethanoic acid and trichloroethanoic acid, the strongest is.....
10. The reaction of benzoic acid with PCl_5 yields.....
11. The reaction in which the alpha-hydrogen of a carboxylic acid is replaced by halogen upon treating with chlorine or bromine in the presence of red phosphorous is called..... reaction.
12. Heating sodium benzoate with soda lime yields.....
13. The reaction whereby a carboxylic acid loses CO_2 is called a.....
14. Electrolysis of a concentrated aqueous solution of ..... yields butane.
15. The products of action of heat on aliphatic dicarboxylic acids are predicted by ..... rule.
16. Heating phthalic acid produces.....
17. Citric acid molecule contains .....carboxyl groups.
18. Ethylene glycol upon oxidation with conc.HNO_3 gives.....
19. Oxalic acid when heated at 110^oC yields.....
20. Acetyl chloride reacts with water to give.....
21. CH_3-CH_2-$COONH_4$ upon heating produces.....
22. Hofmann's hypobromite reaction involves heating an amide with .....and alkali.
23. The product obtained upon warming benzene with oleum is.....

Questions with one-word answers

24. What is the IUPAC name of *succinic acid*?
25. Write the structural formula of *but-2-enoic acid*?
26. Give the IUPAC name of :

27. Give the IUPAC name of :



28. Which acid is produced by the acidic hydrolysis of ethanenitrile?
29. Name the final product obtained when methyl magnesium bromide is treated with dry ice in dry ether solution and then subjected to acidic hydrolysis.
30. Among halogenated acetic acids, which is strongest?
31. What is the product obtained when ammonium acetate is heated?
32. What is the product obtained when sodium propanoate is heated with dry soda lime?
33. Among trichloroacetic acid, propanoic acid and 2,2-dimethyl propanoic acid, which can undergo HVZ reaction?
34. Among oxalic acid, malonic acid, picric acid and lactic acid, which is not a carboxylic acid?
35. Which is the strongest acid among phenol, acetic acid, ethanol and chloroacetic acid?
36. Name the hydrocarbon obtained when a concentrated aqueous solution of *potassium acetate* is electrolysed.
37. What type of product is obtained, according to Blanc's rule when a *1,6-dicarboxylic acid* is heated at 300^{o}C with acetic anhydride?
38. Name the product obtained when *crystalline oxalic acid* is heated with *glycerol* at 230^{o}C.
39. Give the IUPAC name of *lactic acid.*
40. Among phthalic acid, malonic acid, citric acid and succinic acid, which is a hydroxy acid?
41. What is the product obtained when benzamide is heated with phosphorus pentoxide?
42. Name the product obtained when ethanamide is heated with bromine and alkali.
43. What is *p*-toluene sulphonyl chloride commonly called?
44. Which is the strongest among the following: acetic acid, benzoic acid, benzene sulphonic acid?
45. By what name is *o*-sulphobenzoic imide commonly known?
46. What is the reaction of an alcohol with *p*-toluenesulphonyl chloride in the presence of pyridine called?
47. Among the reagents Na_2CO_3, $NaHCO_3$ and Tollen's reagent, which can be used to distinguish between formic acid and acetic acid?

Answers

1. Ethanoic acid

2. Prop-2-enoic acid
3. CH_3-O-CH_2-CH_2-CH_2-COOH
4. Ethanedioic acid
5. CH_3-CH_2-COOH
6. Propanoic
7. Benzoic
8. Carbon dioxide
9. Butanoic acid (CH_3-CH_2-CH_2-COOH)
10. Trichloroethanoic acid
11. Benzoyl chloride(C_6H_5-COCl)
12. Hell-Volhard-Zelinsky (HVZ)
13. Benzene
14. Decarboxylation
15. Sodium propanoate (or potassium propanoate)
16. Blanc's
17. Phthalic anhydride
18. CH_3-COOH
19. Three
20. Oxalic acid (ethanedioic acid)
21. Formic acid
22. Acetic acid(CH_3-COOH)
23. CH_3-CH_2-$CONH_2$ (propanamide)
24. Bromine
25. Benzenesulphonic acid
26. Butanedioic acid
27. CH_3-CH=CH-COOH
28. Chloroethanoic acid
29. 2-Hydroxycyclohexanecarboxylic acid
30. Ethanoic acid (acetic acid)
31. Ethanoic acid (acetic acid)
32. Trifluoroacetic acid
33. Acetamide (ethanamide,CH_3-$CONH_2$)
34. Ethane
35. Propanoic acid
36. Picric acid
37. Chloracetic acid
38. Ethane
39. Cyclic ketone
40. Phthalic anhydride

41. Ally alcohol (Prop-2-en-1-ol)
42. 2-Hydroxypropanoic acid
43. Citric acid
44. Phenyl cyanide (Cyanobenzene or Benzonitrile or C_6H_5-CN)
45. Methanamine (methyl amine)
46. Tosyl chloride
47. Benzenesulphonic acid
48. Saccharin
49. Tosylation
50. Tollen's reagent

Modulei

PARTB (Short Answer)

1. Give the structural formulae of
   (i)3-bromo-5-ethyl-4-iodoheptane; (ii)1-bromo-2,2-dimethylpropane.
2. Write the IUPAC names of (i)$(CH_3)_2CH$-$CHBr$-CH_2-CH_3 and (ii)CCL_2=CHCl

3. State each of the following cases whether the halide shown is *primary,secondary*,or *tertiary:*
   (a)$(CH_3)_2CHCH_2Cl$ (b)$(CH_3)_3CBr$ (c)CH_3-CH-CH_2Cl

   CH_2CH_3

4. Write the structural formulae of the position isomers having molecular formula C_3H_7Cl and name them.

5. Mention one method with one example for converting an alcohol into the corresponding alkyl halide.
6. Explain with equation what happens when butan-2-ol is heated with red phosphorous and bromine.
7. Name the product obtained when propan-1-ol is heated with thionyl chloride in the presence of pyridine.Give the equation for the reaction.
8. For the preparation of alkyl chlorides from alcohols,thionyl chloride($SOCl_2$) is preferred as the reagent.Give reason.
9. How can 2-methylpropenebe converted into 1-bromo-2-methylpropane?
10. Give the equation for the reaction between 3,3-dimethylbut-1-ene and HCl and name the product.
11. Give an example for a *radical halogenation* reaction.
12. Give an example for the *allylic halogenation* of alkenes.
13. Illustrate *Finkelstein reaction* with suitable example.

14. Complete the following equations and name the product in each case:
    (a)CH_3-CHBr-CH_3+NaI→?
    (b)$ClCH_2$-CH=CH_2+NaI→?
15. Explain *Swarts reaction* with an example.
16. What is meant by a nucleophilic substitution reaction? Give an example of such a reaction for an alkyl halide.
17. How can 1-bromopropane be converted to methoxypropane?
18. Explain the term *Willaimson's synthesis* with suitable examples.
19. What is the major product obtained when 2-bromobutane is heated with alcoholic silver cyanide?
20. How can *ethyl bromide* be converted to *ethyl cyanide?*
21. What is meant by a nucleophilic substitution reaction?Mention the two kinds undergone by alkyl halides.
22. What is an S_N1 reaction?
23. What is meant by an S_N2 reaction?
24. Give a method for the conversion of *ethyl iodide* to *ethylamine*
25. Draw the products obtained from the S_N2 reaction of (a)2-bromobutane and methoxide ion,and (b) 3-iodopentane and hydroxide ion .
26. What is the order of S_N2 reactivity among methyl halide,1°alkyl halide,2°alkyl halide,3°alkyl halide?

27. Rearrange the following compounds in the increasing order of reactivity towards S_N2 displacement:2-bromo-2-methylbutane,1-bromopentane,2-bromopentane.
28. For each pair of compounds,state which compound is the better S_N2 substrate:
    (a)1-iodo-2-metylpropane or 2-iodo-2-methyl propane.
    (b)2-bromobutane or 2-bromopropane.
    (c)1-choro-2,2-dimethylbutane or 2-chlorobutane.

29. Draw the structural formula for the most stable carbocation with molecular formula $C_4H_7^+$.
30. Draw the structural formula for the most stable carbocation with molecular formula $C_4H_9^+$.
31. Give an example for a reaction that principally follows the S_N1 pathway.
32. What is the order of S_N1 reactivity among methyl halide,1°alkyl halide,2°alkyl halide,3°alkyl halide?
33. Rearrange the following compound in the increasing order of reactivity towards S_N1 displacement:2-chloro-2-methylbutane,1-chloroopentane,2-chloropentane.
34. Choose the member of each pair that will react faster by the S_N1 mechanism:
    (a)1-bromopropane or 2-bromopropane.
    (b)2-bromo-2-methylbutane or 2-bromo-3-methylbutane
    (c)*n*-propyl bromide or allyl bromide.
35. Choose the member of each pair that will react faster by the mechanism:
    (a) 1-bromo-2,2-dimethylpropane or 2-bromopropane.
    (b) *tert*-butyl iodide *or tert*-butyl chloride.

(c) 2-bromo-2-methylbutane or iodoethane.

36. What is an *elimination reaction*? Give an example.
37. What is an E2 reaction?
38. State whether the rate of an E2 reaction depends only upon the concentration of the substrate or only upon the concentration of the base or on both.why?
39. State the *Saytzeff's* rule (*Zaitsev's rule*).
40. Give an example which illustrates the Zaitsev orientation.
41. Give the structure and name of the alkene formed from E2 elimination of 1-chloropentane.
42. What is an E1 reaction?
43. What is the major product obtained when *2-bromo-2,2-dimethylbutane* undergoes dehydrohalogenation?
44. Which is the major product obtained when 1-bromopropane undergoes reaction with methoxide ion?
45. How can *allyl iodide* be converted to *allyl alcohol?*
46. Name and formulate the *position isomers* having the molecular formula C_7H_7Cl.
47. Complete the following equation:$C_6H_5\text{-}NH_2 \rightarrow A \rightarrow X$.Name and formulate the compounds A and X.
48. How can *aniline* be converted to *bromobenzene*?
49. Suggest a method with the conditions required for the the conversion of *chlorobenzene* to *phenol* by means of a nucleophilic substitution reaction
50. Arrange *chlorobenzene ,4-nitrochlorobenzene,2,4-dinitrochlorobenzene* and *2,4,6-trinitrochlorobenzene* in the increasing order of their reactivity towards nucleopilic aromatic substitution.
51. How can *benzyl chloride* be converted to *benzyl alcohol*?Give equation.
52. Give a chemical test to distinguish between *chlorobenzene* and *benzyl chloride* and explain the chemistry involved in it.
53. Give one use each of *chloroform* and *iodoform*.
54. What is *halothane*?What is it's principal use?
55. Formulate *freon-12*.Mention two uses of the compound.
56. What compound is represented by the name *pyrene* and in the context of what kind of use of the compound?
57. By what industrial names are the following compounds known?
    (i) CCl_2F_2 (ii)$CF_3\text{-}CHClBr$

Module II

PART B(Short Answer)

1. Give the structures of : (i) 3,3-dibromo-4-ethylcyclohexanone;(ii)nhex-4-en-2-one.
2. Write the IUPAC names of (i) $(CH_3)_2CH\text{-}CO\text{-}CH_2\text{-}CH_3$,and (ii)$(CH_3)_3C\text{-}CHO$.
3. Give IUPAC names of:
   (i)$CH_3\text{-}CH(CH_3)\text{-}CH_2\text{-}CH(CH_3)\text{-}CHO$
   (ii)$CH_3\text{-}CO\text{-}CH_2\text{-}CO\text{-}CH_3$

4. Draw the structures of:
   (i)4-chloropentan-2-one (ii)4-Methylpent-3-en-2-one.
5. Give the common names and IUPAC names of
   (i)phCOph (ii)CH_2=CH-CHO.
6. Draw all the possible constitutional isomers of aldehydes and ketons possible for the molecular formula C_3H_6O and give their IUPAC names.
7. Write the structural formulae of (a)3-methylcyclohexanone and (b)3-phenylbutanone.
8. Draw the structures of: (a)2,2-Dimethylcyclohexanecarbaldehyde;
   (b)Cyclohexane-1,3-dione.
9. What products would you expect from reaction of Collins reagent with (i)2-phenylethanol,and (ii)cyclopentanol?

10. Give equations for the following reactions: (a) But-2-en-1-ol is heated with PCC;
    (b) cyclohexanol is heated with acidic dichromate.
11. Give an example for *Stephan's reaction*.
12. How can *ethanenitrile* be converted to *ethanal*?
13. Explain a reaction for converting *acetyl chloride* to *acetaldehyde*?
14. Give an example for *Rosenmund's reduction.*
15. What happens when *calcium propanoate* is dry distilled?
16. What is *Etard's reaction*? Illustrate with an example.
17. Explain how *benzene* is converted to *acetophenone*.
18. Illustrate *Friedel-Crafts acylation* reaction of benzene with a suitable example.
19. What is *Oppenauer oxidation*?
20. Give an example for a *nucleophilic addition* reaction undergone by an *aldehyde*.
21. Which forms a more stable hydrate-acetaldehyde or trichloroacetaldehyde? Why?
22. What are acetals?Give an example for a recation in which an acetal is formed.
23. Explain the reaction between *cyclohexanone* and excess *methanol* in the presence of *p-toluenesulphonic* acid.
24. How does *ethanal* react with (a)HCN and (b)$NaHSO_3$? Give equations.
25. Give an example(with equation) for a nucleophilic addition reaction undergone by ketones.
26. How can *acetaldehyde* be converted to *2-hydroxypropanoic* acid?
27. How does *benzaldehyde* react with HCN? What type of reactions does this illustrate?
28. Give the equation for the reaction of *propanone* with *sodium hydrogen sulphite* and name the type of reactions illustrated by this example.

29. Depict the reaction of *acetone* with *ethylene glycol* in the presence of *p*-toluenesulphonic acid.
30. Explain with equations what happens when *butanone* reacts with *methylmagnesiumbromide* and the product is subsequently subjected to acidic hydrolysis.
31. Explain with equations how *ethyl magnesium bromide* can be converted to *propan-1-ol.*
32. Explain with equations how *acetaldehyde* can be converted to *butan-2-ol*.
33. How can *propanone* be converted to *2-methylpropan-2-ol*?

34. Explain how you can use the addition of a Grignard reagent to a ketone to synthesize 2-phenylpropan-2-ol.[*Hint*: Use acetophenone and CH_3MgBr]
35. Give the equation for the reaction of *acetophenone* with *methanamine* in the presence of a trace of acid. What is the product commonly referred to as?
36. Give an example (with equation) for an *addition-elimination* reaction undergone by an aldehyde.
37. Explain the reaction between cyclohexanone and hydroxylamine in the presence of a small amount of acid.
38. What happens when acetone is treated with phenylhydrazine?
39. How does acetophenone react with hydrazine ?
40. How does acetaldehyde react with ammonia? What happens when the product is heated?
41. Expalin the reaction of formaldehyde with ammonia.Mention the chief use of the product.
42. What is *clemmensen reduction*? Give an example.
43. What is *Wolff-Kishner* reduction? Give an example.
44. How can *benzaldehyde* be converted to *toluene*?
45. Complete the fllowing equations:

46. What is *Meerwein-Ponndorf-Verley reduction*?Give an example.
47. Give equation for the reduction of *2-methylcyclopentanone* with $LiAlH_4$.Name the product.
48. Expalin what happens when *benzaldehyde* is heated with *aluminium isopropoxide* in *isopropyl alcohol.*
49. Give an example for the use of *metal hydride reduction* in organic chemistry.
50. Complete the following equations:
    (a) $C_6H_5\text{-}CO\text{-}CH_3 + CH_3\text{-}CHOH\text{-}CH_3 \rightleftharpoons$
    (b) $C_6H_5\text{-}CH{=}CH\text{-}CO\text{-}CH_3 \rightarrow$

51. Explain the reaction of an aliphatic aldehyde with *Benedict's solution*.
52. Give one chemical test to distinguish between *benzaldehyde* and *benzophenone*.
53. Give an example for *aldol reaction* and give its equation.
54. Explain what happens when propanone is treated with very dilute $Ba(OH)_2$ and subsequently heated.
55. Explain the *aldol condensation* reaction that *acetaldehyde* undergoes.
56. Give the equation for the formation of the aldol upon trating *propanal* with a dilute base.
57. Give an example for *cross aldol condensation*.
58. Give the equation for the formation of the mixed aldol from *acetone* and formaldehyde.
59. Give an example for *Clasien-schmidt* reaction and give its equation.
60. Explain what happens when *benzaldehyde* is treated with *propanone* in the presence of a base and subsequently heated.
61. Give a suitable example for *perkin reaction*.
62. Illustrate *Knoevengel condensation* and give the concerned equation.

63. What happens when *benzaldehyde* is treated with *melonic ester* in the presence of an amine base?Give the equation for the reaction.
64. Give the equation for the reaction of *cyclohexanone* with *ethyl cyanoacetate* in the presence of an amine base.What is the reaction called?
65. Explain what happens when *acetophenone* is heated with *iodine* and *sodiumhydroxide*?
66. Illustrate *haloform reaction* and give the equation for the reaction .
67. What is *iodoform test*?
68. Give one chemical test to distinguish Between *acetophenone* and *benzophenone.*
69. What happens when *butanone* is treated with chlorine and alkali? Explain with equation.
70. Give a chemical test to distinguish between *butanal* and *butanone.*
71. How will you convert benzaldehyde to *3-bromo-5-nitrobenzaldeyde*?[*Hint:Nitration* followed by *bromination*]
72. How will you convert *phenol* to *2-hydroxy-5-nitrobenzaldehyde*?[*Hint;Reimer-Tiemann* reaction followed by *nitration]*
73. How will you convert *benzaldeyde* to *cinnamaldehyde?[Hint:Clasien-Schmidt* condensation with acetaldehyde]

Module Iii

PART B

1) Give the structural formulae (1).3-bromo-4-chloropentan-2-ol ;(2).butane-1,2,3-triol.
2) Write the IUPAC name of (1).$(CH_3)_2CH\text{-}CHOH\text{-}CH_2\text{-}CH_3$ and (2).$CH_3\text{-}CH{=}CHOH$.

3) State in each of the following cases whether the alcohol shown in primary, secondary or tertiary

a)$(CH_2)_2CHCH_2OH$ b)$(CH_3)_3COH$ c)$CH_3\text{-}CH(CH_2CH_3)\text{-}CH_2OH$

4) Draw all the possible constitutional isomers of alcohols possible for the molecular formula C_3H_8O and give their IUPAC names.
5) Write the structural formulae of (a)3-methylcyclohexanol and (b) 2-phenylpropan-1-ol.
6) Give IUPAC name of

1)$CH_3\text{-}CH(CH_3)\text{-}CH(CH_3)\text{-}C(CH_3)_3$ 2)$HO\text{-}CH_2\text{-}CH(OH)\text{-}CH_2\text{-}OH$

7) Write the structures of the following compounds.
   i)3-Cyclohexylpentan-3-ol
   ii) Cyclopent -3-en-1-ol
8) Explain with equations what happen when propanone reacts with ethyl magnesium bromide and the product is subsequently subjected to acidic hydrolysis.

9) Explain with equations how methyl magnesium bromide can be converted to ethanol.

10) Explain with equations how ethanol can be converted to butan-2-ol.

11) How can propene be converted to propan-2-ol?

12) How can acetone be converted to tert-butyl alcohol ?

13) Give one test to differentiate between n-propyl alcohol and iso propyl alcohol.

14) Show how you will synthesize

i)1-phenylethanol from a suitable alkane ;

ii)pentan-1-ol using a suitable alkyl halide.

15) How can 2-methylpropene be converted into 2-methylpropan-2-ol?

16) What carbonyl compound(s) might you reduce to obtain the following alcohols?

a) CH_3 OH b)

||

$CH_3CH_2CHCH_2CHCH_3$

17) Complete the following equations and name the product in each case :

a) $CH_3\text{-}CH_2\text{-}CHO + H_2 \xrightarrow{pd}$?

b) $CH_3\text{-}CH{=}CH_2 + H_2O \xrightarrow{H^+}$?

18) identify A and B and name them :

$CH_3\text{-}CO\text{-}CH_2\text{-}CH(CH_3)_2 \xrightarrow{NaBH_4}$ A $\xrightarrow{KI/95\%/H_3PO_4}$ B

19) what is catalytic dehydrogenation? Give one example.

20) Explain with equation what happens when butan-2-ol is heated with red phosphorus and bromine.

21) What is meant by an esterification reaction? Give an example of such a reaction.

22) Rearrange the following alcohols in the increasing order of reactivity towards esterification with a given acid :$CH_3\text{-}OH, CH_3\text{-}CH_2\text{-}OH, (CH_3)_2CH\text{-}OH, (CH_3)_3C\text{-}OH$.

23) Comment on the reactivity of 1° ,2° and 3° alcohols with Lucas reagent.

24) Give equations for the following reactions (a) allyl alcohol is heated with Collins reagent ; (b) cyclohexanol is treated with $Na_2Cr_2O_7$ and aqueous sulphuric acid.

25) What is PCC and what is its special use?

26) Give equations of the following reactions

i) Oxidation of propan-1-ol by alkaline $KMnO_4$.

ii) Reaction of vapours of t-butyl alcohol with Cu heated to 573 K

27) Rank the following compounds is decreasing order of acidity : ethanol , 2- chloroethanol ,2,2-dichloroethanol ,2,2,2-trichloroethanol.

28) Arrange the following compounds in increasing order of acidity : water , ethanol ,2-chloroethanol ,acetic acid.

29) Give equations for the oxidation of the following compounds with Jones reagent and name the product in each case : (i)hexan-1-ol ; (ii) hexan-2-ol.

30) An alcohol (A) with molecular formula C_3H_8O yields a blur coloration upon subjecting to Victor Meyer's while another one (B)with the same molecular formula yields a blood coloration ; formulate and name A and B .

31) Give one chemical test to distinguish between propan-1-ol and propan-2-ol.

32) What do the following terms means – (i) rectified spirit; (ii) absolute alcohol ?

33) How can absolute alcohol be obtained from 'wash' ?

34) What is meant by denaturation of alcohol?

35) Explain the term denatured spirit.

36) Explain the term proof spirit.

37) What is power alcohol? Explain.

38) Illustrate pinacol-pinacolone rearrangement.

39) How is benzene converted to phenol?

40) Explain one method preparation of phenol from chlorobenzene.

41) Which is more acidic –phenol or para- nitrophenol? Justify

42) Give equation for the reaction of phenol with dilute nitric acid at 25°C and name the product(s).

43) How can phenol be converted to picric acid ?

44) Illustrate Reimer-Tiemann reaction.

45) What is Kolbe –Schmidt reaction ? explain with example.

46) How can phenol be converted to salicylaldehyde?

47) How can phenol be converted to salicylic acid?

48) Write the structural formulae of (i)picric acid and (ii)aspirin.

49) Explain a chemical test to distinguish between phenol and benzyl alcohol.

50) Explain a chemical test to distinguish between phenol and benzoic acid.

51) Mention the uses of phenol.

52) Complete the following reaction and name the product.

53) Give one example for phthalein reaction.

54) How is phenolphthalein prepared?

55) What are the uses of phenolphthalein ?

56) Give one method of preparation of fluorescein.

57) What are the uses of fluorescein?

58) Give the structural formulae of phenolphthalein and fluorescein.

59) How is eosin prepared?

60) What are the uses of eosin?

61) What is alizarin? how is it prepared?

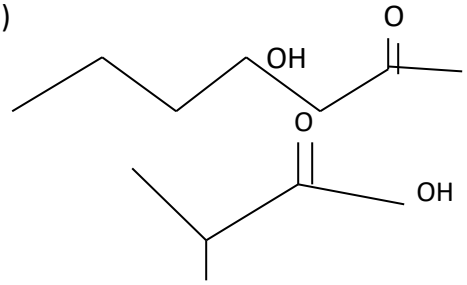
62) Mention the uses of alizarin.

Module IV

PART B

1. Give the IUPAC name of:

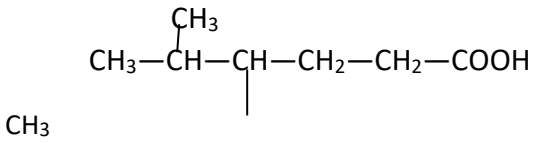
(a)



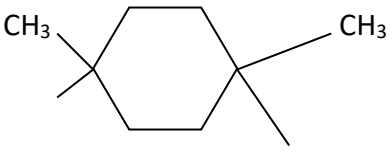
(b)

2. Write the structures of: (i) 3-methyl-2-nitropentanoic acid;
   (ii) 3-isopropylcyclohexanecarboxylic acid.
3. Write the structures of: (i) 4-oxoheptanoic acid;
   (ii)phenylrthanoic acid.
4. Name and formulate the chain isomer of *butanoic acid.*
5. Give IUPAC name of each compound:

(a)



(b)



CH_3

COOH

6. How can you convert *1-bromopropane* to *butanoic acid?* Explain with suitable equations.
7. What product is obtained when *ethyl bromide* is treated alcoholic KCN and the product is subjected to acidic hydrolysis? Explain with suitable equations.
8. What product is obtained when *ethyl magnesium iodide* is treated solid CO_2 in dry ether solution and the product is subjected to acidic hydrolysis? Explain with suitable equations.
9. Give the Grignard's method of converting *iodomethane* to *ethanoic acid.*
10. Explain with equations how *chlorobenzene* can be converted to *benzoic acid.*
11. How can the following conversion be effected?
12. Explain how *4-methylbenzoic acid* can be prepared in a Grignard synthesis.
13. Starting from *benzene,* how will you prepare *benzoic acid*?
14. Explain a chemical test by which *phenol* can be distinguished from *benzoic acid.*
15. Arrange the following in the increasing order of acidity : phenol, ethanol, benzoic acid, acetic acid.
16. Arrange the following in the decreasing order of acidity: CH_3-COOH, CH_3-CH_2-COOH, CF_3-COOH, $(CH_3)_2$CH-COOH.
17. Is *p-nitrobenzoic acid* more acidic or less acidic than benzoic acid?Why?
18. Give a test to distinguish between *formic acid* and *acetic acid*.
19. Chloroacetic acid is stronger than acetic acid while methylacetic acid is weaker.How will you explain this?
20. What is *Fischer esterification*?
21. How can *propanoic* acid be converted to *propanamide?*
22. What is HVZ reaction?Explain with suitable example
23. .Expain the *decarboxylation* reaction with a suitable example.
24. .Give an example(with equation)for the *Kolbe's electrolytic reaction.*
25. *32.*Explain a method for the conversion of *acetic acid* to *ethane.*
26. *33.*What are the products obtained in the *decarboxylation* of:
27. i)salicylic acid ii)phthalic acid
28. 34.predicts the product in the following reactions
29. i)salicylic acid ii)Adipic acid
30. 35.What is the action of heat on :

i)*calcium benzoate, and*

ii)a mixture of calcium acetate and calcium formate?

31. what is meant by saponification?Give an example.

32. .What is trans-esterification?Give an example.

33. Do you expect fumaric acid to form a cyclic anhydride on heating?Explain

34 40.State Blanc's rule.

35Explain the action of heat on succinic acid.

36How can ethylene glycol be converted to oxalic acid?

37How does hot oxalic acid solution react with $KMnO_4$ solution in the presence of dilute sulphuric acid?

38Give two important uses of oxalic acid.

39.Explain one method for converting benzaldehyde to cinnamic acid?

40What happens when cinnamic acid is heated with dry soda lime?

41.Mention the uses of cinnamic acid.

42.Give the structural formula and IUPAC name of citric acid.

43How does citric acid react with acetyl chloride?

44Explain what happens when citric acid is heated with conc.hydroiodic acid.

45Mention the important uses of citric acid.

46Whic compound in each of the following sets is more reactive in nucleophilic acyl substitution reaction?

(a)CH_2-COCl or CH_3-CO-OCH_3

(b) $(CH_3)_2CH$-$CONH_2$ or CH_3-CH_2-CO-OCH_3

(c) CH_3-CO-OCH_3 or CH_3-CO-O-CO-CH_3

(d) CH_3-CO-O-CO-CH_3 or CH_3-COCl

48. Explain how *ethanoic acid* be converted to *ethanal*.
49. How does *bezoyl chloride* react with *aniline*?
50. How can *acetic anhydride* be prepared from *acetic acid*?
51. Give one method of preparation of *benzenesulphonic acid*.
52. Starting from *ethyl iodide*, how will you prepare *propanoic acid* ?
53. Starting from *ethyl iodide*, how is *acetic acid* prepared?
54. Mention the important uses of *saccharin*.

Module I

PART C

1. Write the structural formulae of:(a)2-chloro-3,3-dimethylhexane,(b)3,3-dichloro-2-methylhexane,and (c)3-bromo-3-ethylpentane.

2. Write the structural formulae of all the isomers having the molecular formula C_4H_9Br.Name each isomer according to the IUPAC system and classify them as 1°,2°,or3° alkyl halide.
3. Explain,with equations,two methodsfor the conversion of *isopropyl alcohol* to *isopropyl chloride.*
4. State and illustrate *Marownikkoff's rule(Markovnikov's rule*).
5. What is meant by *Kharasch effect*?Explain with an example.
6. How can 3,3-dimethylbut-1—ene be converted to (i) 2-bromo-3,3-dimethylbutane and (ii) 1-bromo-3,3-dimethylbutane?
7. Illustrate two different general methods for the conversion of *alcohols* to *alkylhalides.*
8. Write a short note on *radical halogenations reactions*.
9. Explain the reaction of *methane* with chlorine.
10. Discuss the term *allylic bromination* of alkenes.
11. Explain the role of *N-bromosuccinimide* in the allylic bromination of alkenes.
12. Give the mechanism for the *allylic bromination* of propene using NBS.
13. How can *1-bromopropane* be converted to (i) propan-1-ol and (i) propan-1-ol and (ii) propan-2-ol?
14. How can the following conversion be carried out?
    (a)Propene to allyl bromide; (b) ethyl bromide to ethyl cyanide; (c) Ethyl chloride to ethyl fluoride.
15. Mention three different nucleophilic substitution reactions undergone by alkyl halides with suitable examples.
16. Explain with equations what happens when isopropyl bromide is heated with (i) moist silver oxide and (ii) dry silver oxide.
17. What is meant by an S_N2 reaction? Cite an example and explain its mechanism.
18. Explain the term *Walden inversion*.
19. Explain the relative reactivities of 1°,2°,3° alkyl halides in S_N2 reactions.
20. Predict the order of reactivity of the four isomeric bromobutanes in S_N1 and S_N2 reactions.
21. Discuss the potential energy profile for an S_N2 reaction with a suitable example.
22. Explain mechanistically why an S_N2 reaction follows second order kinetics.
23. The reaction below exhibits a second-order rate equation:

    What happens to the rate:
    (a) If the concentration of 1-iodopropane is tripled and the concentration of sodium hydroxide remains the same?

(b) If the concentration of 1-iodopropane remains the same and the concentration of sodium hydroxide is doubled?

(c) If the concentration of 1-iodopropane is doubled and the concentration of sodium hydroxide is tripled?

24. What is meant by an S_N1 reaction ? Give an example and explain its mechanism.
25. Discuss the stereochemical aspects of S_N1 reactions.
26. Explain the relative reactivities of 1°,2°, and 3° alkyl halides in S_N1 reactions.
27. Give the mechanism for the reaction of *methyl bromide* with the hydroxide ion.
28. Discuss the potential energy profile for an S_N1 reaction with a suitable example.
29. Explain mechanistically why an S_N1 reaction follows first order kinetics.

30. Explain with an example how rearrangements determine the products in S_N1 reactions.
31. Explain what the digits 1 and 2 signify in the terms $S_N1$and S_N2 respectively.
32. The reaction of *1-bromopropane* and *sodium hydroxide* in ethanol occurs by an S_N2 mechanism. What happens to the rate of this reaction under the following conditions ?

    (a) The concentration of NaOHnis doubled.

    (b)The concentration of both NaOH and 1-bromopropane are doubled.

    (c)The volume of the solution in which the reaction is carried out is doubled.

33. Draw the carbocation intermediate that would be formed if each of the following substrates would participate in an S_N1 reaction. In each case, identify the carbocation as being primary,secondary or tertiary.

34. The following reactions is very slow:

    (a) Identify the type of mechanism involved in the above.

    (b) Explain why the reaction is so slow.

    (c) When hydroxide ion is used instead of water, the above reaction is very rapid; explain why it is so fast.

35. Discuss the factors that determine the reactivity of *allyl halide* in nucleophilic substitution reactions.
36. Discuss the factors that determine the reactivity of *benzyl halide* in nucleophilic substitution reactions.
37. Vinyl halides such as vinyl bromide, CH_2=CHBr, undergo neither SN1 nor SN2 reactions. What factors account for this lack of reactivity?
38. Mention the features that distinguish S_N1 from S_N2.
39. What is the major product obtained when the following compound is heated with alcoholic KOH ?State the rule that at helps predict the product.

40. State and explain the *Zaitsev's rule*.
41. Give the structures and names of the alkenes formed from E2 elimination of 2-chloropentane. which will be the major product and why?

42. Arrange $(CH_3)_3CBr$,CH_3-CHBr-CH_3 and CH_3-CH_2-CH_2Br in the increasing order of their E2 reactivities.Justify the order.
43. Explain the E1 mechanism for the dehydrohalogenation of alkyl halides taking an example.
44. What is general order of E1 reactivities of 1°,2° and 3° alkyl halides ?Account for the order.
45. Bring out the significance of *rearrangements* in determining the orientation in E1 reactions with a suitable example.
46. Which is the major product obtained when 2-chloro-2-methylbutane undergoes dehydrohalogenation? Justify your answer.
47. Bring out the significance of the competition between S_N2 and E2 reactions with regard to reactions of alkyl halides with suitable examples.
48. What happens (i) toluene is treated with chlorine in the presence of $FeCl_3$ at room temperature and(ii) silver benzoate is heated with bromine in CCl4?Give equations.
49. Illusrate Sandmayer's and Gattermann's reactions with suitable examples.
50. Explain the low reactivity of chlorobenzene towards nucleophilic substitution on the basis of the resonance cocept.
51. Illusrate(a) aWurtz-Fitting reaction; (ii)Fitting reaction and (iii)Ullman reaction
52. Give three nucleophilic substitution reactionsof *chlorobenzene* with equation and starting the conditions.
53. Explain why aryl halides do not udergo SN1 or SN2 reactions.

Module II
PART C

1. Write the structural formulae of: (a) 4-ethylheptanal,(b) oct-3-yn-2-one, and (c)2-mrthylcyclopentanone.
2. Give the structures and IUPAC names of the isomeric carbonyl compounds that have the molecular formula $C_5H_{10}O$.
3. Suggest a method each for the following conversions: (i) 2-methylpropan-1-ol to 2-methylpropanal; (ii) cyclohex-2-en-1-ol to cyclohex-2-enone;(iii)ethanenitrile to propanone.
4. How will you prepare the following using suitable Grignard reagents?
   9a)Butanal;(b)pentan-3-one;(c)pentab-2-one.
5. Explain with equations when acetyl chloride react with (i) CH3MgI and then followed by acidic hydrolysis;(iii) dimethylcadmium in dry ether ?
6. Give the equation for the reaction between the reactants in each cases mentioned below and name the product formed:
   (a) cyclohexanol with Jones reagent;
   (b) 3-methylcyclopentanol with pyridinium chlorochromate;
   (c) 5-methylheptan-1-ol with Collins reagent.
7. Name two reagents used for the selective oxidation of *alcohols* to *aldehydes*.Illustrate the action of each with an example.

8. How can benzaldehyde be obtained from (i)toluene,(ii)benzoyl chloride and (iii)phenyl cyanide?
9. Identify the product in each of the following cases:
   (a)C_6H_5-CN→ (b)CH_3-CN→
10. Critically analyze the relative reactivities of *aldehydes* and *keones* in nucleophilic addition reactions.
11. Explain why *aromatic aldeydes* are less reactive than *aliphatic aldehydes* in nucleophilic addition reactions.
12. Discuss the hydration reaction undergone by aldehydes and ketones with suitable examples.
13. How does ethanal react with (i) ethanol (excess) in the presence of dry HCl gas;(ii) sodium bisulphite, and(iii)HCN in the presence of a base?
14. How can ethyl magnesium bromide be converted to (i) propan-1-ol,(ii)butan-2-ol,and (iii)2-methylbutan-2-ol?
15. Illustrate, with an example each, two different nucleophilic addition reactions undergone by aldehydes.
16. Illustrate, with an example each, two different nucleophilic addition reactions undergone by ketones.
17. Write equations for the addition of HCN to (a) propanal,(b) cyclopentanecarbaldehyde, and (c)benzophenone.
18. Explain with equations how benzaldehyde reacts with each of the following(a) HCN;(b)aniline;(c) hydroxylamine.
19. Explain with equations how propanone reacts with each of the following: (a) hydrazine,(b)phenylhydrazine;(c) semicarbazide.
20. Show the products from the reaction of *pentan-2-one* with the following:
    (a)NH_2OH (b) (c)CH_3CH_2OH,H^+
21. Explain with equations the reactions between (a) butanal and hydroxylamine,(b) pentan-3-one and phenylhydrazine, and (c) cyclopentanone and semicarbazide.
22. How does *cyclohexanone* react with the following:((i)zinc amalgam and conc.HCl;(ii)H_2/Pd;(iii)2,4-dinitrophenylhydrazine?
23. What alcohols are obtained from the reduction of the following compounds with sodium borohydride: (a) 2-ethylpropanal; (b) 4- *tert*-butylcyclohexanone; (c) acetophenone? Give the concerned equations.
24. Write the products you would obtain from treatment of *cyclohexanone* with the following:
    (a)CH_3NH_2; (b) CH_3CH_2OH, H^+;(c) $LiAlH_4$?
25. Find which aldehyde or ketone would give the shown alcohol upon reduction with NaBH4 in each of the following cases?

26. Explain the action of the following on acetaldehyde: (i) Tollen's reagent; (ii) Fehling's solution; (iii)Iodine and alkali.
27. Draw the structural formula for the enol form of: (a) propanal; (b) propanone;
    (c) acetophenone.

28. Discuss the acidity of *a*-hydrogens of aldehydes and ketones and explain *enolateion formation*.
29. Draw the resonance contributors to the enolate anion of (a) propanal, and (b) propanone.
30. What is aldol condensation? Explain it with suitable example.
31. Write the mechanism of a clasien-schmidt reaction that bezaldehyde undergoes?
32. What is knoevenagel condensation? Explain it with a suitable example.
33. Discuss the haloform reaction, clearly illustrating what type of compounds undergoes this reaction.
34. Explain iodoform test and discuss its significance.
35. What is cannizaro reaction? Give two examples.
36. Give one chemical test each to distinguish between:
    (a)C_6H_5-CHO and C_6H_5-CO-CH_3;
    (b)C_6H_5-CHO and C_6H_5-CO-C_6H_5;
    (c)C_6H_5-CO-CH_3 and C_6H_5-CO-C_6H_5.
37. Explain with mechanism the Beckmann rearrangement reaction in acetophenone oxime.

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Module III

PART C

1) Write the structural formulae of (a) 4-ethylheptan-3-ol , (b) 2,3,3-trimethylbutan-2-ol ,and (c) 3-bromopropane-1,2-diol
2) Write the structural formulae of all the alcohols having the molecular formula $C_4H_{10}O$.Name each isomer according to the IUPAC system and classify them as 1°,2° or 3° alcohols.
3) Write all the isomeric alcohols of the formula $C_5H_{12}O$ and classify them into 1° , 2° ,3° alcohols.
4) How can propene be converted to propan-1-ol?explain with equations.
5) How can 1-bromopropane be converted to (i)propan-1-ol and (ii) propan-2-ol?
6) How can the following conversion be effected –(i) methanal to ethanol , and (ii) ethanal to propan -2-ol ?
7) How can the following conversions be carried out ?
   (a) propanal to propan-1-ol ; (b) 2-methylpropene to 2-methylpropan-2-ol ; (c) 1-chlorobutane to butan-1-ol .
8) What is hydroboration –oxidation reaction ?how is it carried out ? what is the importance of this reaction ?
9) Discuss the oxymercuration-demercuration reaction of alkenes.
10) Explain the oxymercuration – demercuration reaction of propene.

11) Show how you will synthesize:

i)1-phenylethanol from a suitable alkane;

ii) pentan-1-ol using a suitable alkyl halide.

12) Give one example to illustrate

i)Markovnikov's addition to propylene.

ii)anti –Markovnikov's addition to propylene.

13) Explain how the following compounds can be obtained from methyl magnesium bromide :

(i) ethanol;(ii) propan -2-ol;(iii)2- methylpropan -2-ol.

14) Explain how ethanol is manufactured from molasses.

15) Give the structure of the principal product(s) when each of the following alcohols reacts with (i) $Na_2Cr_2O_7/H_2SO_4$ and (ii) PCC .

(a) Pentan-1-ol; (b) Pentan-2-ol .

16) Suggest the most appropriate method for each the following laboratory conversions :

(a) butan-1-ol →butanal ; (b) but-2-en-1-ol →but-2-enoic acid ;

(c)butan-2-ol → butanone

17) Explain with equations what happens when (i) propan-2-ol is treated with $SOCl_2$ in the presence of pyridine, and (ii) propan-2-ol is heated with KI and 95% H_3PO_4 ?

18) Explain with suitable examples how 1°and 2° alcohols react with alkaline $KMnO_4$.

19) What is Jones reagent ? Illustrate how it reacts 1° and 2° alcohols .

20) Discuss the action of PCC on 1°, 2°, and 3° alcohols .

21) Name the formulate the product of treating each alcohol with PCC :

(i) hexan-1-ol ; (ii) hexan-2-ol; (iii) cyclohexanol .

22) Name the formulate the product of treating each alcohol with chromic acid :

(i) pentan-1-ol; (ii) pentan-2-ol; (iii) cyclopentanol .

23) Discuss the mechanism of acid – catalysed dehydration of ethanol .

24) Explain the acidity order of ethyl alcohol , isopropyl alcohol and tert –butyl alcohol .

25) Explain the Lucas test to distinguish between 1° , 2° and 3° alcohols .

26) Explain the Victor Meyer's test to distinguish between 1° , 2° and 3° alcohols .

27) Show how you would use a simple chemical test to distinguish between the following pairs of compounds :

(i) isopropyl alcoholand ethyl alcohol .

(ii) isopropyl alcohol and tert- butyl alcohol .

28) Discuss the chemistry of methanol poisoning .

29) Evaluate the harmful effects of consumption of ethanol on the human body .

30) Give the sequence of reactions to convert $CH_3 –CH_2 –OH$ to $CH_3 –CH_2 –OH$.

31) Explain what is meant by pinacol –pinacolone rearrangement and discuss its mechanism .

32) How is phenol manufactured on a large scale ?

33) Explain the reason for the acidic nature of phenol .

34) Discuss the effect of electron-withdrawing substituents on the acidic property of phenol.

35) Discuss the effect of electron –donating substituents on the acidic property of phenol.

36) Explain the order of acidity of phenol, p- nitrophenol and p- methoxyphenol.

37) Arrange these compounds in the order of increasing acidity: 2,4 –dinitrophenol,phenol and benzyl alcohol.explain your answer.

38) How are the following conversions effected – (i) chlorobenzene to phenol, and (ii) phenol to phenolphthalein ?

39) What is Reimer –Tiemann reaction ? discuss the mechanism of the reaction

40) Give the mechanism of the reaction of phenol with $CHCl_3$ and ^-OH. What is the reaction called ?what is the intermediate in the reaction ?

41) What is kolbe's reaction ? explain with an example.

42) Give to methods to prepare salicylic acid starting from phenol.

43) Discuss the consequences of intermolecular hydrogen bonding and intramolecular hydrogen bonding taking nitrophenols as examples.

44) Predict the products of

i) $(CH_3)_3CBr + C_2H_5ONa \longrightarrow$

ii) $C_6H_6 + HCl + 1/2O_2 \longrightarrow$

iii)

45) Write the isomeric structures of trihydric phenols and name them.

46) Explain with equations how phenol react with nitric acid under different conditions.

47) Explain the reactions of phenol with (i) bromine water, (ii) bromine in CCL_4 and (iii) conc.H_2SO_4.

48) Explain Liebermann's nitroso reaction.

49) How can the following conversions be carried out?

(a) propanal to propan-1-ol; (b)2-methylpropene to 2-methylpropan-2-ol

(c) 1-chlorobutane to butan-1-ol

50) How is phenolphthalein prepared? Mention two of its important uses.

51) How will you explain the reason for the colour change of phenolphthalein with Ph?

52) How is fluorescein prepared? What are its uses?

53) Mention three tests to distinguish between a phenol and an alcohol.

54) How is alizarin prepared? Mention its applications.

Module IV

PART C

1. Name and formulate the carboxylic acids having the molecular formula $C_4H_8O_2$.Name and formulate any two functional isomers of the above acids.
2. Draw the structure of :
   i) 3-Bromo-4-phenyl pentanoic acid
   ii) Hex- 2 – en-4-ynoic acid.
   iii) 2- Bromo- 2- phenyl ethanoic acid.
   iv) α-hydroxyphenyl acetic acid.

5. Discuss the origin of acidity in a carboxylic acid.
6. Which is a stronger acid —*phenol* or *acetic acid*? Explain.

7. Arrange $CH_3CH_2CHBr—COOH$, $CH_3CHBr—CH_2—COOH$,$(CH_3)_2CH—COOH$,$CH_3—CH_2—CH_2—COOH$ in the increasing order of acid strength.Explain.
8. (a) What is HVZ reaction? Give an example.
   (b)What is the importance of this reaction in organic synthesis?
9. What is meant by *decarboxylation* reaction? What are the products obtained on the decarboxylation of (i) salicylic acid, and (ii) phthalic acid ?
10. How can the following conversions be effected?
    (a)Pentanoic acid to 2-hyroxypentanoic acid; (b) Butanoic acid to but-2-enoic acid.
    [Hint(a)HVZ reaction with red P/Br_2 followed by hydrolysis with aq.NaOH ; (b)HVZ reaction with red P/Br_2 followed by dehydrohalogenation with alc. KOH.]
11. Give the mechanism of esterification of carboxylic acid by taking any one example.
12. What is *Kolbe's electrolysis*? Discuss its mechanism.
13. Identify X,Y and Z in the following sequence:
    $CH_3—CH_2—COOH \xrightarrow{Cl_2/red\ P} X \xrightarrow{aq.NaOH} Y \xrightarrow{I_2/OH^-} Z$ (yellow solid)
14. Expain why :

(i)During the preparation of esters from a carboxylic acid and an alcohol in the presence of an acid catalyst, the water or the ester should be removed as soon as it is formed.
(ii)It is very difficult to esterify 2, 4, 6 - trimethyl benzoic acid.

15. State Blanc's rule. Illustrate with 2 examples.
16. Explain how *maleic acid* and *fumaric acid* can be distinguished on the basis of action of heat.
17. Find the product obtained in each case when each of the following dicarbixylic acids is distilled with acetic anhydride: (i) malonic acid (ii) succcinic acid (iii) adipic acid. Give equation for each reaction.
18. Explain how oxalic acid is commercially prepared. Explain the action of following on oxalic acid: (a) heat (b) con. H_2SO_4.
19. Explain with equations how oxalic acid reacts with glycerol under different conditions.
(a)H_2/Ni; (b) Br/H_2O;(c) $C_2H_{5OH/H}{}^+$.
22. How does *cinnamic acid* react with the following reagents:
(a)H_2/Ni; (b) Br/H_2O;(c) C_2H_5OH/H^+.
23. Give one method of preparation of *cinnamic acid*. Explain its *ozonolysis* reaction.
24. Explain how glycerol is converted to citric acid. Explain the action of heat on citric acid.
25. Explain the esterification reaction of citric acid with ethanol.
26. Discuss the role of *lactic acid* in exercise.
27. Discuss comparatively the boiling points of acid chlorides, acid anhydrides, esters and 1^o acid amides of comparable molecular masses.
28. Explain (with equations) the action of (i)acetyl chloride, and (ii) conc.HI, on citric acid.
29. What is *nucleophilic acyl* substitution? Discuss the general mechanism of the reaction.
30. How can propanoic acid be converted to the following: (i) propanoyl chloride; (ii) propanoic anhydride; (c)propanamide; (d) ethylpropanoate?
31. Explain the reactions of *acetyl chloride* with the following reagents: (i) water (ii) ethanol; (iii) ammonia.
32. Explain how the following reactions can be carried out:
(a)Ethanoyl chloride to ethanol; (b) Benzene to acetophenone; (c) Ethanoyl chloride to ethanoic anhydride.
33. What is *Schotten-Bauman* reaction? Explain with an example.
34. How can acetamide be converted to the following : (i) ethylamine; (ii) methylamine; (iii) methyl cyanide ?

Module I

PART D

1. Discuss the aspects regarding the mechanism, kinetics, potential energy profile and stereochemistry of SN2 reactions.
2. Discuss the factors affecting the reactivity of alkyl halides in S_N2 reactions.
3. What is meant by an S_N1 reaction? Citing an example, discuss its mechanism, kinetics, energy profile and stereochemistry.
4. Discuss the factors affecting the reactivity of alkyl halides in S_N1 reactions.

5. State and illustrate the *saytzeff's rule (Zaitsev's rule)* and explain it on a mechanistic basis.
6. Bring out the significance of the competition between nucleophilic substitution and elimination reactions with regard to the alkyl halides with suitable examples.
7. How can the following conversions be brought about? Explain with equations.
(a) Aniline to bromobenzene; (b) Benzene to iodobenzene; (*o*-Toluidine to *o*-chlorotoluene; (d) Chlorobenzene to phenol; (d) Bromobenzene to toluene.
8. Discuss the reason for the low reactivity of aryl halides towards nucleophilic substitution on the basis of (a) the resonance concept and (b) hybridisation concept.
9. Explain the addition-elimination mechanism of nucleophilic aromatic substitution. Discuss how the presence of (i)electron-withdrawing groups and (ii) electron-donating groups at *ortho* and *para* positions (with regard to the halogen) affect S_NAr reactivity of an aryl halide.
Discuss the *benzyne mechanism* of nucleophilic aromatic substitution

Module II

Section D (Essay)

1. (a) What products are formed when the following compounds react with CH_3MgBr, followed by acidic hydrolysis?(b)Explain the term keto-enol tautomerism and illustrate it with regard to acetaldehyde .
2. (a) Explain the following reactions with suitable equations:(i) Butanone is subjected to clemmensen reduction;(ii) 3-Methylbutanal is subjected to Wolff-kishner reduction;(iii) Acetophenone is subjected to MPV reduction.

(b)Give two chemical tests to distinguish between acetaldehyde and acetone.

3. (a) What is Beckmann rearrangement?

(b)Illustrate Beckmann rearrangement with a suitable reaction and give its mechanism.

4. (a) What is aldol condensation ? Explain with a suitable example and give its mechanism.

(b) Explain the term cross aldol condensation with an example.

5. (a) Explain the following reactions with an example each:
(i)Clasien-Schmidt condensation; (ii) Knoevenagel condensation;
(iii) Benzoin condensation;

(b) What is cannizaro reaction? Give an example and explain its mechanism.

6. (a) What is perkin's reaction? Explain with an example.

(b) What is haloform reaction? What kind of compounds undergo the reaction? Explain with suitable examples.

7. (a) Explain the following with regard to their significance in the chemistry of aldehydes and ketones:

(i)Tollen's test; (ii) Fehling's test; (iii) Iodoform test.

(b) Give one method of preparation of vanillin. Mention three uses of vanillin.

8. (a) Explain with equations how the following conversions can be effected:
(i)pentanal to pentanoic acid; (ii)ethanal to but-2-enal;

(iii)benazldehyde to cinnamic acid; (iv)benzaldehyde to benzoin.

(b) Give two chemical tests to distinguish between benzaldehyde and acetophenone.

9. (a) Explain the following reactions with an example each:

(i) Clemmensen reduction; (ii) Wolff-Kishner reduction;

(iii) Meerwein-Ponndorf-Verley reduction.

(b) Explain a chemical test each to distinguish between the omponents of each pair shown below:

(i) Pentan-2-one and pentan-3-one; (ii)Butanal and butanone.

MODULE III

PART D

1) (a) Discuss, giving adequate examples, the Grignard synthesis of alcohols.

   (b) Explain the Lucas test for the distinction of primary, secondary, tertiary alcohols.

2) (a) Explain a fermentation process for the manufacture of ethanol

   (b)Explain the following terms: (i) rectified spirit ; (ii) denatured spirit ; (iii) proof spirit ; (iv) power alcohol.

3) (a) How is chlorobenzene converted to phenol?

   (b) Explain the reason for the acidic property of phenol and how is its acidity is affected by substituents on the benzene ring.

4) Discuss the orientation in the electiphilic substitution in phenols and substituted phenols giving suitable examples.

5) How is phenol manufactured on a large scale ? how and under what conditions does it react with

   i)CO_2 ii)$CHCl_3$ and OH^- iii) Br_2 iv) $NaNO_2$ and H_2SO_4 ?

   Give equations and adequate explanation for each reaction.

6) (a) Describe a simple chemical test explain the chemistry involved to distinguish between:

   (i) butan-1-ol and phenol (ii) butan-1-ol,butan-2-ol and 2-methylpropan-2-ol.

(b) What is pinacol-pinacolone rearrangement? Explain with an example and give its mechanism.

Module IV
Section D (Essay)

1. How can propanoic acid be converted to the following: (i) propanoyl chloride; (ii) propanoic anhydride; (c)propanamide; (d) ethylpropanoate?

2. Explain the reactions of *acetyl chloride* with the following reagents: (i) water (ii) ethanol; (iii) ammonia.
3. Explain how the following reactions can be carried out:

(a)Ethanoyl chloride to ethanol; (b) Benzene to acetophenone; (c) Ethanoyl chloride to ethanoic anhydride.

GEC5P02 PHYSICAL CHEMISTRY II

Module 1

PART A

FILL IN THE BLANKS

1. Radioactive disintegration follows ..... order kinetics .
2. The rate of a reaction ..... with increase in temperature.
3. If the catalyst and the reactants are in different phases, it is called ..... catalysis .
4. A catalyst ..... the activation energy of a reaction.
5. The rate constant of a reaction is 7.3×10^{-3} L mol $^{-1}s^{-1}$ .The reaction is of ..... order.
6. In a first order chemical reaction : A→ products, when the concentration of A is doubled, the rate of reaction ..... .
7. The rate constant of a..... order reaction has the unit *mol* $L^{-1}\,s^{-1}$.
8. ..... is the difference between threshold energy and average energy of the reactants.
9. A chemical reaction whose rate is independent of the concentration of the reactants has order ..... .
10. The sum of the powers of the concentration terms of the reactants in the rate equation is known as ..... of the reaction .
11. For a decomposition reaction , the time in seconds required for half of the substance to decompose is found to be inversely proportional to its molar concentration . the unit of its rate constant is ..... .
12. The initial rate of a second order reaction becomes ..... times when the initial concentrations of the reactants are doubled .
13. A reaction $2A(g)+B(g)\rightarrow A_2B(g)$ has an order 2 with respect to A and an order 1 with respect. The volume is reduced to 1/4 th of the initial value by application of pressure. The rate of the reaction now will be ..... times the initial value.
14. According to Arrhenius equation, ...=In A – $\frac{E_a}{RT}$
15. Acidic hydrolysis of ethyl acetate is an example for a..... first order reaction .

QUESTIONS WITH ONE –WORD ANSWERS

16. The rate of a second order reaction is ' *X* 'mol $L^{-1}\,s^{-1}$ at a certain temperature . If the volume of reaction vessel is doubled at the same temperature , what would be the new rate in mol $L^{-1}s^{-1}$?
17. Benzenediazonium chloride decomposes as $C_6H_5N_2^+Cl^- \rightarrow C_6H_5Cl+N_2$. At 0°C ,the evolution of nitrogen becomes two times faster when the initial concentration of the salt is doubled . What is the order of the reaction ?

18. An enzyme catalysed reaction is found to have rate constant of 0.025 M s^{-1} . what is the order of the reaction ?
19. Half-life ($t_{1/2}$) of a particular reaction is related to its rate constant (k) by the expression: $t_{1/2} = \frac{2.303 \log 2}{K}$ .What is the order of reaction?
20. If the catalyst and the reactants are in the same phase, what is this type of catalysis called ?
21. What is the order for the decomposition of hydrogen peroxide?
22. By what term is a substance that increases the activity of a catalyst known?
23. What term denotes the minimum energy that the colliding reactant molecules must possess if their collision is to result in chemical reaction ?
24. Which type of catalysis does Haber process for ammonia illustrate —homogeneous or heterogeneous?
25. In a decomposition reaction , the initial concentration of the reactant was 1.6 mol L-1 The reactant concentration was found to decrease to 0.8 molL-1 in 300 seconds and then to 0.4 mol L-1 in the next 300 seconds . What is the order of the reaction?
26. What is the unit of k for a zero order reaction ?
27. For a certain reaction, rate =k . What is the order of the reaction?
28. What is the order of a reaction for which k =7.3×10-3 dm3 mol-1 s-1 ?
29. In a chemical reaction:A→Products, when the concentration of A is doubled , the rate of a reaction quadruples. What is the order of the reaction?
30. The rate constant of a decomposition reaction is k = 6.2 × 10^{-1} s^{-1}. For a particular reactant concentration ' x' mol L^{-1} ,The rate is found to be 'r' mol L^{-1} s^{-1}.What must the reactant concentration if the rate is to be ' 4r' mol L^{-1} s^{-1}?

answers

1. First 2.increases 3.hetrogenous 4.lowers 5.zero

6. Activation energy 7. second 8. Doubles 9.zero

10 .order 11 . L mol^{-1} s^{-1} 12 .4(four) 13 . 64 14. In k

15 . pseudo 16. 0.25 x(or x/4) 17 . 1 18. 0 19 . 1

20 . Homogenous catalysis 21 . 1 22.promoter 23. Threshold energy

24. Heterogeneous 25. 1 26. mol L^{-1} s^{-1} 27. 0(zero) 28. 2 29 .2

30 . 4x mol L^{-1}

ModuleII

PARTA

Fill in the blanks

1. Energy absorbed per mole of activated molecules constitute one.....
2. Instantaneous emission of radiant energy after its absorption by a substance is called .....
3. *Among the radiative transition: S.....* ,the one that

represents

phosphorescent is.....

4.Emission of radiant energy after a time-lag after its absorption by a substance is called .....

5.Number of molecules reacting per quantum of radiation absorbed is called.....

6.The energy of Avogadro number of quanta is called a/an.....

7.A substance added to bring about a photochemical reaction without itself undergoing any change is called a.....

8. The..... process of photochemical reaction is that step in which atoms or molecules are activated by actual absorption of radiation.

9. Process that occurs after light absorption in a photochemical reaction is called..... process.

10.Chlorophyll in photosynthesis functions as a/an.....

Questions with one-word answers

11.What term describes the ratio of emergent intensity(..) to the incident intensity(..)in respect of light absorption by a substance?

12.What term denotes the negative logarithm of the ratio of emergent intensity (..) to the incident intensity (..) in respect of light absorption by a substance?

13.On which law is the function of spectrophotometers based?

14.What is the phenomenon of emission of light as a result of chemical reaction called?

15.What term describes the non-radiative transition of an excited molecule to a state of different multiplicity?

16.What is an *S..... S..* radiative transition in a substance called?

17.Which molecule act as a photosensitizer in the process of photosynthesis?

18.Name the phenomenon that causes the glow of phosphorus in air observed in the dark?

19.Among internal conversion, intersystem crossing and vibrational relaxation, which non- radiative transition is forbidden by a quantum mechanical selection rule?

20.Among the arrangements *potentiometer, colorimeter* and *solar cell*, which functions on the basis of Beer-Lambert law?

Section A:key

1)Einstein

2)Fluorescence

3)T.....S..

4)Phosphorescence

5)Quantum yield

6)Einstein

7)Photosensitizer

8)Primary

9)Secondary

10)Photosensitizer

11)Transmittance
12)Absorbance
13)Beer-Lambert law
14)Chemiluminescence
15)Intersystem crossing
16)Fluorescence
17)Chlorophyll
18)Chemiluminescence
19)Intersystem crossing
20)Colorimeter

Module III

Section A

Fill in the blanks

1. Adsorption is essentially a ..... phenomenon.
2. The substance getting absorbed is called the .....
3. The process of removing the adsorbed species from the surface of the adsorbant is called .....
4. The enthalpy change for adsorption is.....
5. A graph between the extend of adsorption and the temprature at constant pressure is called an adsorption .....
6. With increase in temprature,the physisorption of a gas on the surface of a solid .....
7. A substance which cause a marked reduction in the interfacial tension between water and a phase immiscible with it is called a .....
8. The aggregated clusters of surfactant ions or molecules are called .....
9. The role of activated charcoal in gas masks is as an .....
10. For the adsorption process,ΔS is .....
11. The major factor contributing towards the stability of a lyophobic sol is the ..... on the colloidal particles.
12. Among the aqueous sols of As_2S_3,$Fe(OH)_3$,gold and starch, that of ..... is a hydrophilic sol.
13. Among starch gelatine As_2S_3 and gum, the best protective colloid is .....
14. Tyndall effect is an ..... property of sols.
15. The random erratic zig-zag motion of colloidal particles is called ..... motion.
16. In a .....sol, there is very little affinity between the disappeared phase and the dispersion medium.
17. A colooidal solution in which the dispersed phase is a liquid and the dispertion medium is a solid is known as an .....
18. Delta deformation involves ..... of the colloidal impurities of river water at the mouth of the river where it meets the sea.
19. Colloidal particles migrate under the influence of an electrical feild and this property is called .....

20. The precipitation of the disperced phase of a sol through the induced aggregation of its particle is called .....
21. The protective action of different lyophilic colloids is expressed in terms of .....
22. The addition of an electrolyte in sufficient concentration to a sol results in the ..... of the sol.
23. The phenomenon of ..... is due to the scattering of light by colloidal particle.
24. The smaller the gold number of a protective colloid, the ..... is its protective action.
25. A substace that stabilises an emultion is called an .....
26. The process of bringing a freshly precipitated substance in to the colloidal state by adding a suitable reagent is called .....
27. Tyndall effect is due to ..... of light by colloidal particles.
28. The visibility of the path of the beam from the projector in a cinema hall is an example for the phenomenon called .....
29. The migration of the dispersion medium towards an electrode is observed in the phenomenon known as .....
30. Among starch, gelatin, gum and haemoglobin, that one that has the lowest gold number is .....

Question with one-word answer

31. What happens to the extend of adsorption of a substance on an adsorbent upon transforming the bulk state of the adsorbent to the finely divided state?
32. What type of adsorption shows an initial increase in its extend with an increase of temperature?
33. Which type of adsorption involves weak van der waals forces?
34. What kind of substance can be converted to the sol state by the Bredig's arc method?
35. Among lyophilic and lyophobic sols, which show only weak Tyndall effect?
36. Which physical state is not possible for the disperse phase in a colloidal system if the dispersion medium is a gas?
37. By what name is a colloidal system in which the disperse phase and dispersion medium are both liquid known?
38. Among the devices ultrafilter, dialyse, ultracentrifuge and ultra microscope, which makes use of Tyndall effect?
39. What terms denote the pH at which the particle of a protein sol became electrically neutral and exhibit no movement in an electric field?
40. Is a colloidal dispersion homogeneous or heterogeneous?
41. Among water, oil, sodium chloride and soap, which one is a emulsifier?
42. Among 1 M aqueous solution of NaCl, $BaCl_2$,K_2SO_4 and $FeCl_3$, which is the most effective in causing the coagulation of a negatively charged As_2S_3 sol?
43. Among the ions NO_3^-, SO_4^{2-}, PO_4^{3-} and $Fe(CN)_6^{4-}$, which is most effective in causing the coagulation of positive charged $Fe(OH)_3$ sol?

44. What term describes the minimum concentration of an electrolyte, in millimoles per litre of mixed solution, required to cause the coagulation of a particular sol?
45. What term describes a lyophilic colloid whose presence even in a small quantity makes a lyophobic colloid very much less sensitive to the coagulating action of electrolyte?
46. When As_2S_3 sol is subjected to the action of an electric field, its coagulation occurs around the anode. What does this indicate about the charge on the sol particles?
47. What is the name given to the potential difference that exists between the fixed and mobile layers of the electrical double layer of a colloidal system?
48. What happens when an electrolyte solution is added to a lyophobic colloidal solution?
49. Is an aqueous starch sol a hydrophobic sol or a hydrophilic sol?
50. What is the name given to the phenomenon in which a gel exudes small amount of liquid upon standing?

Answes

1. Surface
2. Absorbate
3. Desorption
4. Negative
5. Isobar
6. Decreases
7. Surfactant
8. Micelles
9. Adsorbent
10. Negative
11. Charge
12. Starch
13. Gelatine
14. Optical
15. Brownian
16. Lyophobic
17. Gel
18. Coagulation
19. Electrophoresis
20. Coagulation
21. Gold number
22. Coagulation
23. Tyndall effect
24. Greater
25. Emulsifier
26. Peptization
27. Scattering

28. Tyndall effect
29. Electroosmosis
30. Gelatine
31. Increases
32. Chemisorptions
33. Physisorption
34. Metals
35. Lyophilic
36. Gas
37. Emulsion
38. Ultramicroscope
39. Isoelectric point
40. Heterogeneous
41. Soap
42. $FeCl_3$
43. $Fe(CN)_6^{4-}$
44. Coagulation value
45. Protective colloid
46. Negative
47. Zeta potential
48. Coagulation
49. Hydrophilic
50. Synerisis

Module IV

PART A

FILL IN THE BLANKS

1. The type of chromatography in which a layer of adsorbent is spread on a glass or plastic plate is called ……. chromatography
2. The mobile phase in GLC is a ……..
3. In LLC, the stationary phase is a ……..
4. In LSC, the retarding mechanism that operates upon the components is selective …….
5. In liquid –liquid column chromatography, differential migration of sample components is established through their …….. between the stationary liquid phase and the mobile liquid phase.
6. In gas chromatography an inert gas is used as the mobile phase to carry the sample through the column to the detector; this gas is known as ……..
7. Gel permeation chromatography separates molecules according to their …….
8. Effective separation of lanthanides was made possible first by …….. chromatography.

9. In gel-permeation chromatography, the molecules having the …….. size are eluted as.
10. Gel permeation chromatography and gel filtration chromatography are the sub categories of the type of chromatography referred to as …….. chromatography.
11. Among LSC, LLC and GLC, which uses an adsorbent as the stationary phase?
12. Among liquid – solid chromatography, liquid –liquid chromatography, thin layer chromatography and gas – liquid chromatography, which type has the limitations that it is suitable only for compounds that are sufficiently volatile and are thermally stable?
13. What term is used to designate a graph showing the quantity of a substance leaving a chromatography column as a function of time?
14. What name is given to the process of dissolving out the components from the adsorbent using suitable solvent in adsorption chromatography?
15. In planar chromatography, what is the ratio of the distance travelled by a particular component to the distance travelled by the solvent front during the same time called?
16. Which type of liquid chromatography separation depends on interactions between components of the sample solution, mobile phase and immobilized liquid stationary phase?
17. Among paper chromatography (PC), gas –liquid chromatography (GLC), liquid – solid adsorption chromatography (LSC) and gel permeation chromatography (GPC), in which type dose separation mechanism not depend upon the interactions between components of the sample solution, mobile phase and stationary phase?
18. What term describes the method used in HPLC for degassing a solvent where the dissolved gases are swept out of the solvent by passing fine bubbles of an inert gas insoluble in the concerned solvent?
19. Among paper, thin layer, adsorption, ion – exchange and gel permeation chromatographies, which is the most suited to find the molecular mass distributions in synthetic polymers?
20. What term describes the time taken by a particular analyte peak to reach the detector after sample introduction in GLC?

answers

1. Thin layer
2. Gas
3. Liquid
4. Adsorption
5. Partitioning (or distribution)
6. Carrier gas
7. Sizes
8. Ion exchange
9. Least (smallest)
10. Size –exclusion
11. LSC
12. Gas –liquid chromatography

13. Chromatogram
14. Elution
15. R_f
16. Partition
17. GPC
18. Sparging
19. Gel permeation chromatography
20. Retention time

Module V

PARTA

Fill in the blanks

1. Adsorption of microwave radiation may induce a transaction between …….. energy levels of a molecule .
2. Among CO, NO, HCL and CO_2, that which will not yeild a microwave (rational) spectrum is ……..
3. The rational spectrum of a rigid diatomic molecule will consist of a series of *equispaced* lines such that Type equation here.lines such that Δ = …….. Cm^{-1} where 'B' is the rational constant.
4. The SI unit of the force constant of a bond is ……
5. Normally modes of vibration for a molecule that have the same frequency are said to be ……..
6. The number of normal modes of vibration for the CO_2 molecule is ……..
7. For a particular vibration to result in adsorption of infrared energy, the vibration must cause a change in the ..... Of the molecule .
8. The vibrational Spectra of molecules are obtained in the ……. region.
9. Among C-C, C=C ,C≡C, the bond that shows the highest stretching frequency is ……..
10. A non– polar *n* – atom molecule has …….. normal modes of vibration.
11. The vibration of CO_2 which is Raman active but IR inactive is the …….. stretch.
12. Among and the type of transition that generally has the lowest energy is……..
13. If I_o is the intensity of radiation incident upon the sample and I_x the emergent intensity, *absorbance* is ……
14. Shifts of *adsorption maximum* to shorter wavelength is called a …….. shift.
15. According to Franck -Condon principle, an electronic transition takes place so rapidly that a vibrating molecule does not change its ……..appreciably during the transition.
16. Shielding shifts the value of an NMR signal to …… values.
17. The number of peaks in the NMR spectrum $CHCl_2–CH_2Cl$ is ……..
18. Normally, the OH proton will absorb at a …….. field strength than a CH proton.
19. The number of signals exhibited by the protons of acetone in its NMR spectrum is ……..
20. For a nucleus of spin quantum number *I*, there are …….. allowed spin spates .
21. The number of allowed spin States possible for a proton is ……..

22. For CHOH , the intensity of the peak die to CH protons and that due to the OH proton will be in the ratio ……
23. The number of signals exhibited by the protons of TMS in its NMR spectrum is ……
24. Electromagnetic radiation in the …….. region is used to study electron spin resonance.

Questions with one – word answers

25. Among IR radiation X-radiation, UV radiation and visible radiation, which has the highest energy?
26. How is the energy (E) of one quantum of radiation related to its wave number?
27. What is a molecule which rotates such that its internuclear bond distances do not change during a rotation called?
28. How many normal modes of vibration may a diatomic molecule have?
29. How many normal modes of vibration does water molecule have?
30. How many normal modes of vibration does a linear *n*-atom molecule have?
31. Which radiation is commonly used for irradiation radiation in Raman spectroscopic arrangements?
32. Among Cl_2 , $CO_2$and H_2O , which yields a Raman spectrum but not infrared spectrum ?
33. What is a shift of *absorption maximum* to longer wavelength referred to as?
34. Absorption of energy in which region (S) of the electromagnetic spectrum is required to induce electronic transitions form lower to higher energy levels in a molecular species?
35. Which type of electronic transition between the HOMO and LUMO of molecular species requires the highest energy of excitation?
36. What term describes an isolated functional group that, when not in conjugation with any other group, exhibits a characteristic absorption in the UV or visible region?
37. On which photo physical law is the analytical technique of spectrophotometry based?
38. What is spin quantum number of a proton?
39. How many peaks there will be in the PMR spectrum of 1, 3-dibromopropane?
40. To which side (higher or lower) does shielding shift the value of an NMR signal?
41. How many signals do the protons of dimethyl ether exhibit in its NMR spectrum?
42. What is the spin quantum number of the ^{13}C nucleus?
43. Among the molecules N , O and F which can be studied using the ESR method ?
45. How many lines does the ESR spectrum of methyl radical contain?

ANSWER

1. Rotational
2. CO_2
3. 2B
4. N m $^{-1}$
5. Degenerate
6. Four
7. dipole moment

8. infrared
9.
10. 3n-6
11. Symmetric
12.
13. Log($I_0 I_x$)
14. Hypsochromic (blue)
15. internuclear distance
16. Lower
17. Two
18. lower
19. One
20. $(2l+1)$
21. 2(two)
22. 3:1
23. 1 (One)
24. Microwave
25. 0(zero)
26. X-radiation
27. E=hcῡ
28. rigid rotator (rigid rotor)
29. 1(One)
30. 3(three)
31. $3n$-5
32. Visible
33. Cl_2
34. bathochromic shift (redshift)
35. UV-visible
36. $\sigma \rightarrow \sigma^*$
37. Chromophore
38. Beer - Lambert law
39. 1/2
40. 2(two)
41. lower
42. 1(One)
43. ½
44. O_2
45. 4 (four)

Module VI

Part-A

Fill in the blanks

1. A symmetry operation is the movement of a molecule that brings it into a/an …….. configuration.
2. The tetrahedral methane (CH_4) molecule has four …….. Axes.
3. A symmetry plane that contains the principal axis and, at the same time, bisects the angle between two similar C_2 axes adjacent to it in the molecule is called a …….. plane of symmetry.
4. A group in which all elements commute with each other is called a/an …….. group.
5. The order of the $C_{2\upsilon}$ point group is called ……..
6. All …….. Molecules have a C_∞ axis .
7. The number of vertical mirror planes that ammonia molecule has is ……..
8. If the product of two symmetry operations A and B does not depend up on the order in which the two operations are performed so that BA=AB, then it is said that the two operations A and B ……..
9. The effect of a symmetry operation is completely cancelled out by the application its ……
10. A …….. is a collection of all the symmetry operations, the act of which leaves at least one point of the molecule unmoved.
11. The principal axis for the benzene molecule is a…….. axis.
12. The highest-fold rotation axis that the HCl molecule has is the ……axis.
13. The number mirror planes that the square planar XeF_4 molecule has is ……..
14. A molecule that has a C_4 axis, 4 equally spaced C_2 axis perpendicular to C_n, and a σ_h is said to belong to the …….. point group.
15. The number of elements in a finite group is called its ……

Questions with one word answers

16. Among C_6H_6,N_2,BF_3 and C_2H_4, which molecule does not have a center of symmetry?
17. What mathematical term denotes the successive application of the same or different symmetry operations on a molecule?
18. Among identity rule, commutative multiplication rule, associative and inverse rule, which is not a condition to be satisfied for a point group?
19. Among CH_3Cl, eclipsed CH_3-CH_3, staggered CH_3-CH_3 and BH_3, in which molecule belongs to the $C_{3\upsilon}$ point group?
20. What is the highest-fold rotation axis that N_2 molecule has?
21. How many proper rotation axes does the trigonal planar BF_3 molecule have?
22. How many mirror planes does an ammonia molecule have?
23. What is the inverse of the C_2 operation?
24. Name the point group to which molecules having no symmetry element other than identity belong.

Name the point group to which ammonia molecule belongs.

Answers

1. Equivalent
2. C_3
3. dihedral
4. abelian(commutative)
5. 4(four)
6. Linear
7. 3(three)
8. Commute
9. Inverse
10. Point group
11. C_6
12. C_∞
13. 4(four)
14. D_{4h}
15. Order
16. BF_3
17. Multiplication
18. Commutative multiplication rule
19. CH_3Cl
20. C_∞
21. 4(four)
22. 3(three)
23. C_2
24. C_1
25. C_3

Module I

PART B

1. Mention two factors that affect the rate of reactions .
2. Define rate of reaction .
3. What is the unit used to express the rate of a reaction?
4. Define average rate of reaction .
5. Define *instantaneous rate of reaction.*
6. How will you relatively express the rate of the gaseous reaction : $2NO_2+O_2 \rightarrow 2NO_2$ in terms of the concentration of each species ?
7. Write the relationship between the rate of disappearance of A and B and the rate of appearance of A_2B_3 in the reaction : $2A+3B \rightarrow A_2B_3$.
8. Define specific reaction rate.
9. When is the rate of a reaction equal to the specific reaction rate?

10. What is meant by *order* of a reaction ?
11. Define *molecularity* of a reaction .
12. The rate constants of two reactions (i) and (ii) are respectively 2.3×10^{-5} L mol $^{-1}$ s^{-1} and 9.3×10^{-4} mol L^{-1} s^{-1} . Identify the order of the reaction in each case .
13. The reaction $A+2B \rightarrow C+D$ obeys the rate equation: rate $=k[A]^x[B]^y$. What would be the order of the reaction?
14. Give an example each for reactions of order 1 and 2.
15. Give an example for a fractional order reaction and state its order.
16. What is meant by a complex reaction ?
17. What is meant by the rate- determining step of a complex reaction?
18. What is meant by pseudo first order reaction?
19. Give an example for a pseudo first order reaction .
20. What is the unit of k for (i) a zero order reaction ; (ii) a first order reaction?
21. What is the unit of k for (i) a second order reaction ;(ii) a third order reaction ?
22. What is the unit of the rate constant for a reaction having order 3/2?
23. What is the order of the acidic hydrolysis of sucrose?
24. What is the order of the acidic hydrolysis of ethyl acetate?
25. The reaction $A+B \rightarrow C$ has zero order . write its rate equation.
26. What is the relationship between the order of an elementary step of a complex reaction and its molecularity?
27. The reaction $A+3B \rightarrow 2C$ obeys the rate equation: rate $=k[A]^{1/2}[B]^{3/2}$. What is the order of the reaction ?
28. Explain briefly why reactions of molecularity greater than 3 are rare?
29. What is meant by the mechanism of a reactions?
30. The mechanism suggested for the reaction: $2NO+2H_2 \rightarrow 2N_2+2H_2O$ is:
    Step 1: $2NO+H_2 \rightarrow N_2 + H_2O_2$ {slow step};
    Step 2: $H_2O_2+H_2 \rightarrow 2H_2O$ {fast step}
    Write the rate law for the reaction and mention its overall order.
31. Give the integrated rate equation of a first order reaction.
32. Depict the shape of the log [a/(a-x)] versus t plot for a first order reaction . What will be the slope?
33. Define half-life period of a reaction.
34. How is the half-life period of a first order reaction related to its rate constant ?
35. Calculate the time for half- change of a first order reaction of rate constant 0.0693 yr^{-1}.
36. The time taken for 50% of a reaction to be complete is 13.86 hours .Calculate its specific reactant rate .
37. The rate constant of a first order disintegration of a substance is $0.5 \times 10^{-2} s^{-1}$. Calculate the time required for 10g of the substance to disintegrate to 5g.
38. The specific reaction rate for a first order reaction is 1.0×10^{-3} min^{-1}. If the initial concentration is 2.0×10^{-3} M, what is the initial rate in mol L^{-1} min^{-1}?

39. If the volume of the reaction vessel is doubled, how does the new rate of a second order reaction relate to the previous value?
40. For a first order reaction , k=0.693s^{-1}. What is the half – life period of the reaction?
41. For a reaction 2A+B→ products , on doubling the concentration A alone, the rate becomes 4 times whereas on doubling the concentration of B alone, the rate doubles. What is the overall order of the reaction?
42. What is the $t_{1/2}$: $t_{3/4}$ ratio for a first order reaction ?
43. For a decomposition reaction , k = 0.1386 hr^{-1} . What is the time taken for 75% of the substance to decompose ?
44. The rate constant of a first order reaction is $7\times 10^{-4}s^{-1}$. What is the time taken for the reactant to be reduced to one-fourth of the initial concentration?
45. For a certain reaction , it takes 3 minutes for the initial concentration of 1 mol $L^{-1}$to become 0.5 mol L^{-1} and another 3 minutes to become 0.25 mol^{-1} L^{-1} .What is the rate constant of the reaction ?
46. What is the kinetic order of each of the following: (a) radioactive decay ;(b) acidic hydrolysis of ethyl acetate ?
47. If the initial concentration is denoted as C_0 and that at time ' t' as C_t , write the integrated rate equation for a second order reaction when the reaction involves one reactant only.
48. The initial concentration of A and B respectively of a second order reaction :A+B→ products , 'a' mol L^{-1} and 'b' mol L^{-1} , and after a time ' t ' , it is seen that ' x' mol L^{-1} of A has reacted with 'x' mol L^{-1} of B . write the integrated rate equation for the above second order reaction.
49. How is the half- life related to the initial concentration of the reactant for a second order reaction involving one reactant only ?
50. Depict pictorially a plot of $1/C_t$ against ' t ' for a second order reaction .
51. For a general n th order reaction (n > 1) involving one reactant only , if the intial concentration of only reactant A is ' a ' mol L^{-1} and the decrease in concentration after a lapse of time ' t ' is 'x' mol L^{-1} , write its integrated rate equation.
52. What is order for the alkaline hydrolyisis of ethyl acetate?
53. Write the integrated rate equation for a general third order reaction involving one reactant only .
54. Depict the general plot of $1/C_t^2$ against ' t' for a third order reaction .
55. How is the half –life of a zero order reaction involving one reactant related to its initial concentration?
56. Give the general plot of C_t against 't' for a zero order reaction involving one reactant.
57. What is the unit of k for a zero order reaction?
58. Give the integrated rate equation for zero order reaction .
59. How is the half life of a zero order reaction related to its rate constant ?
60. Give an example to illustrate the term parallel reactions .
61. What is chain reaction ?
62. Define temperature coefficent of a reaction.
63. What happens to the rate of a reaction with increase in temperature ?

64. Define threshold energy of a reaction .
65. Define activation energy of a reaction.
66. What is meant by steady state approximation ?
67. What is meant by activated complex ?
68. What is catalyst ?
69. Give an example for catalytic reaction used in industry
70. Give an example for an enzyme – cataylsed reaction.
71. What is a catalytic promoter ?
72. Give an example for a catalytic promoter , giving the reaction in which it is used .
73. What is meant by a catalytic poison ?
74. Give one example for catalytic poisoning.
75. Explain why finely divided metals are more efficient catalysts as compared to their massive forms.
76. What is meant an enzyme ?
77. Give an example for enzyme catalysis.
1. What is meant by the optimum temperature of an enzyme ?

PART B

Module II

2. *1.What is a photochemical reaction?*
3. *2.Give an example for a photochemical reaction.*
4. 3.Mention one difference between a *photochemical reaction* and a *thermochemicak reaction.*
5. *4.State Beer-Lambert law.*
6. *5.Define molar absorption coefficient.*
7. 6.Name an instrument which functions on the basis of *Beer-Lambert law.*
8. *7.State Grotthuss-Draper law.*
9. 8.Is the converse of *Grotthuss-Draper law* true? Justify your answer.
10. *9.State Stark-Einstein law.*
11. 10.What is meant by a *primary process* in a photochemical reaction?
12. 11.What is meant by the term *secondary processes* in a photochemical reaction?
13. 12.Define *quantum yield* of a photochemical reaction.
14. 13.The quantum yield of majority of photochemical reactions is not one. Is this statement true? Justify your answer.
15. 14.Can quantum yield of a photochemical reaction be different from *one*? Why?
16. 15.Comment on the observed quantum yield of the *hydrogen-chlorine reaction.*
17. 16.Give an example for a reaction with *very low* quantum yield.
18. *17.What is fluorescence?*
19. 18.What happens to fluorescence of a substance when the source of exciting radiation is removed?
20. 19.Give an example for *fluorescence?*
21. 20.What is phosphorescence?
22. 21.Which transition does phosphorescent emissions represent?
23. *22.What is meant by chemiluminescence?*

24. 23.Why is chemiluminescence regarded the reverse of photochemical reaction?
25. 24.Give an example for *chemiluminescence?*
26. 25.What is meant by a *chain reaction* in photochemistry?
27. 26.Give an example for a photochemical reaction that occurs by means of a chain*mechanism.*
28. 27.What is meant by photosensitization?
29. 28.Give an example for a photosensitized reaction.
30. 29.What is the role of *chlorophyll* in photosynthesis occurring in plants?
31.*30.What is meant by internal conversion?*

Module III

PART B

1. What is *adsorption*?
2. Explain the term *adsorbent* and *adsorbate.*
3. What is *desorption* ?
4. Distinguish between *adsorption* and *absorption*
5. Define *enthalpy of adsorption.*
6. What are the signs for ΔS and ΔH when a gas gets adsorbed on a solid adsorbent ?
7. Give an application of adsorption.
8. What is meant by *physisorption* ?
9. Give an example for physisorption.
10. What is meant by *chemisorption* ?
11. Give an example for chemisorptions.
12. Define *adsorption isotherm* and *adsorption isobar*.
13. Mention two important factors that influence adsorption of gases on solid surface.
14. Give the *freundlich adsorption equation* and specify the terms.
15. Give the *Langmuir adsorption equation* and specify the terms.
16. Give the *BET equation,* specifying the terms involved.
17. What is a *surfactant* ? give an example
18. What are *colloidal solutions* ?give an example and name the type to which it belongs.
19. Give an example each for the following types of colloidal systems:
    a) A liquid dispersed in gas ; (b) A solid dispersed in gas; (c) A gas dispersed in liquid
20. Name the type of colloidal system in each of the following cases:(a) A colloidal dispersion of gold in water; (b) Milk; (c)Jellies
21. What are *sol* ? Give two examples.
22. Classify the following aqueous sols into *lyophilic* and *lyophobic* sols: (i) gold sol; (ii) gelatine sol; (iii) $Fe(OH)_3$ sol.
23. Differentiate between a sol and an emulsion.
24. What are macromolecular colloids?
25. Explain the term multimolecular colloids.
26. What is meant by an associated colloid?
27. What is meant by a lyophilic colloid? Give an example.

28. What is lyophobic sol? Give an example
29. Mention one distinctively different feature between lyophilic and lyophobic sols.
30. What is meant by peptization?
31. How can a sol of ferric hydroxide be prepared in the laboratory?
32. Menton one prepration of a gold sol.
33. Mention two methods used generally for the purification of sols.
34. What is dialysis?
35. What is meant by ultrafiltration?
36. Explain the term sedimentation potential.
37. What is zeta potential?
38. What is meant by tyndall effect ?what is it due to ? give one application of the phenomenon.
39. Explain why lyophilic sols generally show weak tyndall effect.
40. What happens when a sol of ferric hydroxide prepaid by the hydrolysis of ferric chloride is subjected to the prolonged action of an electric field ?
41. What is meant by Brownian motion ?
42. A sol of ferric hydroxide prepared by the hydrolysis of ferric chloride contains particles which carry positive charges. Explain why.
43. What are electrokinetic phenomena?
44. What happens when As_2S_3 sol is subjected to the action of an electric field?
45. How will you distinguish between a true solution and a colloidal solution?
46. What is meant by electrophoresis?
47. Define isoelectric point.
48. What is meant by electroosmosis?
49. Explain the reason for the stability of a lyophobic sol.
50. What is meant by coagulation of a colloidal solution ?
51. Mention any one method for bringing about the coagulation of a sol.
52. State hardy-schulze law.
53. Define the term flocculation value.
54. What is protective colloid?
55. Define gold number of a protective colloid.
56. Which is a better protective colloid-gelatin or starch? Which of the two has a lower gold number?
57. Give an example each for (i) a multi molecular colloid (ii) a macro molecular colloid and (iii) an associated colloid.
58. What does the term micelle mean?
59. When As_2S_3 sol is subjected to the action of an electric field, its coagulation occurs around anode what does this indicate about the charge on the sol particles? Explain your answer.
60. What happens when an electrolyte solution is added to a lyophobic sol? Why?
61. Which among the following is more effective in coagulating the negatively charged As_2S_3 sol-Ba^{2+} or Al^{3+} ? explain your answer.

62. Which among the following is more effective in coagulating the positively charged $Fe(OH)_3$ sol-Cl^- or

Module IV

PART B

1. What is the basic principle of a chromatographic technique?
2. What are the physical states of the stationary and mobile phases in *adsorption column chromatography*?
3. Comment on the mechanism by which differential migration of sample components is effected in *adsorption column chromatography.*
4. What is meant by *planar chromatography*? What are its two sub-divisions?
5. Illustrate with two examples the classification of chromatographic methods according to the types of phases used.
6. What is the essential difference between *adsorption column chromatography* and *partition column chromatography*?
7. What is R_f?
8. How is R_f value useful in the characterization of a compound?
9. What are the stationary and mobile phases in *partition column chromatography*?
10. Comment on the stationary and mobile phases in *layer chromatography*.
11. What are the stationary and mobile phases in *thin layer chromatography*?
12. What are the two types of *gas chromatography*? Specify the types of phases in each.
13. Give two application of *paper chromatography*.
14. Comment on an important limitation of the GLC technique.
15. Mention two applications of TLC.
16. What does the term *gel permeation chromatography* mean?
17. On what basis is the fractionation of components induced in *gel permeation chromatography?*
18. Explain the type of stationary phase used in *gel permeation chromatography*.
19. If the size of three kinds of components A, B and C in a sample solution are in the order A>B>C, in which order would they be eluted out of a gel permeation chromatographic column?
20. Explain the most important application of *gel permeation chromatography* in the field of synthetic polymers .
21. Mention two applications of *gel permeation chromatography*.
22. Mention the important aspect in which *gel permeation chromatography* differs from other types of liquid chromatographies in the mechanism of effecting separation of components.
23. What is HPLC?
24. How is a higher efficiency achieved in HPLC as compared to the other types of liquid chromatographies?
25. Mention two application of HPLC .

63. O_4^{2-} ? explain your answer.
64. How does Brownian motion arise in a colloidal system?
65. How is the gold number of a protective colloid related to its protective action ?
66. Explain the term Brownian movement as applied to colloidal system.
67. Mention two applications of colloids in the field of medicine.
68. Explain an important application of the process of coagulation.
69. What is mean by emulsion?
70. What is the role of an emulsification?
71. What is the role of an emulsifier?
72. Give an example for an emulsifier.
73. What is meant by a gel? Give an example.
74. Write briefly on the structure of a gel.
75. What are elastic gels? Give an example.
76. What is an non-elastic gel? Give an example.
77. Explain the term imbibitions related to a gel.
78. What is meant by the term swelling as applied to a gel?
79. What is meant by the term synerisis are applied to a gel?
80. Distinguish between the term imbibitions and synerisis as applied to gels.
81. What is thixotropy?
82. Explain delta formation.
83. How is colloid chemistry applied in sewage disposal?
84. Mention an important application of colloids.
85. What is meant by Donnan equilibrium?

Module V

PART B

1. State the Born - oppenheimer approximation.
2. Arrange the following radiations in the increasing order of energy: UV, IR , microwave visible.
3. What are the relationships between the *frequency* of a radiation and its (a) wavelength and (b) energy?
4. Calculate the energy of a radiation that has a wave number 0.005 nm^{-1}.
5. Calculate the wavelength of a radiation that has a energy 4.95×10^{-1}J.
6. What is the essential condition for a molecule to *absorb microwave* radiation?
7. What is meant by a *rigid rotator*?
8. Write the expression relating the moment of inertia (I) and the equilibrium *internuclear distance*(r)for a rigid diatomic molecule.
9. Write an expression for the *rotational energy* of a diatomic molecule.
10. State the selection rule for *rotational transitions* of a rigid rotator.
11. Pick out , from among the following , those which would give *microwave spectrum*O_2 ,HCl ,NH_4, Cl_2 , HCN.
12. What is the essential condition for a molecule to absorb *infrared* radiation?

13. What is mean by *zero point energy*?
14. Define a *normal mode* of vibration.
15. How many normal modes of vibration are possible for (a) the H_2O molecule and (b) theCO_2 molecule?
16. How many *vibrational modes* does a n-atom non-linear molecule have?
17. State the selection rule for the *vibrational transitions* of a harmonic oscillator.
18. How many vibrational modes of CO_2 are *infrared-active*? How many peaks will they totally yield in an IR spectrum of CO_2?
19. Write the expression connecting the vibrational frequency 'ν_{osc}' of a diatomic molecule with its reduced mass' μ'.
20. Calculate the reduced the mass of HCL[H = 1.008;Cl=35.45].
21. Calculate the reduced mass of carbon monoxide [C=12;O=16].
22. How is vibrational energy of a diatomic molecule related to the *vibrational quantum number* and the *frequency* of oscillation?
23. How many absorption lines will be obtained in the vibrational spectrum of a diatomic simple harmonic oscillator molecule? Why ?
24. How many normal modes of vibration does water molecule have and how many of them are IR-active?
25. Sketch the vibrational mode of CO_2 that does not cause adsorption of ITR radiation. Why is it not IR-active?
26. What are *degenerate modes* of vibration?
27. How is force constant related to *bond order* and *bond length*?
28. What is meant by the *fingerprint region* in an IR spectrum of an organic compound?
29. For oxygen molecule, pure rotation spectrum is absent whereas rotational Raman Spectra is present. Explain.
30. What is the essential condition for a vibration or rotation to be Raman-active?
31. What is the quantum mechanical selection rule for vibrational Raman spectroscopy?
32. Name and sketch the vibration of CO_2 that is Raman-active but IIR-inactive
33. What is referred to as a *fundamental Band* in the vibrational spectrum of a molecule ?
34. What does the term *overtones* signify with respect to vibrational spectra ?
35. What are *stretching vibrations*?
36. What does the term *bending vibrations* mean?
37. Explain what is meant by Raman shift.
38. What is zero point energy?
39. What are *hot bands* in a vibrational spectrum?
40. How will you distinguish between the *overtones* and *hot bands* of a spectrum?
41. State the principle of *mutual exclusion*.
42. How is absorbance of a solution related to its concentration?
43. Define transmittance.
44. State *Franck-Condon principle.*
45. What is a *bathochromic* shift?
46. Define a *hypsochromic* shift.

47. What are *hypochromic* and *hyperchromic* shifts.
48. What is a *chromophore*? Give two examples.
49. What are *auxochromes*?
50. What are the spin quantum numbers of a *proton* and a *deuteron*?
51. Under what conditions of *atomic number* and *mass number* does the spin of a nucleus become (I) half integral, (ii) zero and (iii) integral?
52. If the spin quantum number of a nucleus is 1, how many spin States are possible?
53. How is the magnitude of the nuclear magnetic moment of a nucleus related to its spin quantum number?
54. What is meant by *chemical equivalence* of a set of nuclei? How many NMR signals would a set of three chemically equivalent nuclei yield?
55. Predict the number of signals in the PMR spectra of *p-xylene* and methyl acetate.
56. Draw a schematic diagram of the PMR spectrum of *pure methanol* and label the peaks. Draw a labeled schematic diagram of the PMR spectrum of *acetone* .[*Hint*: A six proton-singlet due to the two sets of CH_3 protons around 2 δ only]
57. How many peaks will be obtained in a PMR spectrum of *benzene*? Why?
58. Define the δ scale of chemical shifts.
59. Sketch the schematic NMR spectrum of *1,1-dibromoethane* and label the signals.
60. Sketch the NMR spectrum of *symmetrical-trimethylbenzene* and label the signals.
61. Explain the different signals that are obtained in the NMR spectrum of acetaldehyde.
62. How many signals will be there in the PMR spectrum of *toluene*? What are they due to?
63. Sketch the schematic PMR spectrum of *ethyl acetate* and mark the peaks.
64. Explain the number of peaks in the PMR spectrum of *acetophenone*.
65. Sketch the schematic PMR spectrum of *dimethyl ether* and identify the peak(s).
66. Sketch the schematic PMR spectrum of *acetaldehyde* and identify the peaks.

How many peaks will be the in the H NMR spectrum of *propanal*? Comment on their

Module VI

PART B

1. Define a symmetry element.
2. What is meant by a symmetry operation?
3. What is the identity operation?
4. Define a proper rotation axis.
5. What does the term proper rotation mean? Give an example.
6. Identify the proper rotation axes of the benzene molecule.
7. Name a molecule that possesses a C_4 axis.
8. Identify the principal axis in each of the following cases: (a) $CHCl_3$; (b) cyclopentadienyl anion.
9. XeF_4 is a square planar molecule. How many proper rotation axes does the molecule have?
10. Identify the highest-fold rotation axis in each of the following molecules: (i) 1,3,5-tribromobenzene; (ii) ethyne.
11. Define a plane of symmetry. What is the associated symmetry operation?
12. What are vertical planes of symmetry?
13. Define a horizontal mirror plane.

14. How many mirror planes does a water molecule have? What kind are they?
15. What is a dihedral mirror plane?
16. Distinguish between vertical and dihedral mirror planes.
17. What kinds of mirror planes does the benzene molecule possess?
18. What is an inversion centre?
19. What is meant by the term inversion operation?
20. Define an improper rotation axis.

Module I

PART B

1. Mention the factors that affect the rate of a reaction.
2. Explain an experimental method for measuring the rate of reactions .
3. Distinguish between the terms average rate and instantaneous rate for a reaction .
4. For the reaction:$Cl_2 + 2I^- \rightarrow 2Cl^- + I_2$, carried out in aqueous solution , if the initial concentration of I^- was 0.50 mol dm^{-3} and its concentration after 10 minutes was 0.46 mol dm^{-3} , calculate (i) the rate of disappearance of I^- and (ii) the rate of appearance of I_2 .
5. Calculate the rate of the disappearance of oxygen in the gas phase reaction :
   $4NH_3 + 5O_2 \rightarrow 4NO + 6H_2O$, if the rate of appearance of NO is 3.6×10^{-3} mol dm^{-3} s^{-1} .
6. The reaction: $2N_2O_5(g) \leftrightarrow 4NO_2(g) + O_2(g)$, takes place in a closed container. It is found that the concentration of NO_2 increases by 1.6×10^{-2} mol L^{-1} in 4 seconds. Calculate the rate of the reaction and the rate of change of concentration of N_2O5.
7. For the gas phase reaction : $2N_2O_5 \leftrightarrow 4NO_2 + O_2$, if the concentration of NO_2 increases by 3.0×10^{-3} mol L^{-1} in 6 seconds, what is the average rate of reaction ?
8. For the reaction $2A+B \rightarrow A_2B$,rate = $k[A][B]^2$ with $k = 2.0\times10^{-6}$ mol $^{-2}$ L^2 s^{-1}. If the initial concentrations are [A]=0.1 mol L^{-1} and [B] =0.2 mol L^{-1},determine (a) the initial rate of the reaction and (b) the rate after 0.04 mol L^{-1} of B has reacted .
9. Distinguish between reaction rate and specific reaction rate.
10. Explain the term order of a reaction .
11. Give two example each for first and second order reactions .
12. Define order of a reaction .Give an example each for (a) a zero order reaction ,(b) a fractional order reaction and (c) a third order reaction.
13. Explain the term molecularity of a reaction.
14. What is a complex reaction? Comment on the significance of the terms order and the molecularity in the case of complex reactions .
15. The thermal decomposition of Nitrous oxide follows the equation $2N_2O \rightarrow 2N_2+O_2$ .If the rate equation for the reaction is : rate =$k[N_2O]$, suggest a plausible mechanism for the reaction .
16. Distinguish between the terms order and molecularity of reactions .
17. Explain the term pseudo first order reaction with a suitable example .

18. Derive the integrated rate equation for a first order reaction .
19. A first order reaction is 20% complete in 10 minutes. Calculate the specific reaction rate and half-life of the reaction .
20. The rate constant for a first order reaction is 2.5×10^{-6} s-1 and the initial concentration is 0.1 mol L^{-1} . What is the initial rate of the reaction in mol L^{-1} s^{-1} ?
21. If the half- life of a first order reaction A→B is 2min ,how long will it take for [A] to reach 10 % of its initial concentration?
22. A reaction that is first order with respect to A has a rate constant 6 min-1 . If we start with [A]= 5.0mol L^{-1} ,when would [A] reach the value of 0.05 mol L^{-1} ?
23. Benzenediazonium chloride undergoes first order thermal decomposition at 323K with a rate constant of 0.071 min^{-1} .How long will it take for the reaction to be 90% complete ?
24. If the half – life of a first order reaction is 1 hour , what will be the time taken for 90% completion ?
25. For the reaction $2N_2O5\rightarrow4NO_2+O_2$, the rate is directly proportional to $[N_2O_5]$. At 45˚C ,90% N_2O_5 reacts in 3600 seconds . Find the value of the rate constant.
26. A first order reaction has a specific reaction rate of 10^{-3} s^{-1} . How long will it take for 10g of the reactants to reduce to 1.5g ? Also calculate the half-life of the reaction.
27. The decomposition of H_2O_2 was studied by titrating it at different intervals with KMNO4. From the following data obtained, show that the reaction is of the first order.

Time (in minutes)	:	0	10	20
Vol. of KMNO4 in mL	:	46.1	29.8	19.3

28. In the study of the hydrolyisis of ethyl acetate using 0.5N HCl at 298K , 2mL portions of the reactions mixture were withdrawn at definite intervals and titrated against 0.2N NaOH solution . The data obtained are given below . calculate the rate constant at 298K .

Time (in min)	:	0	20	75	119	∞
Vol. of NaOH in mL	:	20.24	21.73	25.20	27.6	43.95

29. In the study of the hydrolysis of cane sugar using 0.9 M HCl at 298 K, the data obtained are given below. Calculate the rate constant at 298K and find out the order of the reaction.

Time (in min)	:	0.00	7.18	18.00	27.05	∞
Optical rotation (degrees)	:	+24.09	+21.41	+17.74	+15.00	-10.74

30. Show that half-life period of a first order reaction is independent of the initial concentration.
31. What are the important characteristics of a first order reaction?
32. Show that the half-life is inversely proportional to the initial concentration of the reactant for a second order reaction.
33. What are the kinetic characteristic of second order reaction ?
34. Explain why the hydrolysis of an ester in the presence of dilute acid follows first order kinetics while that in the presence of an alkali follows second order kinetics.
35. Give the general kinetic characteristics of a zero order reaction .
36. Ethyl acetate was saponified using caustic soda , starting with equal initial concentration of both withdrawal of equal volume of the reaction mixture at different time intervals And titration against standard acid yielded the following titre values:

Time (in min)	:	0	25	55	∞
Acid used (in mL)	:	16.0	4.32	2.31	0

Show that the reaction is of second order , determine the rate constant and find out what fraction of ethyl acetate will be decomposed in 30 mts?

37. The half-life of a second order reaction involving only one reactant is 20 minutes when the initial concentration of the reactant is 0.05 mol dm^{-3} . Calculate the rate constant .
38. A second order reaction in which a=b is 20% complete in 40 s. Calculate its time for half –change.
39. Explain the integrated rate law method for the determination of the order of a reaction .
40. How is the order of a reaction determined by the graphical method?
41. Explain the differential rate equation method for the determination of the order of a reaction.
42. Explain the principle of the determination of the order of a reaction by the half-life method .
43. How is the order of the reaction determined by the initial rate method ?
44. Explain the Ostwald 's isolation method for the determination of the order of a reaction.
45. The half-life of a decomposition reaction at a particular concentration was found to be 50 minutes .When the reactant concentration was doubled , the half –life of the reaction was found to become 100 minutes . Determine the order of the reaction .
46. For the thermal decomposition of a gaseous compound, the half-life is found to be 105 mts when the initial pressure is 750mm and 950mts when it is 250 mm .Determine the order of the reaction .

47. For the reaction: $2A(g)+B_2(g)\rightarrow C+D$, The following data where obtained at 303 K .

Experiment	Initial concentration (mol L^{-1})		Initial rate (mol $L^{-1}min^{-1}$)
	[A]	[B]	
1	0.10	0.10	6.00×10^{-3}
2	0.30	0.20	7.20×10^{-2}
3	0.30	0.40	2.88×10^{-1}
4	0.40	0.10	2.40×10^{-2}

(a) Find the orders with respect to each of the reactants.
(b) Write the rate law for the reaction and the overall order.
(c) Calculate the rate constant for the reaction at the temperature of the experiment .

48. For the reaction : $2NO(g)+O_2(g)\rightarrow 2NO_2(g)$, the following data were obtained at 303 K.

Experiment	Initial concentration(mol L^{-1})		Initial rate (mol L^{-1} min^{-1})
	[NO]	[O_2]	
1	0.30	0.30	0.096
2	0.60	0.30	0.384
3	0.30	0.60	0.192
4	0.60	0.60	0.768

(a) Find the orders with respect to each of the reactants .
(b) Write the rate law for the reaction and the overall order .
(c) Calculate the rate constant for the reaction at the temperature of the experiment.

49. Give an example each to illustrate (i) opposing reactions,(ii) parallel reactions and (iii) consecutive reactions.
50. Illustrate with an example what chain reactions are .
51. Explain the term parallel reactions with suitable example .
52. Explain with an example what opposing reaction are .
53. What does the term consecutive reactions mean? Explain with an example .
54. Explain the influence of temperature on reaction rate on the basis of collision theory .
55. Give Arrhenius equation and explain its significance.
56. Explain the significance of Arrhenius parameters .
57. Give Arrhenius equation and account for the influence of temperature on the reaction rate on the basis of the equation.
58. Give the Arrhenius equation and indicate what each parameter in it stands for.
59. How will you evaluate Arrhenius parameters ?
60. How will you evaluate activation energy of a reaction ?
61. Distinguish between the terms threshold energy and activation energy of a reaction. How are the two related?
62. For the bimolecular decomposition of NO_2 into NO and O_2, The rate constant is 83.9 at 327° C and 407 at 372°C . Calculate the activation energy .
63. Calculate the activation energy of a reaction if its rate constant gets tripled due to an increase of temperature from 295K to 305K .[hint:$k_2/k_1=3$]
64. The rate constant of a reaction is 3.56×10^{-5} s^{-1} at 298 K and 1.35×10^{-4} at 308 K .Calculate the energy of activation of the reaction.
65. The activation energy of a second order reaction is 1×10^5 J mol^{-1} .Its rate constant at 300K is 2.0 dm^3 mol^{-1} s^{-1} .Calculate the Arrhenius pre- exponential factor.
66. The rate of a particular reaction quadruples when the temperature from 293 to 313 K . Calculate the energy of activation for such a reaction [Hint: $k_2/k_1=4$]

67. The rate of a particular reaction becomes thrice when the temperature changes from 293 to 323K. Calculate the energy of activation .
68. k for second order reaction has a value of 5.70×10^{-5} L mol^{-1} s^{-1} at 298 K and a value of 1.64×10^{-4} L mol^{-1} s^{-1} at 313 K . Calculate the Arrhenius parameters . [hint: first calculate E_a and then using that value , calculate A.]
69. For the decomposition of N_2O_5,$k=3.46\times10^{-5}$ s^{-1} at 298K and k= 4.87×10^{-3} s^{-1} at 338K . Calculate the activation energy for the reaction.
70. Draw a labelled potential energy diagram for (i) an exothermic reaction and (ii) an endothermic reaction ,in accordance with the activated complex theory of reaction rates.
71. Discuss briefly the transition state theory of reaction rate.
72. Explain how a catalyst increases the rate of a reaction.
73. Give three important characteristics of catalytic reactions.
74. Explain the terms catalytic promoter and catalytic poison with an example each.
75. Distinguish between homogeneous catalysis and heterogeneous catalysis. Give an example for each.
76. Briefly discuss the intermediate compound formation theory of homogeneous catalysis .
77. Briefly discuss the adsorption theory of heterogeneous catalysis .
78. Mention three important characteristics of enzyme catalysis.
79. Explain the mechanism of enzyme action.
80. Give the Michaelis-Menten equation and explain the terms.

MODULE II

PART C

1) State and explain *Beer-Lambert* law.
2) Derive a relationship connecting *absorbance* of a solution and its *concentration.*
3) Distinguish between the terms *absorbance* and *transmittance.*
4) State *Beer-Lambert law* and briefly describe one application of the law. Mention its limitations.
5) When a monochromatic light is passed through 5 cm length of a 0.075 M solution of a substance, the emergent intensity is found to be half of the initial intensity. Calculate the *molar extinction coefficient* of the substance.
6) An aqueous solution of an organic substance absorbs 25% of the incident radiation in a path length of 3 cm. The molar absorption coefficient of the substance is 1.2 L mol..cm... Calculate the *concentration* of the solution.
7) A solution of a substance absorbs 15% of an incident monochromatic radiation in a path of length 2 cm. What percentage of the same incident light would be absorbed if the concentration of the solution is *tripled* for the same path length?
8) An aqueous solution of an organic dye in a Beer cell absorbs 20% of the incident light. What percentage of the same incident light will the same solution absorb when taken in a cell twice longer than the first?

9) At 360 nm, a blue filter transmits 37% and a yellow filter transmits 19% of light. What is the transmittance at the same wavelength of the two filters in combination?
10) In a cell, 0.001 mol dm.. solution of a substance absorbs 10% of incident light. What concentration of the same solute in the same cell will absorb 90% of incident light?
11) A 0.03 mol L.. solution of a substance has an absorbance of 2.0 at 660 nm in a cell of length 1 cm. Calculate the percent absorption for a 0.015 mol L.. solution in the same cell.
12) How do *photochemical reactions* differ from *thermal reactions?*
13) State and explain: (i) Grotthuss-Draper law; (ii) Stark-Einstein law.
14) State and explain *Einstein's law of photochemical equivalence.* Explain the term *quantum efficiency.*
15) Define *quantum yield* of a photochemical reaction. Explain the high quantum yield for the hydrogen-chlorine reaction.
16) Calculate the energy of an einsteinof radiation of wavelength 250 nm.
17) Calculate the energy available on absorption of 1.5 einstein of a radiation of wavelength 5560...
18) What is meant by fluorescence? How would you explain fluorescence?
19) Define the term *phosphorescence* and explain the phenomenon.
20) Write a short note on *photosensitization.*
21) Explain the mechanism of the photochemical *hydrogen-chlorine reaction.*
22) Explain the terms 'chemiluminescence' and 'bioluminescence'.
23) Explain the mechanism of the *hydrogen-bromine reaction* and explain its quantum yield.
24) Explain with mechanism an example for a photochemical reaction that has a high quantum yield.
25) What are *radiative* and *non-radiative transitions?* Explain.
26) Draw the *Jablonsky diagram* anf explain the various types of transitions.
27) Explain the main differences between the two terms *internal conversion* and *intersystem crossing.*
28) Distinguish between the terms *photochemical reaction* and *chemiluminescence*with suitable examples.
29) Give two examples for *photosensitization* highlighting the role of photosensitizer.
30) Explain the terms *primary process* and *secondary process* with illustrative examples.
31) What is meant by *chemiluminescence*? Explain with two examples.
32) Explain the significance of *photosynthesis* highlighting the role of *chlorophyll* in it.

Module III

PART C

1. Explain the term adsorption with suitable examples.
2. Is the adsorption process exothermic or endothermic? Justify your answer. Define enthalpy of adsorption.
3. Explain the term physisorption with suitable examples.
4. Explain the term chemisorptions with suitable examples.
5. Distinguish between the terms physisorption and chemisorptions.

6. How can physisorption be experimently distinguished from chemisorptions?
7. Mention the factors that influence the adsorption of a gas on a solid surface.
8. Explain the influence of temperature on gas adsorption and solid surfaces.
9. Briefly explain the effect of pressure on the adsorption of gas on a solid.
10. Derive the freundlich adsorption isotherm from empirical arguments.
11. How is Langmuir adsorption equation useful in the determination of the surface area of an adsorbent?
12. What are the limitations of Langmuir's theory of unimolecular adsorption ?
13. Give the main postulates of the BET theory and discuss the BET equation.
14. Explain how BET studies can be used to calculate the surface area of the adsorbent.
15. One gram of a sample of an adsorbent required 55 mL of nitrogen at STP to completely cover its surface with a monolayer. calculate the surface area of the adsorbent sample. Given: the area of cross-section of N_2 molecule = 16.2 $Å^2$.
16. The volume of nitrogen required at STP to cover the surface of a sample of iron catalyst with a monolayer as determined from the BET plot was found to be 8.15 cm^3g^{-1} of the adsorbent. The area occupied by one nitrogen molecule is $16.2\times10^{-20}m^2$. Calculate the surface area per gram of the iron catalyst.
17. Explain the term surfactants with suitable examples.
18. What are micelles ? write briefly on their structure.
19. Mention three applications of adsorption.
20. Distinguish between the terms true solution, colloidal solution and suspention.
21. What are sols and emulsions? Give an example for each.
22. Distinguish between lyophilic colloids and lyophobic colloids.
23. Briefly explain one condensation method and one dispersion method for the preparation of lyophobic sols.
24. Explain the term dialysis.
25. How are sols purified by ultrafiltration?
26. Write a note on tyndall effect.
27. Briefly explain (i) an optical property and (ii) a kinetic property of colloids.
28. Explain the term electrophoresis as applied to the colloidal system.
29. Write a note on electroosmosis with regard to sols.
30. Explain the term electrical double layer.
31. How do charges originates on colloidal particles?
32. Explain the stability of sols.
33. What is meant by coagulation of sols ? describe how it can be brought about.
34. Explain the following:
    (a)hardy-schulze rule; (b) protective colloids
35. What are protective colloids? Give an example. How is the protective action of a colloid measured?
36. Explain the term gold number.
37. Write a note on the role of emulsifying agents with suitable examples.

38. Explain the term macromolecular colloids and multimolecular colloids.
39. Explain in detail the term associated colloids.
40. Discuss two condensation methods for the preparation of lyophobic sols.
41. Explain how the bredig's arc method can be used for the preparation of metallic sols.
42. Bring out the importants of colloid chemistry in the present day world.
43. Explain the cleansing action of soap and detergents.
44. How are emulsions classified?
45. How are emulsions prepared?
46. Discuss the generally properties of emulsions.
47. Briefly explain two tests for determining the type of emulsion.
48. What are gels? Distinguish between elastic and non-elastic gels.
49. What is the essential difference between a sol and a gel? Explain the term 'thixotropy'.
50. Write briefly on the structure and properties of the gels.
51. Explain the term dorn effect.
52. What are the applications of emulsions?
53. Mention the applications of gels.
54. Write briefly on the applications on colloids in food and medicine.

Module IV

PART C

1. Explain the general principle of *chromatography* .
2. How are chromatographic techniques classified on the basis of the type of phases involved ?
3. Distinguish between the terms *adsorption chromatography* and *partition chromatography*
4. Explainthe principle of *adsorption column chromatography* .
5. How is *adsorption column chromatography* carried out ?
6. What is *LSC* ?Explain its principle .
7. Write a short note on *partition column chromatography* .
8. Explain the principle of paper chromatography .
9. Explain how paper chromatography is carried out.
10. In what important respects do the paper and thin layer chromatographic techniques differ?
11. What are the application of paper chromatography?
12. Explain the principle of *TLC*.
13. How is *TLC* carried out?
14. What are the applications of *TLC*?
15. What is R_f value? Explain its significance.
16. What is *GLC*? What is its basic principle?
17. Evaluate the merits and demerits of *liquid-solid chromatography*.
18. Mention the merits of the two planar chromatographic techniques.
19. Discuss the applications of *gas-liquid chromatography*.
20. What are the merits and limitations of *GLC*?

21. Explain the term *development of chromatogram* as applied to paper chromatography.
22. Explain the principle of *gel permeation chromatography* .
23. How is *gel permeation chromatography* carried out ?
24. Give the important application of *gel permeation chromatography*.
25. Discuss how *gel permeation chromatography* finds use in the characterisation of polymers.
26. Mention the important merits and limitations of *gel permeation chromatography*.
27. What is *HPLC*? Explain its principle.
28. Explain how *HPLC* is applied in adsorption column chromatography.
29. Discuss any two applications of *HPLC*.
30. Discuss the merits and limitations of *HPLC.*

Module V

PART C

1. Calculate and compare the energies of two radiations, one with wave length 800nm and the other with 400 nm.
2. Briefly mention three types of spectroscopic techniques indicating the type of transitions involved and the kind of radiations that cause them.
3. Which among the following molecules will give rise to a *rotationspectrum*: Br_2, HBr, CS_2, CCl_4? Explain your answer.
4. Derive an expression for the *momentofinertia* of a diatomic rigid rotator.
5. Derive an expression for the *rotationalenergy* of a diatomic rigid rotator.
6. How can rotational spectral data be used to calculate *momentofinertia* in the case of diatomic molecule?
7. Explain how rotational spectroscopy can be used to calculate the *bondlengths* in diatomic molecules.
8. Explain how internuclear separations can be studied from *rotational* spectra.
9. Give the expression for the *rotationalenergy* of a diatomic molecule treated as a rigid rotator. Show that the spectral lines for such a molecule are *equallyspaced*.
10. The rotational spectrum of gaseous HBr has a series of equispaced lines separated by 16.94 cm^{-1} .Calculate the moment of inertia and bond length for HBr .[H=1.008 ; Br=79.909]
11. In rotational spectrum of HF, the lines are 41.9cm^{-1} apart .Calculate the *momentofinertia* and *bondlength* of HF. [H=1.008;F=19.0]
12. The bond length in HCl molecule is 127.5 pm .Calculate the wave number in cm^{-1} for the transition J=0 to J=1 for this molecule.[Atomic mass :H=1.008×10^{-3} kg mol^{-1} ; Cl=35.45×10^{-3} Kg mol^{-1}].
13. Sketch the different *vibrationalmodes* of CO_2.Classify them as IR-active and IR-inactive modes and explain your answer.
14. Diagrammatically represent the different *vibrationalmodes* of CO_2 .How many fundamental peaks will be observed in the IR secptrum of CO_2? Justify your answer.

15. Sketch the different *vibrationalmodes* of H_2O. Which of them are IR active?
16. Explain how vibrational spectroscopy can be used to calculate the *forceconstant* of a bond in a diatomic molecule.
17. Explain the term *fundamentalbands* and *overtonebands* with reference to IR spectroscopy.
18. Discuss the vibrational energy levels of an anharmonic oscillator. How is the selection rule for vibrational transitions modified for an anharmonic oscillator?
19. Show that the wave number in cm^{-1} of the IR radiation causing a vibrational transition in a simple harmonic oscillator is equal to the vibrational frequency in cm^{-1} of the mode that is excited.
20. Give that the fundamental vibrational frequency for HI is $2192.5cm^{-1}$, calculate the *forceconstant* of the H-I bond. [H=1.008; I=126.9].
21. If the force constant of HCl bond is 482.086 Nm^{-1}, calculate the *fundamentalvibrational* frequency in s^{-1} . [H=1.008; Cl = 35.45].
22. Give that the force constant of the carbon –oxygen bond in CO is at $1850.64Nm^{-1}$, calculate the *fundamentalvibrationalfrequency* in cm^{-1} . [C=12; O=16].
23. The IR absorption peak for HBr is found at 3770 nm. Calculate the force constant of the H-Br bond. [H=1.008 amu ; Br=79.30amu] [*Hint*: convert λ to meter; calculate ν in s^{-1} using the formula $\nu = c/\lambda$ and then calculate the force constant.]
24. Briefly discuss the concept of *groupfrequencies* with regard to the IR spectra of organic compounds.
25. What is meant by *fingerprintregion* and what is its significance in the IR spectral studies of organic compounds?
26. What is *Ramanshift*? Give the classical theory of Raman shift.
27. Diagrammatically represent the different vibrational modes of CO_2. How many fundamental peaks will be observed in the Raman spectrum of CO_2? Justify your answer.
28. Discuss the quantum mechanical concept of *Raman scattering*.
29. Explain the terms *Stokes* and *anti-Stokes* lines with regard to Raman spectra.
30. Explain the selection rules for *vibrational* and *rotational* Raman spectroscopies.
31. Explain the *rule of mutual exclusion*.
32. Give the selection rules for *vibrational* and *rotational* Raman spectroscopies.
33. The fundamental vibrational frequency of HCl is $8.8652 \times 10^{13} s^{-1}$ .calculate the frequency of the first Stokes line obtained in s^{-1} if HCl is irradiated with 436.8 nm mercury line.
34. When a sample is irradiated with radiation of wavelength 4000ÅαΨΩθ, the first Stockes line is obtained $350cm^{-1}$ away from Rayleigh line in the spectrum. Calculate the frequency in cm^{-1} at which the first anti-Stokes line will be obtained?
35. Why are anti-Stokes lines less intense than the Stokes line in the Raman spectrum?
36. Explain the term *hotbands* which regard to vibrational spectroscopy .How can hot bands be distinguished from *fundamentals* and *overtones*?
37. Discuss the *complementarycharacter* of IR and Raman spectroscopies.
38. Discuss the applications of IR spectroscopy.
39. Discuss the applications of Raman spectroscopy.

40. Discuss the significance of the term *fingerprintregion* with regard to vibrational spectroscopy.
41. Explain with an illustrative example how IR spectroscopy can be helpful in organic structure elucidation.
42. Explain how IR spectral analysis can be used to detect *hydrogenbonding* in organic molecules.
43. What are the different types of *electronictransitions* in molecules? Arrange the in the increasing order of energy.
44. Explain the general broadness of spectral bands in UV –visible spectroscopy.
45. State *Franck-Condon principle* and explain it with regard to electronic transitions in a diatomic molecule.
46. Discuss the significance of *Franck-Condon principle* in explaining the intensities of spectral lines in electronic spectroscopy.
47. Discuss the theory behind the dissociation of a diatomic molecule through absorptive electronic transitions.
48. How can *dissociationenergy* for a diatomic molecule determined from electronic spectral data.
49. Explain the terms *bathchromic* and *hypsochromic* shifts with suitable examples.
50. Distinguish between the terms *bathchromic* and *hypsochromic* shifts.
51. Explain the terms *chromophores* and *auxochromes*.
52. Mention the application of electronic spectroscopy in organic chemistry.
53. Briefly explain the principle of *spectrophotometry*.
54. Explain the use of electronic spectroscopy in the quantitative estimation of organic molecules.
55. Given that for ^{19}F, $g_N = 5.257$ and that the nuclear magneto (β_N or μ_N) $=5.05 \times 10^{-27} JT^{-1}$, calculate the NMR frequency of the nucleus in a magnetic flux density of 1.4973 T.
56. Calculate the NMR frequency of bare proton in a magnetic field of 51.67×10^3 gauss. Given: $g_N = 5.585$, β_N (orμ_N) $= 5.051 \times 10^{-31} JT^{-1}$.
57. Given: $g_N = 5.585$, β_N (orμ_N) $= 5.051 \times 10^{-27} JT^{-1}$, calculate the magnetic flux intensity required for proton magnetic resonance at 350MHz.
58. Draw schematic diagrams of the PMR spectra of (i) phenol and (ii) benzaldehyde. [Hint: (i) A 5- proton multiplet around 7δ for the aromatic protons and a 1- proton singlet at 5-6 δ for the OH proton ; (ii) A 5 - proton multiplet around 7δ for the aromatic protons and a 1- proton singlet at 10 δ for the CHO proton .]
59. Explain the term *larmorprecession* and based on the concept, explain nuclear magnetic resonance.
60. Explain the term *diamagneticshielding* as applied to NMR spectroscopy.
61. Explain the term *chemicalshift* in NMR spectroscopy.
62. What is the most common reference compound used in NMR spectroscopy? Why is it advantageous to use it as a reference compound?
63. Explain the term *shielding* and *desheilding* with regard to NMR spectroscopy.

64. How does *shielding* of protons affect the positions of their signals in the NMR spectra?
65. Explain the term *magneticantisotropy*.
66. Discuss the term *spin – spincoupling*.
67. Mention the general rules that are helpful in determining the multiplicity of a signal due to a set of equivalent proton in PMR spectra.
68. Explain the splitting of a signal into multiplet due to spin – spin coupling taking the example of the NMR spectrum of *ethyl bromide*.
69. Draw the schematic sketches of the PMR spectra of (i) *ultrapureethanol* and (ii) *acidifiedethanol* and highlight the difference between the two.
70. Explain the term *chemical exchange*.
71. Explain the lower multiplicities of the peaks in the NMR spectrum of *acidified ethanol* as compared to the corresponding peaks in the NMR spectrum of *ultrapure ethanol*.
72. Sketch the schematic NMR spectrum of *butanone*. Label the signals and explain their multiplicities.
73. Draw the schematic sketches of the PMR spectra of *acetone* and *acetophenone* and highlight the difference between the two.
74. Suppose you have two NMR spectra one of *benzene* and the other of *phenol.* How would you identify which is which how will you distinguish between *1-chloropropane* and *2-chloropropane* from their and NMR Spectra [*Hint*: The former has three different sets of equivalent protons -CH_3 , CH_3 , $CH_2$and 7Cl-attachedCH_2; the latter has only two-CH_3(the two sets being equivalent) and CH.]
75. Explain how PMR spectroscopy can be used to distinguish between ethylbenzene and *para – xylene*?
76. How can the NMR method be used to distinguish between the structures of propane-1-ol and propan-2-ol ?[*Hint*: The former has four different sets of equivalent protons-CH_3 , CH_2

,'OH'- attached CH_2 and OH ;the latter has only three-CH_3. (The two sets being

Equivalent) and CH.]

77. Draw the H NMR spectrum of *1,3-dibromopropane* and explain it.

78. Discuss the applications of NMR spectroscopy.
79. Nuclear spin -spin splitting is observed in 2-methylpropane, but not in 1-Chloro-2,2-dimethylpropane .Explain why.
80. Sketch the schematic NMR spectrum of *ultrapure ethanol* and explain the peaks.
81. Explain the diagrammatically the types of peaks obtained in the PMR spectrum of *ehylbromide*.
82. How will you account for the different types of peaks in the NMR spectrum of *acetaldehyde*?
83. Discuss the PMR spectrum of *ethylacetate*.
84. Give a diagrammatic representation of the NMR spectrum of *toluene* and explain the signals in it.
85. Explain the H NMR spectrum of *acetophenone.*
86. Explain the significance of the term *chemical equivalence* in relation to the number of signals that appear in the PMR spectrum of an organic compound.
87. Explain the term *coupling constant* and discuss its significance in NMR spectroscopy.
88. Draw the schematic sketch of the PMR spectrum of *methoxymethane* ant discuss it in the light of the structure of the compound.

89. Draw the schematic sketch of the PMR spectrum of *ultrapure ethanol* and explain the splitting of signals.
90. Sketch schematically the PMR spectrum of *propanal* and correlate it with its structure.
91. Bring out the significance of the term *magnetic equivalent* in PMR spectroscopy.
92. Draw the schematic sketch of the PMR spectrum of *acetone* and explain it on the basis of the structure of acetone.
93. Discuss the *sensitivity* and *chemical shift* in respect of 13 C NMR spectroscopy as compared to H NMR spectroscopy.
94. Explain the term *spin-spin coupling* and the *multiplicity* of signals as related to13 C NMR spectroscopy.
95. Explain how C NMR spectra can be simplified by the process of *noise decoupling*.
96. Given : for a free electron , the electron g factor(g_e)=2.0023and Bohr Magneton (β) =9.274×10^{-24} .Calculate the frequency of the radiation required to effect a transition between its spin states in a magnetic field of 0.37T.[h=6.625×10^{-34}].
97. Given: for a free electron , the electron g factor(g_e)=2.0023and Bohr Magneton(β) =9.274×10^{-24} .Calculate the magnetic field required its resonance at a frequency of 9.534 GHz.

ModuleVI

PART C

1. Explain the term symmetry operation and element of symmetry with a suitable example.
2. Define a mirror plane. Explain the different kinds of mirror planes found in molecules.
3. Explain the terms proper rotation and proper rotation axis with suitable examples.
4. Explain the difference between vertical, horizontal and dihedral mirror planes.
5. Explain the meanings of centre of inversion and inversion operation. Name three examples for molecules which possess a centre of inversion.
6. Define centre of symmetry. State whether the following molecules are centrosymmetric or not: (i) BF_3; (ii) CH_4; (iii)H_2; (iv) $[PtCl_4]^{2-}$; (v) $CH_2=CH_2$; (vi) PCl_5.
7. Explain the term improper rotation with a suitable example.
8. Distinguish between proper rotation and improper rotation.
9. Discuss the term multiplication as applied to symmetry operations.
10. What is meant by the inverse of an operation? Explain with suitable examples.
11. What is a mathematical group? What conditions must be satisfied by its members?
12. Explain the term point group and the criteria for it.
13. What are the important properties of a point group?
14. What are finite and infinite groups? Explain with examples.
15. Explain the term abelian groups and non-abelian groups.

Module I

PART D

1. Derive the general integrated rate equation for a nth order reaction (n>1) and show that the time for half change is inversely proportional to the $(n-1)^{th}$ power of the initial reactant concentration .
2. Derive the integrated rate equation for second order reaction when there is only one reactant , or when there are two reactants and both have the same initial concentration .
3. Derive the integrated rate equation for second order reaction when the two reactants have different initial concentration.
4. Explain two methods of determining the order of a reaction.
5. Discuss the following methods to determine the order of reaction: (a) Ostwald's isolation method;(b) initial rate method.
6. Explain the following methods to determine the order of reaction : (a) van's Hoff's differential method ; (b) fractional change method .
7. Give Arrhenius equation and explain the significance of the Arrhenius parameters .
8. Discuss two methods for determination of Arrhenius parameters .
9. Derive an equation for rate constant of a bimolecular second order reaction from collision theory.
10. What are the main postulates of the collision theory of bimolecular gaseous reactions? How does collision theory explain the effect of temperature on the rate of a reaction?
11. Discuss the Lindemann theory of unimolecular reactions with special reference to the use of steady state approximation .
12. Discuss the salient aspects of the transition state theory of reaction rates .Discuss the Eyring equation.
13. Discuss the intermediate compound formation theory of homogeneous catalysis and illustrate it with a suitable example.
14. Discuss the adsorption theory of heterogeneous catalysis .How does it explain the action of promoters and poisons ?
15. Explain the Michaelis-Menten theory of the mechanism of enzyme action and briefly discuss Michaelis-Menten equation in respect of the kinetics of enzyme catalysis .
16. Discuss the use of steady state approximation to the kinetics of chain reactions .
17. Explain the significance of Eyring equation in the activated complex theory in relating the thermodynamic parameters of activation

MODULE II

PART D

1. (a) State *Stark-Einstein law* and explain the term *quantum yield* of a photochemical reaction. Explain why the quantum yield of the *hydrogen-chlorine reaction* is very high
   (b) Write a brief note on *photosensitization.*
2. Bring out the essential difference between *fluorescence* and *phosphorescence* giving importance to the mechanisms of the two phenomena.

3. (a) Explain the term 'quantum yield'.
   (b) Discuss the possible reasons for the observation that quantum yields are lower or higher than unity in most photochemical reactions.

Module III

PART D

1. Briefly discuss the postulates of langmuir's adsorption theory and derive langmuir's adsorption equation.
2. Discuss the various factors that affect adsorption of gases on surfaces.
3. Discuss the BET equation and its utility in the determination of surface area of a adsorbent.
4. Discuss the different method of preparation of sols.
5. Discuss the electrokinetic phenomena exhibited by lyophobic colloids.
6. (a) discuss in detail the donnan membrane equilibrium.
   (b) discuss the significant of donnan membrane equilibrium.
7. (a) how are colloidal solutions purified?discuss.
   (b) write a note on the applications of colloids.
8. (a) what are the important differences between the lyophilic sols and lyophobic sols?
   (b) explain an electrical property of sols.
   (c) what is meant by isoelectric point?
9. (a) explain the following as applied to sols: (i) tyndall effect; (ii) electroosmosis
   (b) explain why lyophilic system are more stable than lyophobic systems.
10. (a) discuss electrical properties of sol.
    (b) state and explain hardy-schulze law.
11. (a) explain the following as applied to sols with suitable examples:
    (i)coagulation (ii) electrophoresis.
    (b) what are emulsion? How are they classified?
12. (a) what is meant by protective colloid? Explain the term gold number.
    (b) explain the electrodialysis method for purification of sols.
13. (a) what are emulsifying agents? Explain their role.
    (b) how can lyophobic sol be coagulated? Exaplain.
    (c) what is meant by Brownian movement?
14. (a) explain the term electrical double layer and zeta potential.
    (b) discuss the application of colloidal chemistry in industry.
15. Illustatratively distinguish between multimolecular, macromolecular, and associated colloids.
16. (a) what is meant by coagulation of a sol? Explain tyhe most important method by which it can be brought about.

(b) explain the following phenomena: (i) precipitation of ferric hydroxide around the cathode when aqueous $Fe(OH)_3$ sol is subjected to the action of an electric field; (ii) formation of details.

MODULE IV

PART D

1. Explain the basic principle of chromatography . How are the various chromatographic processes classified on the basic of the type of phases involved ?
2. Discuss the principle and the techniques of *adsorption column chromatography* .
3. Describe the paper chromatographic technique in terms of its principle and process .
4. What is *TLC* ? Explain its principle and how it is carried out .
5. Discuss the different aspects of *column chromatography* .
6. What is *GLC* ?Explain its principle . Explain briefly how the method is carried out .
7. Distinguish between the techniques of *paper chromatography* and *thin layer chromatography* .Explain the significance of measuring the R_f values of the components in both .
8. Briefly explain the principle of *gel permeation chromatography* and how the method is carried out .
9. Discuss the principle of *HPLC* explain how the process can be carried out in the column mode using an adsorbent as the stationary phase .
10. Discuss the relative merits of the different chromatographic techniques .

Module VI

PART D

1. Arrive at expressions for (i) the moment of in inertia and (ii) expression for rotational energy of a rigid diatomic molecule.
2. Describe briefly the principle of *microwave spectroscopy* .What are its applications?
3. Bring out the relationship between the *vibrational energy* and *frequency* of oscillation of a diatomic molecule based on the simple harmonic oscillator model. Comment on the spacing of the vibrational levels and bring out significance of *zero point energy*.
4. Explain the term *force constant* on the basis of the simple harmonic oscillator model of a diatomic molecule. How is it determined using IR spectral information? How is it related to the bond parameters?
5. Discuss the significance of the *concept of group frequencies* in IR spectroscopy and its application in organic structural elucidation.
6. Discuss the quantum mechanical concept of Raman Effect and explain Stocks and anti-Stokes lines.
7. Discuss the classical concept of the Raman Effect and arrive at the essential condition for a vibration or rotation to be Raman-active.
8. Discuss the Rotational Raman spectra of diatomic molecules and explain the quantum mechanical selection rule.

9. (a) Discuss the *dissociation energy* of a diatomic molecule with suitable energy plots in a case where electronic excitation leads to dissociation of the molecule.

   (b)Distinguish between the terms *single state* and *triplet state* as related to the electronic States possible for a molecule.

10. Discuss the theory of electronic spectroscopy of a diatomic molecule.
11. Discuss *Franck – Condon principle*. Explain how dissociation of a diatomic molecule can occur through absorption of radiation and how the dissociation energy can be determined from electronic spectra data.
12. Discuss the various applications of *electronic spectroscopy*.
13. Discuss the quantum mechanical description of *nuclear magnetic resonance*.
14. Explain the factors that affect chemical shifts in NMR spectroscopy.
15. Explain briefly the basic principle of NMR spectroscopy.
16. Illustratively explain the signals in the NMR spectrum of (i) one aromatic hydrocarbon and (ii) an aromatic ketone.
17. Explain what differences you will find in the NMR spectra of ultrapure ethanol and a sample of ethanol containing a small amount of acid.
18. Discuss that significance of the terms *chemical shift* and *spin-spin splitting* in NMR spectroscopy with illustrative examples.
19. Discuss the factors that influence chemical shifts in PMR spectroscopy.
20. Briefly discuss the principles of ^{13}C NMR spectroscopy and also the application of the method in organic structural elucidation.

Modue VI

PART D)

1. Explain the different kinds of symmetry operations with suitable examples.

GEC5PM01 PHARMACEUTICAL MANAGEMENT

Module 1

PART A

1. ..... is regarded as the father of scientific management.
2. Fayol divided all industrial activities into six groups. Write any one.
3. ..... is the harmonization of all the activities of a concern in order to facilitate its working and its success.
4. An effective co-ordination helps in.....
5. Write any one type of co-ordination
6. ..... is the establishment of relationship with a view to coordinate the activities of all the departments , division etc and other workers.
7. Write any one type of internal coordination
8. ..... refers to coordination of relations and activities between the authorities and employees of same status.
9. ..... is the first stage in coordination which is also regarded as an important method of coordinating the efforts
10. Write any one techniques of coordination.
11. The informal communication is the..... and ..... of the organizational process.

ANSWER KEY

1. F.W Taylor
2. Accounting
3. Coordination
4. Increasing the efficiency of the business
5. Internal coordination
6. Internal coordination
7. Vertical coordination
8. Horizontal coordination
9. Managerial order
10. Coordination by command
11. Part and parcel

Module II

PART A

1. ICDRA stands for……

2. DMF stands for……..
3. What is EDMF?
4. …… & …….. helps to be a successful RA professional
5. APR stands for……..
6. ……. is not considered as a powerful management tool
7. ……. is essential for preventing cross contamination
8. Regulatory affairs (RA), also called……
9. ICE number is……..

Answer key

1. International Conference of Drug Regulatory Authorities
2. Drug Master File
3. European Drug Master File
4. Diverse education & Work experience
5. Annual Product Review
6. Annual Product Review
7. Pharmaceutical clean
8. Government affairs,
9. Import Export Code number)

Module III

PART A

1.pharmaceutical management is also known as

2. In Canada ……billion spent on 2004 to market drugs

3. Provision of drug sample is an example of

4. the use of gifts embossed with pharmaceutical products names has been prohibited by

5. PhRMA is ……

6. receiving …….. doesnot reduce prescribing behavior

7. CME stands for

8. number of pharmaceutical representatives in USA

9. KOL stands for

10. ……is generally used for promoting medication

11. in USA marketing and distributions of pharmaceuticals regulated by……..

Module Iv

Part A

1. ……..is the vital function of business
2. ……..is the bridge for introducing new goods and services in the market
3. ……..is the art and profession of selling
4. Personal selling also called……..
5. Salesmanship helps in……
6. Salesmanship is useful to know the ……..of customers
7. Advantage of salesmanship is……..
8. Presale preparation is coming under…….process
9. Selling points and advice should be given without…….
10. The success of sales person depends on……..
11. Anyone of important fundamental success of salesmanship
12. write a principle of selling that a salesman should learn
13. write a piece of advice that salesman should remember while dealing with customer
14. The maximum sales can be achieved by using ……..
15. ……..is a certificate that entities its holder to a specified saving on the purchase of a specified product

Answer key

1. Selling
2. Selling
3. Salesmanship
4. Salesmanship
5. Undertaking needs
6. Attitude
7. Locating prospective buyers
8. Selling
9. Hesitation
10. Degree to which their presentation with the attitude of the costumer
11. Knowledge of product
12. He should try to understand the requirements of his customer well
13. Treat the customers would like to be treated
14. Various techniques of sales
15. Coupon

Module v

PART A

1. ……... is based on the law of statistical regularity and the law of inertia of large numbers.
2. Marketing research is the application of the systems approach to the task of…….
3. A research design is a master plan or model for conducting……...
4. All marketing research can tap two sources of data for investigation. What are they?
5. ……. has no geographic limitation.
6. What are the major weakness of mail survey?
7. ……... is provided to get co-operation and quick return of duty completed questionnaire.
8. ……. Is an important tool to find out casual relationship.
9. ……... is the process by which response categories are summarized by certain symbols to carry out subsequent operations of data analysis.

ANSWER KEY

1. Sampling
2. Collecting,organizing,analyzing and interpreting desired marketing information.
3. Formal investigation
4. Internal source and external source
5. Mail survey
6. High rate of refusal and lower degree of accuracy
7. Gift/incetive
8. Experimental method
9. Coding

Module VI

Part A

1. Write any two modes of purchasing ?
2. Materials management maintains the continuity of production by providing…….
3. The main role of material management …….
4. The important input in a manufacturing organization are…….
5. Material management continous monitoring on the……. and……..
6. Write any three objectives of purchasing
7. Write any two functions of purchasing department.

ANSWER KEY

1. i) Purchasing by requirement
   ii)Market purchasing
2. Regular uninterrupted supply of raw material.
3.
4. Men, material and machinery
5. Input costs,transportation costs
6. Right source,right quality,right quantity
7. i)Checking of the bill and marketing the payment
   ii)Distribuiting the goods to store.

Module V II

Part A

1. ……means creation of utility.
2. The elements essential for production are……., ……. and ……..
3. …….. is generally the chief authority of production department.
4. …….. provides management with the information necessary to plan and schedule work in the plant so that the minimum expense and optimum efficiency can be achieved.
5. …… refers to ensuring the work according to plans.
6. Ppc means……
7. Ppc can be scientifically sub divided into three parts they are ……., …….. and ……
8. Four division of work manager is ……., ……., ……..and ……..

ANSWER KEY

1. Production
2. Men, material and machines
3. Works manager
4. Production planning
5. Production comtrol
6. Production planning and control
7. Production planning, regulating of production and production control
8. Managr production planning, chief engineer ,quality control and cost controller

Module I

PART B

1. Is productivity affected by employee Morale ? How ?
2. Distinguish between motivation and morale.
3. Define Authority.
4. Explain with suitable examples the limitations of an authority.
5. Distinguish between the Fayol's concept and Taylor's version of management.
6. "Functions of Management is to manage workers and work". Comment.
7. Explain the significance of communication.
8. Differentiate between oral communication and written communication.
9. Explain the steps involved in decision making.
10. List out the traits of leader

Module II

PART B

1. Procedure for import of drugs
2. What is meant by drug regulatory affairs
3. Rules related to export of drugs from India
4. Guidelines for export of drugs
5. Regulatory compliance of drug regulatory affairs
6. Challenges in data integrity
7. Note on Health care regulatory authorities
8. Note on recent developments in RA
9. Note on core competence of RA
10. Define RA

Module II I

Part B

1. Note on direct selling
2. Note on manufacturer wholesaler
3. Note on indirect selling
4. What are the advantages of wholesaler
5. Note on small scale retailer
6. What are the functions of retailer
7. Discuss the disadvantages of retailer
8. Define transportation
9. What are the services performed by retailers
10. Discuss the advantages of retailer
11. What is meant by wholesaler
12. What is retailer
13. Define multiple shops

14. Note on mail order business
15. What are the successful factors of mail order business
16. Note on benefits of marketing

Module IV

Part B

1. Define sales promotion
2. Name different techniques of sales promotion
3. Define the term sales manship
4. Name the various steps in selling process
5. Explain the term salesman
6. Define personal selling
7. Define advertising
8. Name the various methods used for advertising the pharmaceutical products
9. Define detailing
10. Define canned detailing
11. Define outdoor advertisement
12. Name the various media of advertisement
13. Name the different qualities of salesman
14. What are the objectives of sales promotion
15. Write the advantages of salesman ship
16. what are the personal qualities of good sales man
17. State the objectives of advertising
18. Distinguish between advertising and publicity
19. What are the various media for advertising
20. What are the main advantages of advertising
21. Discuss the disadvantages of advertising
22. Write the essential features of good advertisement
23. Write the difference between advertisement and sales promotion
24. Give the various points of advice to medical representative
25. Write the important advices which a salesman should follow
26. Discuss the important principle of selling
27. Give a specimen of model detailing
28. Explain the term sales promotion. Discuss the various techniques of sales promotion. write the objectives of sales promotion
29. What various methods would ypu suggest foran effective sales promotion campaign for your firm's product that hasrecently shown some declineinsales
30. What is personal selling? Discuss the various steps in sales process. What are the advantages of sales man ship

31. Define the advertising. Discuss the various media for advertising. Rite the advantages and disadvantages of advertising
32. Discuss the varios methods used for advertising pharmaceutical products. Mention the essential features of good advertisement
33. Explain the term salesmanship. Discuss the various steps in the selling process. Write the advantages of salesmanship
34. Explain the qualities of good salesman
35. Define the term advertising. Discuss the different parts of advertisement. Write the essential features of good advertisement
36. Explain the term salesmanship. write the fundamentals f success in salesmanship
37. Define detailing. Discuss the different stages of detailing
38. Define detailing. Write the advantages and disadvantages of canned detailing. Write a specimen model of detailing

Module V

PART B

1. Define marketing research.
2. What are the three operations of marketing ?Explain it.
3. What is questionnaire?
4. What is called sampling?
5. What is called questionnaire technique?
6. Explain telephone survey.
7. What is interpretation? Write three examples.

Module VI

PART B

1. What are the objectives of material management?Write any two.
2. Define purchasing?
3. Define right quality?
4. What are the steps involving purchasing procedure?
5. Write the modes of purchasing.

ModuleV II

PART B

1. What do you understand by production planning and control.
2. State the objectives of production planning.

Module I

PART C

1. Explain scientific management.
2. Write the comparison between management of F.W. Taylor and Henry Fayol.
3. Write and explain coordination.
4. Explain the types of coordination.
5. Define informal communication. Explain the merits of informal communication.
6. Demerits of informal communication
7. Write the advantages of oral or verbal communication.
8. Disadvantages of oral or verbal communication.
9. Define written communication. Write the advantages and disadvantages of written communication.
10. Define motivation. Explain the important elements of sound motivation system.
11. Define authority and explain the source of authority.

Module II

PART C

1. Challenges in supply chain
2. What are the challenges to professionals in drug regulatory affairs
3. Challenges in quality system
4. Challenges in data integrity
5. Procedure for import of drug
6. Guidelines for export of drugs
7. Note on regulatory authorities

ModuleI II

Part C

1. Note on different channels of distribution
2. Explain the term wholesaler
3. Explain the services performed by retailer
4. What are the advantages and disadvantages of multiple shop
5. Explain the disadvantages of mail order business
6. explain the successful factors of mail order business
7. explain the small scale retailing
8. explain the functions of marketing
9. note on advantage and disadvantage retailer
10. note on classification of wholesalers

11. What are the functions of wholesaler

Module IV

PART C

1. Write the important advices which a salesman should follow
2. Discuss the important principle of selling
3. Give a specimen of model detailing
4. Explain the term sales promotion. Discuss the various techniques of sales promotion. write the objectives of sales promotion
5. What various methods would ypu suggest foran effective sales promotion campaign for your firm's product that has recently shown some decline in sales
6. What is personal selling? Discuss the various steps in sales process. What are the advantages of sales man ship
7. Define the advertising. Discuss the various media for advertising. Rite the advantages and disadvantages of advertising
8. Discuss the varios methods used for advertising pharmaceutical products. Mention the essential features of good advertisement
9. Explain the term salesmanship. Discuss the various steps in the selling process. Write the advantages of salesmanship
10. Explain the qualities of good salesman
11. Define the term advertising. Discuss the different parts of advertisement. Write the essential features of good advertisement
12. Explain the term salesmanship. write the fundamentals f success in salesmanship
13. Define detailing. Discuss the different stages of detailing
14. Define detailing. Write the advantages and disadvantages of canned detailing. Write a specimen model of detailing

Module V

PART C

1. Explain Marketing research process.Explain the seven steps involving marketing research process.
2. What is questionnaire? What are the rules or guideline for designing a good questionnaire?
3. What is data collection?Explain two major types of data with their merits and demerits.
4. What is experimental research and it uses?

Module VI

PART C

1. Explain the objectives of purchasing.
2. Explain material management and write the importance of material management.
3. What is purchasing.Explain the methods of purchasing.
4. Define placing the order.

Module VII

PART C

1. Explain the various techniques of production control .
   Define production management. Add a nt on importance of production planning and condrol.

Module 1

PART D

1. 'The principle of scientific management makes the beginning of management movement'. Discuss the statement bringing out clearly the broad principles of scientific management.
2. Attempt a critical note on Fayol's contribution to management.
3. What are the sources of authority in management? Are there any limitations to such an authority?
4. Give a critical note of various methods of communications used in business management.
5. As a management leader, what problems would you do in motivating your work force? What measures would you adopt to overcome them?
6. Define communication? What is the purpose of communication in an enterprise? Write a note on principles which should guide manages towards establishing good communication network.
7. Define coordination .Discuss its importance in a business organization. Briefly explain the important characteristics of coordination.
8. Explain the term 'decision making'. Discuss the steps involved in decision making. Write its salient features.

Module II

PART D

1. Explain drug regulatory affairs
2. Scope of drug regulatory affairs

ModuleIII

Part D

1. Briefly explain the functions of marketing
2. Explain the wholesale and retail marketing

Module IV

Part D

1. Write the important advices which a salesman should follow
2. Discuss the important principle of selling
3. Give a specimen of model detailing
4. Explain the term sales promotion. Discuss the various techniques of sales promotion. write the objectives of sales promotion
5. What various methods would ypu suggest foran effective sales promotion campaign for your firm's product that has recently shown some decline in sales
6. What is personal selling? Discuss the various steps in sales process. What are the advantages of sales man ship
7. Define the advertising. Discuss the various media for advertising. Rite the advantages and disadvantages of advertising
8. Discuss the varios methods used for advertising pharmaceutical products. Mention the essential features of good advertisement

Module V

PART D

1. Explain primary data and also explain methods of obtaining primary data.

Module VI

PART D

1. Define purchasing and explain purchasing procedure and the important method of purchasing.

Module VII

PART D

1. Define the importance and functions of production management.

SDC5MC01 MEDCINAL CHEMISTRY

Module I

Part A

1. ACE inhibitors stands for
2. Thiazides belongs to
3. Digoxin obtained from
4. Increase of heart rate is
5. Anti-arrhythmia drugs used for
6. Average heart rate is
7. Nitrites are used in the treatment of
8. Example for anti angina agents
9. Drugs used for the dilation of blood vessels
10. Adverse reaction of digitalis
11. Niphedine is an example for
12. Difference between systolic and diastolic blood pressure give
13. Bretylium is an example for
14. Contraction of heart muscle is
15. Example for adnergic blocking drug
16. Propanolol hydrochloride used as
17. Reserpine obtained from
18. Example for opium alkaloid
19. Bradycardia means
20. MI stands for

Part A Answer key

1. Angiotensin converting enzyme
2. Diuretics
3. Digitalis lanata
4. Tachycardia
5. To order cardiac rhythm
6. 72
7. Angina pectoris
8. papaverine

9. Vasodilators
10. Nausea
11. Calcium blockers
12. Pulse pressure
13. Adnergic neuron blocker
14. Systole
15. Phenoxy benzamine
16. Anti arrhythmic drug
17. Rauwlofia
18. Papaverine
19. Decrease heart rate
20. Myocardium infraction

Module II

Part A

1. Agent that acts directly on the cell membrane of the microorganisms affecting permeability is ….
2. The penicillins have a carboxylic acid group placed at..
3. C-12 position is a part of the keto-enol system in …
4. The antibiotic wityh an imine functionality is….
5. Chloramphenicol is obtained from…..
6. The drug useful to treat multi-drug resistant tuberculosis is….
7. The mechanism of PAS is….
8. The antitubercular activity of isoniazid is by…
9. The conversion of amide to thioamide is achived with …
10. Cancer in gland is called…
11. The residue in DNA that exist predominantly as the keto tautomer:
12. The principal active alkylator formed from ayclophosphamide is…
13. The drug effective in Hodgkin's disease is
14. Non-steroidal anti-androgen useful as anti-cancer agent is….
15. A free radical alkylating drug is…

Part A **answer**

1. Nystatin
2. C-3

3. Tetracyclines
4. Roxithromycin
5. Steptomyces venezulae
6. Ethionamide
7. Inhibits folic acid synthesis
8. Makes the tuberculosis organism susceptible to reactive oxygen
9. Phosphorus pentasulphide
10. Carcinoma
11. Guanine
12. Phosproramide mustard
13. Mechlormethamine
14. Flutamide
15. Procarbazine

Module III

Part A

1. Naturally origin analgesis
2. Morphine is an example for
3. Diacetyl derivative of morphine
4. 4-hydrodxy acetaanilide is
5. Adverseeffect of paracetamol
6. Acetylsalicylic acid is
7. Example for para amino phenol derivative
8. NSAIDs stands for

Part A **answer**

1. Morphine
2. Naturally occurring analgesis
3. Heroin
4. Paracetamol
5. Vomiting
6. Aspirin
7. Phenacetin
8. Non-steroidalanti-inflammatory drug

Module IV

Part A

1. Give an example for one naturally occurring female hormones.
2. Oestrogens are synthesized from…
3. The inactive derivative of progesterone is…
4. The steroid metabolite that act as the main regulator of gonadotropin secreation is….
5. The steroid having a role in promoting maturation of the lung in the foetus is ….
6. Example for an orally active progestin…
7. The structural feature essencial for both glucocorticoid and mineralocorticoid activity is….
8. The reagent used for the conversion of hydrocortisone acetate to cortisone acetate is…..

Part A answer

1. Mestranol
2. Androstenedione
3. 17-α-Hydroxyprogesterone
4. Androstanediol
5. Glucocorticoids
6. Norethindrone
7. 3-Keto group on ring-A
8. CrO_3

Module V

PARTA

1. Example for long acting barbiturate
2. Replacement of oxygen at c2 barbituric acid by a sulpher atom
3. clorazepate is
4. the drug doesnot act GABA receptor is
5. anxiolytic drug with no drowsiness
6. benzodiazepines in which benzene ring at the 5 position when omitted
7. nordiazepam when alkylated with trifluro methyl bromide yields

Answers

1. Phenobarbital
2. Increase activity
3. 7-chloro-2,3,-dihydro-2-oxo-5-phenyl-1-4-benzodiazepene-3-carboxylicacid
4. Buspirone
5. Buspirone
6. Act as antagonists to the receptor
7. halozepam

ModuleI

PART-B

1. What are antihypertensive drugs?
2. Explain the classification of antihypertensive drugs.
3. Explain what is M_O A of peripheral anti adnergic drugs.
4. Draw the structure of prazozin.
5. Explain the advantages of peripheral anti adnergic drugs over other α-adnergic blockers.
6. What is M_OA of centrally acting antihypertensive drugs.
7. Explain the structure and use s of donidine.
8. Explain the mechanism of methyldopa.
9. Write a note on β-adnergic blockers
10. Explain the synthesis of propranolol.
11. Write a note on ganglionic blocking agents.
12. Explain the structure of labetalol.
13. Explain the structure of verapamil.
14. Write a note on Renin-Angiotensin system.
15. Explain the adverse effects of ACE inhibitors.
16. What are AT_2 antagonists.
17. Explain M_OA of class I agents of antiarrhythmic drugs.
18. What are calcium channel blockers?
19. Draw the structure of brelylion.

Module II

Part B

1. What are pencilins
2. What are antibacterial activity of early pencillins
3. What are antibacterial activity of pencilliase resistant pencillins
4. Note on adverse effect of pencillins

5. Note on second generation of cephalosporins
6. Note on third generation of cephalosporin
7. Explain MoA of tetracycline antibiotics
8. Give the structure of tetracycline antibiotics
9. Write the three chemical characteristics of macrolide anti**otics**
10. Write the MoA of aminoglycosides
11. Give any four examples of aminoglycosides
12. Write the MoA of Isoniazid
13. What is TB? How it's treated

Module III

PART B

1. Write the classification of antifungal agents
2. Write the MoA of Azole antifungals
3. Write the antifungal agents of antimetabolites
4. Write the MoA of pyramidine derivatives
5. Give the structure of ketoketoconazole
6. Draw the structure of abacavir
7. Draw th structure of Zidovudine
8. Write the MoA of antiHSV agents of pyrimidine nucleosides
9. Write the classification of amoebicides
10. Write the classififcation of Antihelmintics
11. Write the MoA of Mebendazole
12. Write the piperazine derivatives of Antihelmentics

Module IV

Part B

1. What is carcinoma
2. What is sarcoma
3. What is germ cell tumour
4. What is basic tumour
5. Note on cisplatin
6. Give the structure of actinomycin D
7. Classification of alkylating agents in antineoplasticagents

Module V

Part B

1. **:**General MoA of antidepressants
2. Side effects o anti depressants
3. Structure of tricyclopromine
4. What are two primary neuro transmitters involved in antidepreassants action
5. Antipsychotic drugs
6. Classification of classical antipsychotic agents
7. General structure of phenothiazine derivatives

Module VI

Part B

1. What are diuretics
2. Uses of diuretics
3. Main classification of diuretics
4. Uses of osmotic diuretics
5. SAR of carbonic anhydrase inhibitors
6. Structure of Mannitol
7. What are histamine
8. Classification of amino alkyl ethers
9. MoA of antihistamines

Module I

PART-C

1. Explain peripheral anti adnergic drugs.
2. Write a note on doridine and methyldopa.
3. What are calcium channel blockers.
4. Explain briefly the synthesis of verapmil.
5. What are ACE inhibitors?
6. Explain briefly the synthesis of captopril.
7. Classify antihypertensives and give two structural example for each class.
8. Discuss the mechanism of action of hydralazine and prprananolol.

9. Explain the M_OA of ACE inhibitors.
10. Give the synthesis protocol for propranolol,

Module II

PART C

1. Give the synthesis protocol for verapmil,
2. Give the synthesis protocol for captropril.
3. Explain the synthesis of propranolol.
4. How are antiarrhythic drugs classified? Give atleast two structural examples for each classes.
5. Discuss the M_OA of class I agents and how these are classified further according to M_OA as in the case of antiarrhythmic drugs.
6. Write the synthesis protocol of proicainamide
7. Give the synthesis protocol for disopyramide
8. Explain the classification of antiarrhythmic drugs.
9. Write a note on β-adnergic blockers.

Module III

Part C

1. Explain about Griseofulvin
2. Explain on Amphotericin B as antifungal agents
3. Synthesis of Clotrimazole
4. Synthesis of Fluconazole
5. Explainthe lifecycleof HIV
6. Synthesis of Acyclovir
7. Explain the classification antimalrians
8. MoA of quinoline as antimalarianes
9. Match the following with respect to mechanism

Zidovudine	Glucosidase inhibitor
Nelfinavir	Reverse transcriptors inhibitor
Betulinic acid	Integrase inhibitor
Curcumin	Protease inhibitor
Suramin	Viral budding inhibitor
Interferon	Fusion inhibitor
Castanospermine	Adsorption inhibitor

10. Note on antiviral agents
11. Note on antiherpes simplex agents
12. Note on Antiprotozoalagents

13. Synthesis of Mebendazole
14. Explainth egenralMoA of beta lactam antibiotics
15. Classification of pencillins
16. Note on broad spectrum pencillins and anti pseudomonal pencillins
17. SAR of pencillins
18. Explain cephalosporins
19. Explain the clasiifcation of cephalosporins
20. Explain the third generation of cephalosporins
21. SAR of cephalosporins
22. Nte on degradation of cehalosporins
23. SAR of tetracycline antibiotics
24. Effect of p^H in tetracyclines
25. Effctof metals in tetracyclines
26. Note on macrolide antibiotcs
27. Synthesis of ampicillin
28. Synthesis of cephalexine
29. Note on antitubercular quinolnes
30. How does Isoniazidand pyrazinamide act as anti TB agents
31. What is multi drug resistant TB how they are treated
32. Synthesis of ethambutol

Module VI

Part C

1. Note on limitations of therapy
2. Explainthe classification of antineoplastic agents
3. Write the MoA of alkylating agents of antineoplastic agents
4. SAR of nitrogen compounds
5. Synthesis of chlorambucil
6. MoA of pyaramididne antagonist
7. Synthesis of 5-fluorouracil
8. Noteon anticancer antibiotics
9. Note on anticancer plant products
10. MoA of anticancer plant products
11. What are Vinca alkaloids
12. Synthesis of procarbazine

Module V

Part C

1. Note on monoamino oxidase inhibitors
2. Synthesis of Isocarboxazide
3. Note on tricycline antidepressents
4. give the syntesisof phenalzine from phenyl aceto nitrile
5. what are three categories of antidepressants and what are their primary neuronal action
6. general mechanism of antipsychotic agents
7. note on phenothiazines
8. note on butyrophenone derivatives
9. SAR of butyrophenone derivatives
10. D4 receptor antaonist
11. Note on tricyclic antdepressants

Module VI

Part C

1. **note on osmotic diuretics**
2. what are carbonic anhydrase inhibitors
3. note on thiazide diuretics
4. SAR of thiazide diuretics
5. Write any synthesis method of thiazides
6. Note on uses of potassium sparing diuretics
7. MoA of loop diurectics
8. Synthesis of furosemide
9. Synthesis of clorthalidone
10. H_1 receptor antagonist
11. Uses of antihistamines
12. SAR of antihistamines
13. Note on non sedative anti histamines
14. MoA of H_2 receptor antagonist

15. Synthesis of cimetidine
16. SAR of H_2 receptor antagonist
17. Synthesis of ranitidine

Part D

Module IV

1. Explain adrenergic stimulants
2. Explain cholinergic blockers

Module II

PART-D

1. Explain briefly the classification of antihypertensive drugs.
2. Classify antihypertensives and give two structural examples for each class.
3. Give the synthesis protocol for propranolol, verapmil, captropril.
4. How are antiarrhythmic drugs classified? Give atleast two structural examples for each classes.

Module III

Part D

1. Briefly explain the classification of pencillin
2. Note on SAR of pencillin
3. Explain cephalosporins
4. Classification of cephalosporins
5. Explain the synthesis of cephalosporin and cephaloxine
6. Life cycle of HIV virus

Module IV

Part D

1. Explain anti cancer plant products
2. Explain alkylating agents in anti neoplastic agents

Module V

Part D

1. SAR of phenotiazines
2. SAR of butyrophenone derivatives
3. Synthesis o haloperidol

Module VI

Part D

1. what are carbonic anhydrase inhibitors
2. Loop diuretics
3. Classification of diuretics

SDC5EV02 INTRODUCTION TO PHARMACOGNOSY

MODULE 1:

PART A

1. Father of medicine .....
2. Father of pharmacognosy .....
3. ..... is integral component and essence of Yoga.
4. The Indian medical tradition is prevails at two levels ;that are.....and .....
5. The principle of TCM (Traditional Chinese Medicine) are centred on the theory of harmony between two opposite forces .....and .....
6. The non sugar part of the glycoside is known as .....

True or false

1. Alkaloids are the essential basic nitrogenous compounds of vegetable origin.
2. Unani diagnostic involves the examination of pulse ,urine and stool.
3. Cassia acutifolia ,Aloe perry and Rheum emodi are the examples of Anthraquinone glycosides .
4. Root of the Digitalis is used as the drug component .
5. HPLC , Paper chromatography ,FTNMR are used for the isolation and purification of natural compounds .

PART A ANSWERS

1. Hippocrates
2. Dioscorides
3. Medication
4. Classical system and folk system
5. Yin and Yang
6. Aglycon

True or false

1.True
2.True
3. True
4. False
5. True

Part A

1. The non-nuclear fluid was termed……
2. Plant cell and its components studied by using……
3. The nuclear membrane include a dense liquid termed as……..
4. Name a tree which have a stilt root
5. Climbing roots seen in …….
6. Leaves arise in a regular order upon stem is

Part A Answers

1. Cytoplasm
2. Light microscope
3. Nucleoplasm
4. Screw pine
5. Betel
6. Phyllotaxy

Module ii

Part A

1.Give any two chemical constituents of shatavari
2. *Asparagus racemosus* belongs to …….. family
3.Gynaetone is the marketed formulation of
4. Give any therapeutical use of arjuna
5. family of Chitrak is
6. give a use of Chitrak

Part A Answers

1. steroids,saponin glycosides
2. family Liliaceace
3. Shatavari
4. cardiotonic
5. Plumbaginaceae
6. used for piles

Module iii

PART A

1. ..... do not serve a nutritive function like other compounds in plants.
2. ..... are the secondary metabolites that play no role in physiology
3. The oil from Styrax is used in ..... therapy.
4. Farnesiferol-A,B and C occur in the gum resin of.....
5. ..... is valuable remedy in habitual and threatened abortion.
6. ..... is a cicatrizant and diuretic.

True or false

1. Sumatra benzoin used as a ingredient of Friar's balsam.
2. Sumatra benzoin is antidepressant and vulnerary.

3. Burning of benzoin is known to repel snakes.
4. The whole plant of Ferula is used as a fresh vegetables.
5. Etoposide is an antineoplastic.

PART A ANSWER KEY

1. Resins
2. Resins
3. Vapour
4. Asafoetida
5. Asafoetida
6. Balsam of Tolu

True or false

1. True
2. True
3. True
4. True
5. True

Module iV

Part A

1. Example for reticulate ventilation
2. Example for parallel ventilation
3. Leaves are modified into spines…….
4. Pneumatophores breathing rots occurs in
5. Haustoria or seeking roots occurs in

Answers

1. Dicotyledonous plant
2. Monocotyledonous plant
3. Opuntia
4. Mangrove plant
5. Cuscuta

Module V

PART A

1. Tannins were first used and described by.....
2. Polyphenolics with a high molecular weight are .....
3. Which plant family is rich in tannins
4. Tannins are absent in.....

5. In leaves, tannins are rich in.....
6. In roots, much of the tannins occur in.....
7. The seeds of acacia catechu are.....
8. Phlobotannin is a..... which fails to precipitate with antipyrin.
9. The main constituent of..... is minnotannic acid

True or false

1. Tannins are rich in plant galls.
2. Tannins have an astringent taste.
3. Protein-tannin complexes are resistant to proteolytic enzymes.
4. The earliest information on Black Catechu was provided by Gracia de Orta.
5. Black catechu is reported to the anti-leprotic.
6. The wood of Black Catechu has high calorific value.

PART A ANSWER KEY

1. Seguin
2. Tannins
3. Leguminosae
4. Musci
5. Upper epidermis
6. Hypodermis
7. Antibacterial
8. Pseudo tannin
9. Black Catechu

True or false

1. False
2. True
3. True
4. False
5. True
6. True

Module VI

Part A

1. Pentosides contains
2. Colour of glycosides
3. Give an example for Antrquinone glycosiodes

4. Name the classifications of alkaloids one the basis of their families of plant kingdom
5. Give a function of alkaloid
6. Nature of alkaloid is
7. The molecule present in alkaloid is
8. Example for an alkaloid
9. Name test for identification of saponin glycosides
10. On the addition of 80% sulphuric acid the powder of liquorice produce …….colour

Part A Answer

1. Arabinose
2. Colourless
3. Aloe
4. Taxonomic classification
5. Reservoir of nitrogen supply
6. Basic
7. Nitrogen
8. Ergot
9. Foam test
10. yellow

MODULE I

PART B

1. Define pharmacognosy
2. What are the areas dealt with pharmacognosy
3. What are primary metabolits
4. Examples for secondary metabolites
5. What are the objects of pharmacogonsy

Module ii

Part B

1. What is leaf apex
2. What is leaf base
3. What is petiole
4. What is lamina
5. Note on compound leaves
6. Note on food storage in root
7. What do you meant by region of maturation of root
8. What is root cap
9. What is tap root

10. What is adventitious root

Module III

Part B

1. Examples for Leguminose plants
2. Chemical test for Senna
3. Chemical test for Black Catechu
4. Examples for Solanaceae famly plants
5. Note on transverse section of Pecacuanha plant
6. Morphology of Cinnchona
7. Morphology of Tragacanth
8. Any two Chemical test for Tranacanth
9. Solubility of GuarGum

Module iV

PART B

1. Define resins.
2. Note on characters of resins .
3. Write about behaviour, composition of resins.
4. Write classification of resins.
5. Write an account of classification of resins with examples .
6. Note on production of resins .
7. Describe about pharmacognosy of Benzoin .
8. Name the biological source of Balsam of Tolu .
9. Collection and preparation of Balsam of Tolu .
10. Chemical constituents of Balsam of Tolu .
11. Therapeutic uses of Balsam of Tolu.
12. Describe general uses of resins .
13. Note on pharmacological uses of Podophyllum.

MODULE V

PART B

What are tannins.

Name the biological source of myrobalan.

Write an account of pharmacognosy of myrobalan.

Write common name of black catechu

Write pharmacognosy of black catechu

Write synonyms of myrobalan

Write about Nature of tannins

Write uses of tannins

Medicinal and non medicinal uses of black catechu

Write chemical constituents of myrobalan

Preparation of acacia catechu

Biological sources of catechu

Microscopic characters of black catechu

Write 4 properties of tannins

Write classification of tannins

Module VI

Part B

1. Define volatile oil
2. Note on general extraction methods of volatile oil
3. General properties of volatile oil
4. Note on umbelliferous plants
5. Source of coriander
6. Cultivation of coriander
7. Uses of coriander
8. Chemical constituents in fennel
9. Uses of fennel
10. Habitat and morphology of Carway
11. Chemical constituent of Carway
12. Uses of Carway
13. Cultivation of dill
14. Morphology of dill
15. Characters of cinnamon oil
16. Chemical constituents of cinnamonoil
17. Uses o lemon peel
18. Cultivation of clove
19. Structure of Vanillin, Eugenol, clove stalks
20. Synonym of Eucalyptus oil
21. Uses of Cardamon

Module VII

Part B

1. list out the conventional extraction techniques
2. what is maceration extraction techniques
3. what is infusion extraction techniques
4. what is digestion extraction techniques
5. what is decoction
6. what is percolation
7. draw the schematic diagram and label the parts of soxhlet apparatus
8. what are the advantages of ultra sound assisted extraction techniques
9. what are the disadvantages of ultra sound assisted extraction techniques

Module I

PART C

1. 1 .note on historical development of pharmacognosy
2. scope of pharmacognosy
3. how pharmacognosy contribute the advancement of physical and natural science
4. how pharmacognosy correlate between the pharmacology and medicinal chemistry
5. 5.note on secondary metabolites
6. Important features of secondary metabolites
7. Note on ayyurvedha
8. Note on siddha
9. Note on homeopathy
10. Note on naturopathy
11. Note on yoga and meditation

ModuleII

Part C

1. Types of leaves
2. What is phyllotaxy
3. Note on venation
4. Characteristic of root
5. Note on types of root
6. Note on root modification
7. Differentiate tap root and adventitious root

Module III

Part C

1. Note on Senna
2. Morphology of senna
3. Morphology of pale catechu

4. Note on Ashwagandha
5. Chemical test for BalsmTolu
6. Morphology of Ipecacuaha
7. Transverse section of cinchona bark
8. Note on arachis oil
9. Chemical test for acaia

MOdule IV

PART C

1. Define resins .Add a note on their characters ,behaviour ,composition and classifications .
2. Write an account of classification of resins with examples . Add anote on their production.
3. Write an account of the pharmacognosy of Podophyllum .
4. Short note on identification of resins.
5. Explain macro and microscopic characters of Podophyllum.
6. Describe medicinal and non medicinal use of Asafoetida.
7. Describe in detail the pharmacognosy of Benzoin .
8. Short note on medicinal and non medicinal uses of benzoin .
9. Write about pharamacological uses of Balsam of Tolu.
10. Explain about chemical constituents and collection and preparation of Asafoetida.

Module V

Part C

1. Identification tests for tannins
2. Short note on chemical constituents and pharmacological use of black catechu
3. Explain characters and chemical constituents of Myrobalan
4. Short note on medicinal and non medicinal use of Black Catechu.
5. Describe about collection, preparation, and chemical constituents of catechu
6. Short note on properties and classification of tannins.
7. Short note on nature and uses of tannins.
8. Name biological source and write an account of the pharmacognosy of myrobalan.
9. Write the macro – microscopic characters of myrobalan.
10. Short not on black catechu

Modue vi

Part C

1. Biological source and chemical constituent of Dill

2. Note on lemon peel
3. Morphology of clove
4. Chemical constituents of clove
5. Chemical test and adulterants of clove
6. Note on nutmeg
7. Chemical constituents of nutmeg
8. Uses and morphology of nutmeg
9. Chemical constituents and uses of eucalyptus oil
10. Note on chenopodium oil
11. Morphology and chemical constituents of cardamon
12. Collection method of valerian
13. Morphology and uses of valerian
14. Give the structure formula of following constituents and mention the source and use of drugs in which their constituent found
    - Menthol
    - Citral
    - Curcumin
    - Abetic acid

Module I

Part D

1. Explain Homeopathy and Siddha
2. Explain sidda and Unnani system

Module II

PART D

1. Write an essay on Asafoetida .
2. Name the biological source , collection and preparations , chemical constituents and therapeutic use of Balsam of Tolu.
3. Write an account of the constituents of Benzoin , Asafoetida and Podophyllum .
4. Describe in detail the pharmacognosy of Benzoin .

ModuleIII

Part D

1. **(A)** chemical test ofPale Catechu

(b) Morphology of Senna

2. Morphology of Senna
3. Note on antidysenterics plants

Module VI

Part D

1. What are essential oil? How they are isolated? Give source, chemical constituents and usese of eucalyptus oil
2. How are volatile oil prepared ? give general scheme for the biosynthesis of volatile oil componets

MODULE V

PART D

1. Write an essay on black catechu.
2. Name biological source and write an account of the pharmacognosy of myrobalan.
3. Identification tests for tannins
4. What are tannins? Add note on properties and classification of tannins.
5. Chemical constituents and characters and therapeutic use of myrobalan.

SEMESTER VI

MAJOR PROJECT

B.Voc Pharmaceutical Chemistry

ModelQuestion Paper

Theory(S3-S5)

FIRST SEMESTER

B. Voc PHARMACEUTICAL CHEMISTRY DEGREE EXAMINATION

CHE1B01; THEORETICAL AND INORGANIC CHEMISTRY - I

Time: 3 Hours **Maximum marks: 80**

Section A (One word)

Answer all questions. Each question carries 1 mark

1. An untested rational explanation of a phenomena generated on the basis of its observation and also previous knowledge is called a ----------
2. A medieval chemical philosophy having the transmutation of base metals into gold as one of its asserted aims was called ----------
3. The first synthesized organic compound is ----------
4. Atoms having different atomic number but the same mass number are called ----------
5. 10 g CaCO3 on heating leaves behind a residue weighing 5.6 g. Carbon dioxide released into the atmospehre at STP will be ----------
6. 4 g of NaOH are dissolved in 90 mL of water. The mole fraction of NaOH in water is --
7. Name an indicator used in complexometric titration.
8. The ionization enthalpy of He^{+} is 19.6×10^{-18} J/atm. The energy of the first stationary state of Li^{2+} is ----------
9. The minimum amount of the target material required to sustain a fission chain reaction at a constant rate is called ----------
10. The radiant energy of sun is due to ----------

Section B (Short answer)

Answer any eight questions. Each question carries 2 marks

11. List the different branches of chemistry.
12. What are the components of a research project report?
13. How does scientific hypothesis differ from a scientific theory?
14. Differentiate between molarity and molality.
15. Equivalent mass of $KMnO_4$ in acid medium is 31.6. Justify your answer.
16. Calculate the mass of (a) 2.5 g atom of calcium (b) 1.5 g mol of CO_2.
17. Find out the volume of the following at STP (a) 7 g of nitrogen (b) 6.02 x 10^{22} molecules of ammonia.
18. Write the nuclear equation for (a) the emission of an α-particle from Th-232 (b) the emission of a β-particle from Ra-228.
19. The half life period of a radionuclide is 4.8 minutes. Calculate its decay constant.
20. How does the nuclear fluid theory explain nuclear forces?
21. HCl is not used to acidify $KMnO_4$ solution in volumetric estimation of Fe^{2+} or $C_2O_4^{2-}$ Why?
22. Calculate the wave length associated with a bullet of mass 1 x 10^{-3} Kg travelling with a velocity of 3 x 10^4 m/s.

Section C (Paragraph)

Answer any six questions. Each question carries 4 marks

23. Differentiate between the terms scientific proof and scientific evidence.
24. What are the objectives of a chemical research?
25. What are redox indicators? Discuss taking a suitable example.
26. Discuss the principles of iodimetric and iodometric titrations.
27. Write short notes on (a) MSDS (b) R & S Phrases
28. What is meant by dual character of an electron? Derive an expression for the wavelength of de Broglie matter waves.
29. (a) Describe radiocarbon dating (b) The amount of ^{14}C present in an old piece of wood is found to be one-sixth of that present in a fresh piece of wood. Calculate the age of the wood. Half life

of ^{14}C is 5668 years.

30. Explain with examples how radioisotopes are useful in (a) medical diagnosis (b) radiotherapy.
31. Explain the terms atomic number and mass number with a suitable example.

Section D (Essay)

Answer any two questions. Each question carries 15 marks

32. Discuss (a) safe laboratory practices (b) treatment for burns due to phenol and bromine (c) disposal of sodium and broken mercury thermometer.
33. What are the postulates of Bohr theory? Derive the Bohr energy and frequency equations.
34. Write notes on (a) Planck's quantum hypothesis (b) Electron diffraction (c) Heisenberg's uncertainty principle.
35. Discuss the principles and salient features of nuclear reactors.

FIRST SEMESTER

B. Voc PHARMACEUTICAL CHEMISTRY DEGREE EXAMINATION

CHE2B02; THEORETICAL AND INORGANIC CHEMISTRY - II

Time: 3 Hours **Maximum marks: 80**

Section A (One word)

Answer all questions. Each question carries 1 mark

1. The kinetic energy part of Hamiltonian operator is ----------
2. 4p orbitals have ---------- radial nodes.
3. The region where there is zero probability of locating the electron between two non-zero probability region is called ----------
4. Sketch the shape of d_{z^2} orbital
5. The most electronegative element in the periodic table is ---------
6. Lithium shows diagonal relationship with ----------
7. The number of pi bonds in acetylene molecule is ----------
8. Among CH_3Cl, CH_2Cl_2 and $CHCl_3$, the dipole moment is maximum for --------
9. A mixture of *o*-nitrophenol and *p*-nitrophenol can be separated by ----------
10. Among B_2, C_2 and N_2 the paramagnetic species is/are ----------

Section B (Short answer)

Answer any eight questions. Each question carries 2 marks

11. What is meant by a well behaved wave function?
12. Write the time independent Schrodinger wave equation and explain the terms.
13. State and explain Aufbau principle.
14. What is the expression for energy of a particle in a one dimensional box? Explain the terms.
15. Ca^{2+} ion is smaller than Ca atom. Why?
16. Electron affinities of noble gases are zero. Why?
17. What are the applications of Born-Haber cycle?
18. Predict the hybridization and shapes of XeF_6, NH_4^+, H_3O^+ and SO_4^{2-}
19. Write the Born-Lande equation and explain the terms.
20. Discuss any four properties of ionic compounds.
21. What is meant by bond order? What is its significance?
22. Draw the resonance structures of borate, carbonate and nitrate ions. Compare the bond energy.

Section C (Paragraph)

Answer any six questions. Each question carries 4 marks

23. What are the postulates of quantum mechanics?
24. Draw the radial probability distribution curves of *2s*, *2p* and *3s* orbitals. Explain.
25. What are Linear and Hermitian operators? Explain.
26. Explain why the ionization energy of transition elements is reasonably constant.
27. Define lattice energy? How is it related to solubility of a compound in water?
28. Discuss the hybridization and structure of (a) ethylene (b) SF_6.
29. Write a note on intermolecular forces.
30. Discuss the general characteristic of the f block elements.
31. Discuss the variation of covalent radius along a period and down a group.

Section D (Essay)

Answer any two questions. Each question carries 15 marks

32. What are quantum numbers? Discuss the significance of each quantum number. What are the possible values of l, if $n = 4$.
33. Discuss (a) Electronegativity scales (b) Slater rule and its applications.
34. Discuss in detail Fajan's rule and its applications.
35. Discuss the valence bond theory and band theory of metallic bonding and explain metallic properties based on these theories.

FIRST SEMESTER
B. Voc PHARMACEUTICAL CHEMISTRY DEGREE EXAMINATION
SDC1BC01BIOCHEMISTRY

Time: 3 Hours **Maximum marks: 80**

Section A (One word)
Answer all questions. Each question carries 1 mark

1. Simplest aminoacid is
2. If R = CH_2OH the aminoacid is called.
3. Charge of zwitter ion is
4. Glycine is an example for ……. Type Aminoacids
5. Example for sulfer side chain amino acids
6. Example for essential amino acids
7. Example for non essential aminoacids
8. .Name the enzyme which are considered for biological oxidation and reduction.
9. The enzyme act on peptide bonds.
10. example for simple enzyme

Section B (Short answer)
Answer any eight questions. Each question carries 2 marks

11. What are peptides.
12. List out the essential amino acids.
13. Differentiate essential and non essential amino acids..
14. Define Zwitter ions.
15. Note on amphoteric property of amino acids.
16. What are amino acids.
17. Discuss general structure of amino acids.
18. Discuss the source and utilized of aminoacids in the body
19. Give a short note on oxydoductase.
20. what are isomerases.

Section C (Paragraph)
Answer any six questions. Each question carries 4 marks

21. discuss Lock and Key model.
22. differentiate reversible and irreversible inhibitors.
23. Give a short note on metabolism of amino acids.
24. Enumerate the biological significance of proteins.
25. Discuss the secondary structure of protein.
26. Note on conjugated and derived proteins.
27. Discuss globular proteins.
28. Explain the types of protein structure.

Answer any two questions. Each question carries 15 marks.

29. Prepare a note on energetic of the TCA cycle
30. Briefly explain the types of RNA.
31. Briefly explain recombination of DNA techniques.
32. Discuss the following: (a) PCR (b) DNA sequencing

SECOND SEMESTER
B. Voc PHARMACEUTICAL CHEMISTRY DEGREE EXAMINATION
CHE3B03; PHYSICAL CHEMISTRY – I

Time: 3 Hours **Maximum marks: 80**

Section A (One word)

Answer all questions. Each question carries 1 mark

1. For an ideal behaviour, the compressibility factor Z is ----------
2. The temperature below which a gas does not obey ideal gas law is called ----------
3. The maximum efficiency of a steam engine working between 100^oC and 25^oC is -------
4. Entropy of CO at absolute zero is ----------
5. Among volume, temperature, entropy and enthalpy, intensive property is/are ---------
6. The relation between T and P in an adiabatic process is ----------
7. Born-Haber cycle is an application of --------- law.
8. The unit of viscosity in SI system is ----------
9. Surface tension is related to Parachor by the equation ----------
10. The equilibrium constant K_P for the dissociation of PCl_5 is 1.6 at 200^oC. The pressure at which PCl_5 will be 50% dissociated at 200^oC is ------ atm.

Section B (Short answer)

Answer any eight questions. Each question carries 2 marks

11. Calculate the temperature at which O_2 molecule will have the same RMS velocity as CO_2 molecule.
12. Calculate the value of work done when 2g of H_2 expands from a volume of 1 litre to a volume of 10 litres at 27^oC.
13. Write Clapeyron-Clausius equation (integrated form) for liquid-vapour equilibrium and explain the terms.
14. Write Gibbs-Duhem equation and explain the terms.
15. Explain the physical significance of entropy.
16. Define third law of thermodynamics.
17. Calculate the entropy of vapourisation of a liquid which boils at 120^oC. Given enthalpy of vapourisation is 3600 $Jmol^{-1}$.
18. What is optical exaltation?
19. Give the equation for molar refraction of a liquid and explain the terms.
20. Why chemical equilibrium is termed dynamic?
21. State Le Chatelier's principle.
22. What is homogenious equilibrium? Give example.

Section C (Paragraph)

Answer any six questions. Each question carries 4 marks

23. Derive the relationship between heat capacity at constant volume and constant pressure for an ideal gas.
24. Derive the expressions for critical constants in terms of Vander-Waals constants.
25. Derive the relation between temperature and pressure for an adiabatic process.
26. Calculate the change in freezing point for ice when the pressure is increased by 1 atm. Molar volume of water and ice are 18.0 and 19.6 cm^3 and the enthalpy of fusion for ice is 6008 $Jmol^{-1}$. (IJ = 9.87 x 10^{-3} dm^3.atm.)
27. Discuss the variation of free energy with temperature and pressure.

28. Derive an expression for the relation between entropy and probability?
29. What is Parachor? How is it used for structure elucidation?
30. Derive the relationship between K_p and K_c.
31. At what temperature will the RMS velocity of Chlorine gas be equal to that of sulphur dioxide at 273K?

Section D (Essay)

Answer any two question. Each question carries 15marks

32. What is Joule-Thomson effect? Describe Linde's method and Claude's method for the liquifaction of gases.
33. Derive Gibb's Helmholtz equation. What is its significance?
34. What is Kirchoff`s equation? The enthalpy of reaction for the formation of ammonia from N_2 and H_2 at 25^oC was found to be -91.94 kJ mol^{-1}. What will be the enthalpy of reaction at 50^oC? The molar heat capacities at constant pressure and at 27^oC for nitrogen, hydrogen, ammonia are 28.45, 28.32 and 37.07 joules mol^{-1} respectively.
35. (a) Derive Van't Hoff equation for temperature dependence of equilibrium constant. (b) The equilibrium constant for a reaction is 1×10^5. Calculate the standard free energy change for the reaction in kilojoules at 25^oC.

SECOND SEMESTER
B. Voc PHARMACEUTICAL CHEMISTRY DEGREE EXAMINATION
SDC2HA01 HUMAN ANATOMY&PHYSIOLOGY

Time: 3 Hours **Maximum marks: 80**

Section A (One word)
Answer all questions. Each question carries 1 mark

1. Structural functional unit of kidney is
2. The lateral born of forearm
3. Manubrium found in
4. The first seven vertebrae is called
5. The innermost layer of heart
6. Deoxygenated blood reaches to ……..chamber of heart
7. Sub maxillary is an example of
8. Urine passed to urinary bladder through
9. In kidney the projections on inner side is called
10. Range of pH of extracellular fluid in normal person.

Section B (Short answer)
Answer any eight questions. Each question carries 2 marks

11. Various types of movements of joints
12. What are ligaments
13. Note on muscle tone
14. How the heart sound produced
15. what is congestive heart failure
16. what is blood pressure
17. Give the functions of bile juice
18. Role of teeth in digestive system
19. Disorders of skeletal muscles
20. Write the functions of kidney
21. What is Henle's loop
22. Write about renal circulation.

Section C (Paragraph)
Answer any six questions. Each question carries 4 marks

23. Basic physiology and functions of spleen
24. Mechanism of coagulation of blood
25. Functions and compositions of blood
26. Composition and formation of lymph

27. Diseases of kidney
28. With a neat diagram discuss nephron.
29. Functions of thyroid gland
30. Note on pancreas as endocrine gland
31. Physiology of Ear

Section D (Essay)

Answer any two question. Each question carries 15marks

32. Neat and label diagram of liver Write the anatomy and physiology of liver
33. Give the anatomy and physiology of following

    A)Liver B) pancreas
34. Anatomy of kidney
35. Discuss the common disease management with examples.

SECOND SEMESTER
B. Voc PHARMACEUTICAL CHEMISTRY DEGREE EXAMINATION
SDC2MB01 MICROBIOLOGY

Time: 3 Hours **Maximum marks: 80**

Section A (One word)
Answer all questions. Each question carries 1 mark

1. The kingdom protista has been divided into ……. and ……groups
2. Example for a type of Stainig techniques
3. What indicates the lag phase in the bacteria growth curve
4. What indicates the log phase in the bacteria growth curve
5. What indicates thestationary phase in the bacteria growth curve
6. What indicates the decline phase in the bacteria growth curve
7. ……..is the process by which an article, surface or medium is free of all living microporganisms.
8. ……..is the destruction or removal of all pathogenic organism
9. Give any one of physical method of sterilization
10. Give any one of chemical method of sterilization

Section B (Short answer)
Answer any eight questions. Each question carries 2 marks

11. What are the types of cultural media?
12. Write a note on Mac Conkey Agar.
13. Write a note on staphylococcal diseases.
14. Define erysipelas.
15. Prepare a note on morphology of staphylococcus pneumoniae.
16. Write a note on morphology of staphylococcal diseases.
17. Discuss about cultural characteristics of vibrio cholerae.
18. Discuss about types of filters.
19. Note on how halogens act as a disinfectant?
20. Make a note on disinfectant.
21. Discuss about the factors determining potency of disinfectant.
22. What are the conditions for ideal antiseptics?

Section C (Paragraph)
Answer any six questions. Each question carries 4 marks

23. Discuss about classification of bacteria.
24. Prepare a note on morphology of bacteria.
25. Write a note on sterilization methods of following: (a)Filtration (b)Radiation
26. Discuss about sterilization and disinfection in a healthcare system.
27. Discuss about gram stain.
28. What is enriched media?
29. What is differential media?
30. Write a note on special media.
31. Discuss about Autoclave

Section D (Essay)

Answer any two question. Each question carries 15marks

32. Briefly discuss about native immunity.
33. Briefly explain the following: (a)Agglutination reaction (b)Complement fixation test
34. Prepare a note on ELIZA test.
35. Discuss the following: (a)EIA (b)RIA (c)CLIA

University of Calicut

III SEMESTER B.Voc Pharmaceutical Chemistry Examination November201..

GEC3PHY01 PHYSICS-I

Time ;3 Hrs Max Marks:80

Part A (Answer all) 10X1=10

1. There is no change in volume of a wire due to change in its length on stretching. The Poisson ratio of the wire is:
2. -0.5 (b) 0.05 (c) 0 (d) 1
3. The bulk modules for an incompressible liquid is
4. Zero (b) one (c) $10^{11}N/m^2$ (d) infinite
5. The limiting values of Poisson'sratio are.....and .....
6. Write down the relation between surface tension and surface energy
7. The dimensions of surface tension are.....
8. Give an example for conservative force
9. The unit of angular velocity is.....
10. The variable in sound waves is.....

Part B (short answer) (Answer any eight) 8x2=16

10. Which is more elastic, air or water? Why?
11. Define Poisson's ratio. What is the theoretical limit of poisson's ratio.
12. Find out the equation of motion of torsion pendulum.
13. How does surface tension varies with temperature.
14. What do you meant by sphere of influence?
15. Draw VT diagram for adiabatic expansion.
16. Draw VT diagram for isobaric expansion.
17. What is meant by potential energy curve?
18. What do you mean by potential well?
19. Give the general equation of wave motion. What is its significance.
20. Distinguish between transverse and longitudinal wave.
21. What is the significance of wave Function?

Part C (Short essay) (answer any 6) 6x4=24

22. How large a pressure(in Pascal) must be applied to water if it is to be compressed by 0.01 percent. What is the ratio of this pressure to atmospheric pressure 1.01×10^5 pa.
23. Calculate the Poisson's ratio for aluminium. Given Y= 7×10^{10}pa and n= 2.5×10^{10}pa.
24. Derive an expression to find out the period of oscillations of a torsion pendulum.

25. Water is converged through a pipe 8cm in diameter and 4km in length at rate of 120litres per minute. Calculate the pressure required to maintain the flow. Viscosity of water=$0.8\times10^{-3}NS/m^2$
26. 1.State and prove work energy theorem
27. A body having a man of 4g executes simple harmonicmotion. The force acting on the body when the displacement is 8cm is 24g. Find the period. If the maximum velocity is 500cm/s, find the amplitude and maximum acceleration.
28. What are the postulates of quantum mechanics.
29. A ball has velocity 4i^-5j^+10k^ m/s, relative to a train moving with velocity 3i^+4j^m/s relative to an observer on the ground. Calculate the velocity of the ball relative to the ground.

30.Show that length is invariant under Galilean transformation.

Part D (Essay) (answer any two) 2x15=30

31. .Discuss the method of determining rigidity modules of a wire using torsion pendulum.

32.What is entropy? Write a note on entropy and unavailable energy.

3 3.Show that average potential energy/unit volume over a period T of a progressive wave= average kinetic energy/unit volume over a period T.

34.Derive Lorentz transformation equations

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III SEMESTER B.Voc Pharmaceutical Chemistry Examination November201..

GEC3OC01 ORGANIC CHEMISTRY I

Time ;3 Hrs Max Marks:80

Part A (Answer all) 10X1=10

1. Adjacent members of a homologous series differ by a …….. Group.
2. *Cyclohexane* and *hex-2-ene* is a pair of structural isomers, called ……. isomers.
3. Among *ethane, ethene, ethyne,* the molecule in which both the carbon atoms are S_2 hybridized is ……..
4. The specific spatial arrangement of atoms or groups that characterizes a particular stereoisomer is called its…….
5. Since conformational isomers are rapidly interconvertible, they exist in …..... equilibrium.
6. Among the groups, -NO_2, -OH, -NH_2 and –OR, the one showing –M effect is…….
7. A reactive intermediate species that has a carbon bears a negative charge is called
8. Sabatier-Senderens reduction uses the catalyst ……... at 523-573 K.
9. The IUPAC name of $(CH_3)_4C$ is ……..
10. In benzene, the state of hybridization of all the six C atom is ……...

Part B (short answer) (Answer any eight) 8x2=16

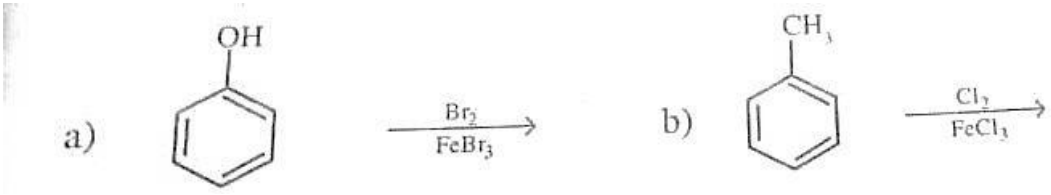
11. Write the IUPAC names of: *Neopentane ii) sec-Butyl alcohol iii) Ethylene dichloride*
12. Write the IUPAC names of:
13. Define the term conformation.
14. What is meant by the term configuration?
15. Draw the sawhorse projections of the two extreme conformations of ethane.
16. What is meant by inductive effect?
17. Name two groups which show –I effect?
18. How can *1-bromo-2-methylbutane* be converted to *3,6-dimethyloctane*?
19. How can *heptane* be converted to *toluene*?
20. Draw the structure for each of the following compounds:

(c) 2,2,4-trimethylpentane

(d) 3 –ethyl-2-methylhexane..

21. Illustrate Friedel-Crafts alkylation reaction with a suitable example. Give equation and name the product.

22. Draw the products of each reaction.



Part C (Short essay) (answer any 6) 6x4=24

23. Explain the general classification or organic compounds.

24. Explain with illustrative examples the following terms:

b) Chain isomerism; b) *ring-chain isomerism .*

25. Distinguish between the terms conformation and configuration.

26. Discuss the reason for conformational isomerism in alkanes.

27. Describe the conformational isomerism with regard to ethane.

28. Define the term reaction mechanism. Illustrate the usefulness of the curved arrow formalism in depicting reaction mechanisms.

29. What is resonance? Explain the utility of the curved arrow formalism in deriving resonance structures of a molecule.

30. What is an E1 reaction? Discuss the general mechanism.

31. Discuss E2 mechanism.

Part D (Essay) (answer any two) 2x15=30

32. Discuss the different kinds of structural isomerism exhibited by organic compounds.

33. Discuss the conformational isomerism in cyclohexane and explain the relative stability of the conformers.

34. Discuss and illustrate the significance of the various electron displacement effects in organic molecules.

35. Discuss (i) the resonance concept and (ii)the molecular orbital concept of the structures and stability of benzene.

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III SEMESTER B.Voc Pharmaceutical Chemistry Examination November201..

SDC3PC01 PHARMACEUTICS

Time ;3 Hrs Max Marks:80

Part A (Answer all) 10X1=10

1. Posology deals in
2. Give clark's formula
3. Doses calculate in proportionate to ._____ of patient
4. An extra ordinary response to a drug which is different from its characteristic pharmacological action is _____
5. .5. o calculate weight and capacity Indian pharmacopeia follows _____ system
6. 1 Lb =_____ oz
7. compression suppositories contain ……and……..drugs
8. in suppositories the drugs released either due to the ……of base or……its contents in ……..fluid
9. cocoa butter is a mixture of ……..of fatty acid
10. Pharmacovigilencerelaing to ……..

Part B (short answer) (Answer any eight) 8x2=16

11. Give the equation for calculating dose for child
12. How to calculate dose proportionate to age
13. Note on following
    b) Synergism b) antagonism
    c) Define allegation method

14. What is proof sprit
15. Write the prescription for calamine lotion
16. Write the prescription for turpentine liniment
17. Differentiate the term monophasic and biphasic liquid dosage form
18. Advantages and disadvantages of suppositories
19. Note on patient counseling
20. Write on objectives of family planning.
21. Write about rhythm method of contraception.
22. Classification of powders

Part C (Short essay) (answer any 6) 6x4=24

13. Discuss various routes of drug administration
14. Write various equations to calculate doses
15. Calculate the volume of 95% alcohol required to prepare 600 ml of 70 % alcohol
16. Calculate the amount of 70%,60%,40% and 30% alcohol should be mixed to get 50% alcohol
17. Differentiate between lotion and liniments
18. Classification of powders
19. What are First Aid treatment of wounds?
20. Write a note on 1. Bandages 2. Adhesive Tape
21. Explain protein deficiency disease.

Part D (Essay) (answer any two) 2x15=30

1. Discuss soild dosage form
2. Discuss suppositories as semisolid dosage forms
3. Write a note on Tuberculosis. Note on Hepatitis.
4. Define demography cycle.

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III SEMESTER B.Voc Pharmaceutical Chemistry Examination November201..

SDC3PIC01 ADVANCED PHARAMCEUTICAL OPERATION AND INORGANIC PHARMACEUTICAL CHEMISTRY

Time ;3 Hrs Max Marks:80

Part A (Answer all) 10X1=10

1. Magnesium hydroxide can be precipitated by the metathesis reaction between Magnesium salt and .....
2. ..... prepared by precipitation from solution of Magnesium Sulphate and Sodium Silicate.
3. The molecular formula of Disodium Hydrogen phosphate is ..... .
4. Aluminium Sulphate may be made by dissolving ..... .
5. The molecular formula for Kaolin is ..... .
6. An expectorant ..... bronchial secretions and nucolytics help ..... thick bronchial secretion.
7. Aluminium Chloride is prepared commercially by reacting ..... with ..... .
8. The substances, which inhibit oxidation of free radicals are called as .
9. α Rays are now known as ..... .
10. β Radiation are .....

Part B (short answer) (Answer any eight) 8x2=16

11. Define radiopharmaceutical compounds.
12. What are the classification of Isotopes ?Give example each
13. What is ϒ-ray?
14. What is Sodium chloride injection USP XVIII?
15. What is Rings injection USP XVIII?
16. List out the official products of sodium replacement therapy.
17. Explain the biological effect of Radiation?
18. Explain the solubility of sodium chloride USP XVIII.
19. Radio opaque contrast media.
20. Explain the Barium sulphate as Radio opaque contrast media.

Part C (Short essay) (answer any 6) 6x4=24

21. What are the applications of Radio nuclides?
22. Explain the storage and handling of radioactive materials.

23. Explain the biological effect of Radiation?
24. Explain the solubility of sodium chloride USP XVIII.
25. Explain the buffer system present in body.
26. What are the steps involving in acid excretion in the kidney?
27. Note on RIA
28. Explain Radio opaque contrast media.
29. Explain the Barium sulphate as Radio opaque contrast media.

Part D (Essay) (answer any two) 2x15=30

30. Explain the types of Radio nuclides.
31. Explain Radio opaque contrast media and how Barium sulphate as Radio opaque contrast media.
32. Explain Physiological acid – base balance.
33. Explain briefly ELISA test

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IV SEMESTER B.Voc Pharmaceutical Chemistry Examination Apri201..

EC4PHY03-PHYSICS-II

Time ;3 Hrs Max Marks:80

Part A (Answer all) 10X1=10

1. In the case of reflection by spherical mirrors, light rays passing between two points takes a path of_____time
2. in an interference pattern produced by two identical slits the Intensity at the centre is I. If one of the slits is closed the intensity at the centre becomes____. (4I, I/4, I, 2I)
3. Intensity of magnetization is small and negative for _____ materials.
4. Dip at magnetic poles of earth is

a) R/4 b) 4R c) R/16 d) 16R

5. At super conducting state, the material becomes _____
6. The temperature coefficient of resistance of a semiconductor is _____
7. The drift velocity of electron in a conductor is of the order of

a) 10^{-5} ms^{-1} b) 10^{5} ms^{-1} c) 10^{6} ms^{-1} d) 10^{-14} ms^{-1}

8. The thermal velocity of electrons in a conductor is of the order of ____ m/s.

9. The resistance is inversely proportional to

a) Length b) Area of cross section c) Density d) Volume

10. Which laser is suitable for optical communication

Part B (short answer) (Answer any eight) 8x2=16

11. Define optical path
12. State fermat's principle of least time
13. State fermat's principle of stationary time
14. What is Meissner effect?
15. 2.A potentiometer is better than a voltmeter in measuring potential difference. Why?
16. . What is meant by ripple factor of a rectifier?
17. 2. Draw the three transistor connections.
18. 3. What is the leakage current in CB transistor?
19. What are hadrons?
20. What are fermions?
21. What are bosons?
22. What are quarks

Part C (Short essay) (answer any 6) 6x4=24

23. Deduce the laws of reflection from fermat's principle
24. Derive snell's law of refraction using fermat's principle
25. Write a note on different kinds of filter circuits with examples.
26. 4 . The applied input a.c. power to half wave rectifier is 100watts. The D.C. output power obtained is
    40W.
    a) Calculate the rectifier efficiency b) What happends to remaining 60watt?
27. 8.A centre-tap full-wave rectifier is connected to a transformer secondary of the type 6-0-6V.If the forward
28. resistance of each diode is 4Ω and load resistance is 400Ω,find the d.c.load current and efficiency of the rectifier
29. Explain the temperature dependence of resistivity of metals and semiconductors
30. Explain why protons does not decay on the basis of baryon number conservation law.
31. Explain larmor frequency

Part D (Essay) (answer any two) 2x15=30

32. Explain the superposition of two sinusoidal waves. Deduce expressions for resultant amplitude and intensity.
33. 1. Explain the working of a fullwave rectifier.Find the efficiency and ripple factor.
34. Explain the theory of Carey Foster bridge. How can we determine the temperature coefficient of resistance of a material using this bridge.
35. With the help of a diagram explain the working of a nuclear reactor.

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IV SEMESTER B.Voc Pharmaceutical Chemistry Examination Apri201..

GEC4IC04 INORGANIC CHEMISTRY –III CHE5B06

Time ;3 Hrs Max Marks:80

Part A (Answer all) 10X1=10

1. The ratio of the absolute error in a determination to the most probable value of the quantity measured is called.....
2. Among *fluoride, oxalate* and *phosphate,* that which can be eliminated before cation analysis by strong heating is.....
3. Upon repeatedly boiling and evaporating and conc. HCl, borate in a mixture gets eliminated as volatile.....
4. The process in which substances that are normally soluble become incorporated into a precipitate during its formation is known as.....
5. The H-O-H bond angle in H_2O is …….. Then the H-S-H bond angle in H_2S
6. The state of hybridisation of S in SO_2 is ……..
7. The formula of disulphuric acid is ……
8. What are inorganic polymers? Give an example for one kind.
9. What are silicones?
10. Structure of isopropene

Part B (short answer) (Answer any eight) 8x2=16

11. How is borate in a mixture eliminated?
12. Give one method of eliminating oxalate from a sample for cation analysis?
13. How can chromate be eliminated from a mixture?
14. What is meant by micro analysis?
15. Mention two advantages of micro analysis.
16. How does metallic character vary as move down group15?
17. While P is able to form its pentahalide, N is not able to form its pentahalide. Why?
18. Name and formulate (a) an oxide of N in which N exhibits
19. Give the general structure of a silicone.

20. Name three different kinds of silicone polymers.
21. . Name the different types of pollution
22. 4. What kind of pollutants are referred to as persistent pollutants? Name two types

Part C (Short essay) (answer any 6) 6x4=24

23. Discuss the advantages of micro scale experiments in inorganic and inorganic qualitative analysis.
24. Give an accout of precipitation gravimetry.
25. What is coprecipitation? By what methods can it be minimised?
26. Give two similarities and two differences that hydrogen shows with alkali metals.
27. Give two similarities and two differences that hydrogen shows with halogens.
28. Discuss the two nuclear isomers of dihydrogen.
29. Mention the important applications of polymeric sulphur nitride.
30. Discuss the classification of solvents on the basis of the proton concept
31. Present a general discussion on the air pollution caused by the oxides of carbon

Part D (Essay) (answer any two) 2x15=30

32. Discuss briefly the principles underlying the separation of cations into groups in inorganic qualitative analysis.
33. Explain the structure of (a)hexagonal boron nitride and (b) cubic boron nitride.
34. Discuss the structures of (a) a polyhalide anion and (b) a polyhalide cation.
35. 18. briefly discuss the discovery of different noble gases.

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IV SEMESTER B.Voc Pharmaceutical Chemistry April..

SDC4DP01 DRUG DESIGN AND PHARMACOLOGY

Time ;3 Hrs Max Marks:80

Part A (Answer all) 10X1=10

1. study of harmful effects of chemicals
2. Identification of botanical resources of drugs is
3. Any two routes of administration of drugs
4. ADMEmeans
5. IV stands for
6. BBB is
7. Limit test are qualitative …….. test designed to identify and control small quantities of impurities.
8. Limit test for chloride has been based open Rx b/w…… and …….. to obtain silver chloride.
9. . Limit test for sulphate has been based upon the ppt of sulphate with …… in the presence of …… .
10. . In limit test for sulphate to prevent the supersaturation of BaSO4 a small amount of ……has been added in the reagent.

Part B (short answer) (Answer any eight) 8x2=16

11. Note on target identification in the new drug discovery.
12. Note on target validation in the new drug discovery.
13. What do you meant by lead identification in the new drug discovery.
14. What are BBB
15. Important fetures of drug – protein binding
16. Drug tolerance
17. Define pharmacodynamics
18. Define pharmacotherapeutics
19. Discuss about drug on the basis of sources

20. What is felicitated diffusion
21. Write active transport
22. Differentiate hydrophobic and hydrophilic drugs

Part C (Short essay) (answer any 6) 6x4=24

23. Briefly explain how are new drugs are discovered.
24. What are the procedures follow in drug design.
25. Note on the search for the lead compound.
26. Note on the molecular modification of lead compound.
27. Discuss various routes of administration
28. How the drug metabolized
29. Discuss type of diffusion
30. Factors influencing drug absorption
31. Steps for biotransformation

Part D (Essay) (answer any two) 2x15=30

32. Rational drug design? Write the advantages over conventional method.
33. Give a note on accidential drug discovery.
34. Explain pharmacokinetic principles
35. How the drug absorbed from GI tract

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IV SEMESTER B.Voc Pharmaceutical Chemistry April..

SDC4DR01 INDIAN DRUG REGULATORY GUIDLINE AND PHYSICAL PHARMACY

Time ;3 Hrs Max Marks:80

Part A (Answer all) 10X1=10

1. NDA
2. DCGI
3. DTAB
4. IND
5. HSE stands for
6. ICOH stands for
7. Example for occupational infection
8. CNRD stands for
9. Define drug according to Drugs and magical remedies Act in
10. Prevention of cruelty of Act in

Part B (short answer) (Answer any eight) 8x2=16

11. What is ISO 9000:2000
12. Role of engineering controls in controlling hazards
13. What is occupational disease
14. Primary prevention of occupation diseases
15. Safe handling of pesticides
16. Write any four tasks for trainees.
17. . Very fine powder.
18. Coarse powder.
19. . How rate of feeding affect the efficiency of sieving system.
20. How rate of feeding affect the efficiency of sieving system (particle size).
21. Explain stake's Law explain the terms.
22. Main parts of cyclone separator.

Part C (Short essay) (answer any 6) 6x4=24

23. Note on New drug application
24. What are the phases of clinical trials

25. What are the rules and guidelines should follow the regulation of drugs in India
26. Write any four principles of OSH
27. Note on Govt. duties in work place safety
28. Note on employers right in work place
29. Note on features of National Policy on occupational safety and health
30. Note on National Profile on occupational safety and health
31. What are the procedures to important drug?.

Part D (Essay) (answer any two) 2x15=30

32. What are the stages of drug approval
33. Explain briefly about the workers duties and right
34. Conditions to release the imported drugs.
35. Factors affecting size reduction.

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V SEMESTER B.Voc Pharmaceutical Chemistry Examination November201..

GEC5OC02 Organic Chemistry-II

Time ;3 Hrs Max Marks:80

Part A (Answer all) 10X1=10

1. The structural formula of 4-chloro-3-methylpent-1-ene is .....
2. Propene reacts with HI to yield .....
3. *n-propyl* bromide when heated with alcoholic silver cyanide predominantly yields .....
4. The IUPAC name of acetone is .....
5. The name of the straight chain metamer of pentan-2-one is .....
6. ..... is the IUPAC name of CH_2=CH-CH_2-CHO.
7. The formula of benzene carbaldehyde is .....
8. .IUPAC name of ethyl isopropyl ketone is .....
9. A reagent suitable for the oxidation of CH_2=CH-CH_2OH to CH_2=CH-CHO is .....
10. Aldol condensation product of ..... is but-2-enal

Part B (short answer) (Answer any eight) 8x2=16

11. Give the structural formulae of
    (i)3-bromo-5-ethyl-4-iodoheptane; (ii)1-bromo-2,2-dimethylpropane.
12. Write the IUPAC names of (i)$(CH_3)_2$CH-CHBr-CH_2-CH_3 and (ii)CCL_2=CHCl
13. Name the product obtained when propan-1-ol is heated with thionyl chloride in the presence of pyridine.Give the equation for the reaction.
14. For the preparation of alkyl chlorides from alcohols,thionyl chloride($SOCl_2$) is preferred as the reagent.Give reason.
15. Explain *Swarts reaction* with an example.
16. What is meant by a nucleophilic substitution reaction? Give an example of such a reaction for an alkyl halide.
17. How can 1-bromopropane be converted to methoxypropane?
18. Explain the term *Willaimson's synthesis* with suitable examples.
19. What is the major product obtained when 2-bromobutane is heated with alcoholic silver cyanide?
20. How can *ethyl bromide* be converted to *ethyl cyanide?*
21. What is meant by a nucleophilic substitution reaction?Mention the two kinds undergone by alkyl halides.

Part C (Short essay) (answer any 6) 6x4=24

22. Write the structural formulae of: (a) 4-ethylheptanal,(b) oct-3-yn-2-one, and (c)2-mrthylcyclopentanone.
23.)Explain with mechanism the Beckmann rearrangement reaction in acetophenone oxime
24. Give the structures and IUPAC names of the isomeric carbonyl compounds that have the molecular formula $C_5H_{10}O$.
25. Suggest a method each for the following conversions: (i) 2-methylpropan-1-ol to 2-methylpropanal; (ii) cyclohex-2-en-1-ol to cyclohex-2-enone;(iii)ethanenitrile to propanone.
26. How will you prepare the following using suitable Grignard reagents?
    9a)Butanal;(b)pentan-3-one;(c)pentab-2-one.
27. Explain with equations when acetyl chloride react with (i) CH3MgI and then followed by acidic hydrolysis;(iii) dimethylcadmium in dry ether ?
28. Give the equation for the reaction between the reactants in each cases mentioned below and name the product formed:
    (a) cyclohexanol with Jones reagent;
    (b) 3-methylcyclopentanol with pyridinium chlorochromate;
    (c) 5-methylheptan-1-ol with Collins reagent.
29. What is cannizaro reaction? Give two examples.
30. What is an S_N1 reaction?
31. Write the structural formulae of: (a) 4-ethylheptanal,(b) oct-3-yn-2-one, and (c)2-mrthylcyclopentanone

. Part D (Essay) (answer any two) 15x2=30

32. Discuss the aspects regarding the mechanism, kinetics, potential energy profile and stereochemistry of SN2 reactions.
33. Give one chemical test each to distinguish between:
    (a)C_6H_5-CHO and C_6H_5-CO-CH_3;
    (b)C_6H_5-CHO and C_6H_5-CO-C_6H_5;
    (c)C_6H_5-CO-CH_3 and C_6H_5-CO-C_6H_5.
    (B)Explain with mechanism the Beckmann rearrangement reaction in acetophenone oxime
34. (a) What products are formed when the following compounds react with CH_3MgBr, followed by acidic hydrolysis?
    (b)Explain the term keto-enol tautomerism and illustrate it with regard to acetaldehyde .
    (i) Clemmensen reduction; (ii) Wolff-Kishner reduction;
    (iii) Meerwein-Ponndorf-Verley reduction.
    (C) Explain a chemical test each to distinguish between the omponents of each pair shown below:
    (i) Pentan-2-one and pentan-3-one; (ii)Butanal and butanone.
35.) Give three examples with equations for the addition-elimination reactions that aldehydes and ketones undergo.

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V SEMESTER B.Voc Pharmaceutical Chemistry Examination November201..

GEC5P02 PHYSICAL CHEMISTRY II

Time ;3 Hrs Max Marks:80

Part A (Answer all) 10X1=10

1. Radioactive disintegration follows ..... order kinetics .
2. The rate of a reaction ..... with increase in temperature.
3. If the catalyst and the reactants are in different phases, it is called ..... catalysis .
4. A catalyst ..... the activation energy of a reaction.
5. The rate constant of a reaction is 7.3×10^{-3} L mol $^{-1}s^{-1}$ .The reaction is of ..... order.
6. Emission of radiant energy after a time-lag after its absorption by a substance is called
7. *.What is a photochemical reaction?*
8. The type of chromatography in which a layer of adsorbent is spread on a glass or plastic plate is called …… chromatography
9. The mobile phase in GLC is a ……..
10. Unit of third order reaction is…

Part B (short answer) (Answer any eight) 8x2=16

11. Mention two factors that affect the rate of reactions .
12. Define rate of reaction .
13. What is the unit used to express the rate of a reaction?
14. Define average rate of reaction .
15. Define *instantaneous rate of reaction.*
16. How will you relatively express the rate of the gaseous reaction : $2NO_2+O_2\rightarrow2NO_2$ in terms
17. What is *adsorption*?
18. Explain the term *adsorbent* and *adsorbate.*
19. What is *desorption* ?
20. State the Born - oppenheimer approximation.
21. Arrange the following radiations in the increasing order of energy: UV, IR , microwave visible.

Part C (Short essay) (answer any 6) 6x4=24

22. Calculate and compare the energies of two radiations, one with wave length 800nm and the other with 400 nm.

23. Briefly mention three types of spectroscopic techniques indicating the type of transitions involved and the kind of radiations that cause them.

24. Which among the following molecules will give rise to a *rotationspectrum*: Br_2, HBr, CS_2, CCl_4? Explain your answer.

25. Explain the term adsorption with suitable examples.

26. Is the adsorption process exothermic or endothermic? Justify your answer. Define enthalpy of adsorption.

27. Explain the term physisorption with suitable examples.

28. Mention the factors that affect the rate of a reaction.

29. Explain an experimental method for measuring the rate of reactions .

30. Distinguish between the terms average rate and instantaneous rate for a reaction .

31. What is *desorption* ?

Part D (Essay) (answer any two) 2x15=30

32. integrated rate equation for a nth order reaction (n>1) and show that the time for half change is inversely proportional to the $(n-1)^{th}$ power of the initial reactant concentration .

33. Derive the integrated rate equation for second order reaction when there is only one reactant , or when there are two reactants and both have the same initial concentration

34. Briefly discuss the postulates of langmuir's adsorption theory and derive langmuir's adsorption equation

35. Arrive at expressions for (i) the moment of in inertia and (ii) expression for rotational energy of a rigid diatomic molecule.

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V SEMESTER B.Voc Pharmaceutical Chemistry Examination November201..

GEC5PM01 PHARMACEUTICAL MANAGEMENT

Time ;3 Hrs Max Marks:80

Part A (Answer all) 10X1=10

1. ..... is regarded as the father of scientific management.
2. Fayol divided all industrial activities into six groups. Write any one.
3. ..... is the harmonization of all the activities of a concern in order to facilitate its working and its success.
4. ICDRA stands for……
5. DMF stands for…….
6. What is EDMF?
7. …… & ……. helps to be a successful RA professional
8. .pharmaceutical management is also known as
9. In Canada ……billion spent on 2004 to market drugs
10. Provision of drug sample is an example of

Part B (short answer) (Answer any eight) 8x2=16

11. Is productivity affected by employee Morale ? How ?
12. Distinguish between motivation and morale.
13. Define Authority.
14. Procedure for import of drugs
15. What is meant by drug regulatory affairs
16. Rules related to export of drugs from India
17. Guidelines for export of drugs
18. Note on direct selling
19. Note on manufacturer wholesaler
20. Note on indirect selling
21. Define sales promotion
22. Name different techniques of sales promotion

Part C (Short essay) (answer any 6) 6x4=24

23. Explain scientific management.

24. Write the comparison between management of F.W. Taylor and Henry Fayol.
25. Write and explain coordination.

26. Explain the types of coordination.
27. Challenges in supply chain
28. What are the challenges to professionals in drug regulatory affairs
29. Challenges in quality system
30. Note on different channels of distribution
31. Explain the term wholesaler

Part D (Essay) (answer any two) 2x15=30

32. The principle of scientific management makes the beginning of management movement'.
33. . Discuss the statement bringing out clearly the broad principles of scientific management.
34. Explain drug regulatory affairs
35. Discuss the important principle of selling

University of Calicut

V SEMESTER B.Voc Pharmaceutical Chemistry Examination November201..

SDC5MC01 MEDCINAL CHEMISTRY

Time ;3 Hrs Max Marks:80

Part A (Answer all) 10X1=10

1. Average heart rate is
2. Nitrites are used in the treatment of
3. Example for anti angina agents
4. Drugs used for the dilation of blood vessels
5. The drug useful to treat multi-drug resistant tuberculosis is….
6. The mechanism of PAS is….
7. The antitubercular activity of isoniazid is by…
8. Diacetyl derivative of morphine
9. 4-hydrodxy acetaanilide is
10. Adverseeffect of paracetamol

Part B (short answer) (Answer any eight) 8x2=16

11. What are antihypertensive drugs?
12. Explain the classification of antihypertensive drugs.
13. Explain what is M_O A of peripheral anti adnergic drugs.
14. Write the MoA of aminoglycosides
15. Give any four examples of aminoglycosides
16. Write the MoA of Isoniazid
17. What is TB? How it's treated
18. Note on cisplatin
19. Give the structure of actinomycin D
20. Classification of alkylating agents in antineoplasticagents
21. Classification of classical antipsychotic agents
22. General structure of phenothiazine derivatives

Part C (Short essay) (answer any 6) 6x4=24

23. Explain peripheral anti adnergic drugs.
24. Write a note on doridine and methyldopa.
25. What are calcium channel blockers.
26. Discuss the M_0A of class I agents and how these are classified further according to M_0A as in the case of antiarrhythmic drugs.
27. Write the synthesis protocol of proicainamide
28. Give the synthesis protocol for disopyramide
29. Explain about Griseofulvin
30. Explain on Amphotericin B as antifungal agents
31. Synthesis of Clotrimazole

Part D (Essay) (answer any two) 2x15=30

32. Explain adrenergic stimulants
33. Explain cholinergic blockers
34. Explain briefly the classification of antihypertensive drugs.
35. Explain cephalosporins

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V SEMESTER B.Voc Pharmaceutical Chemistry Examination November201..

SDC5EV02 INTRODUCTION TO PHARMACOGNOSY

Time ;3 Hrs Max Marks:80

Part A (Answer all) 10X1=10

1. Pentosides contains
2. Colour of glycosides
3. Give an example for Antrquinone glycosiodes
4. Name the classifications of alkaloids one the basis of their families of plant kingdom
5. Give any two chemical constituents of shatavari
6. . *Asparagus racemosus* belongs to …….. family
7. .Gynaetone is the marketed formulation of
8. Give any therapeutical use of arjuna
9. Father of medicine .....
10. Father of pharmacognosy .....

Part B (short answer) (Answer any eight) 8x2=16

11. Define pharmacognosy
12. What are the areas dealt with pharmacognosy
13. What are primary metabolits
14. Examples for secondary metabolites
15. What are the objects of pharmacogonsy
16. What is leaf apex
17. What is leaf base
18. What is petiole
19. Morphology of Cinnchona
20. Morphology of Tragacanth
21. Any two Chemical test for Tranacanth
22. Solubility of GuarGum

Part C (Short essay) (answer any 6) 6x4=24

23. .note on historical development of pharmacognosy
24. scope of pharmacognosy

25. Note on venation
26. Characteristic of root
27. Note on types of root
28. Note on root modification
29. Differentiate tap root and adventitious root
30. Define resins .Add a note on their characters ,behaviour ,composition and classifications .
31. Write an account of classification of resins with examples . Add anote on their production.

Part D (Essay) (answer any two) 2x15=30

32. Explain Homeopathy and Siddha
33. Write an account of the constituents of Benzoin , Asafoetida and Podophyllum .
34. (A) chemical test ofPale Catechu

    (B)Morphology of Senna

35. How are volatile oil prepared ? give general scheme for the biosynthesis of volatile oil componets

UNIVERSITY OF CALICUT

B.Voc PHARMACEUTICAL CHEMISTRY

PRACTICAL EXAMINATION

SEMESTER I-VI

(2018 Admn onwards)

UNIVERSITY OF CALICUT

B.Voc PHARMACEUTICAL CHEMISTRY

GUIDELINES FOR PRACTICAL EXAMINATION

SEMESTER I-VI

(2018 Admn onwards)

UNIVERSITY OF CALICUT

I SEMESTER B.VocPHARMACEUTICAL CHEMISTRY PRACTICAL EXAMINATION NOV……..

GUIDELINES FOR PRACTICAL EXAMINATION

For Inorganic chemistry practical -I

1. Question I and question II(volumetric) shall be answered by the candidate within 20 minutesin the space provided in the facing sheet.
2. For weighing electronic balance or chemical balance may be used.
3. Standard solution of the experiment must be prepared by the candidate.
4. Standard solution for volumetric estimation shall be prepared as follows.
   (I) Estimation of ferric ion: 120.5g of AR ferric alumin 500ml to prepare N/2 ferric salt solution (add required amount of con.HCl, heat to dissolve the crystals and make up after cooling to room temperature)
   (II) Estimation of ferrous ion: dissolve 98 gm of AR Mohr's salt in 500ml distilled water(add sufficient amount of dil.H_2SO_4 before making up)
5. At least three set of volumes are given in the range of 20-25 ml to candidates in the batch. The skilled assistant must be given a different volume
6. The stock solution required are N/10 $KMnO_4$ and N/10 $K_2Cr_2O_7$
7. Enter the following in the answer book (1) volume given (2)RV (3) SV/TV (4) percentage error (5) marks awarded

Scheme of valuation

Sl.No	Item	Max Marks
I	Question on volumetric analysis	10
II	Procedure	10
III	Implementation and calculation	30
IV	Result and output	10
V	Record	10
VI	Viva-voce	10

I. Question on volumetric analysis: candidate shall answer all questions in the score sheet

II. Procedure on volumetric analysis: procedure writing may be selected from the following list and written in the score sheet.

- Estimation of Ca in $CaCl_2$ solution given pure oxalic acid (conventional method)
- Estimation of Cu in Copper sulpahte solution given pure $K_2Cr_2O_7$ (conventional Method)
- Estimation of Mg in $MgSO_4$ solution given pure $ZnSO_4$ crystals(conventional method)

- Estimation of iron in ferrous sulphate solution given pure Mohr's salt(double burette method)
- Estimation of oxalic acid given pure Mohr's salt (double burette method)

Valuation of volumetric procedure:1.correct inter mediate ;2.prepration of standard solution;3. Standardization of inter mediate;4. Indicator and end point of standardization;5. Making up of given solution;6. Titration of made up solution;7.indicator and end point of estimation;8. Any other relevant points. (**8 points : 10 marks ; 6-7 points:8 marks;4-5 points :6 marks;3 points:5 marks; 2 points: 4 marks, 1 point :2mark)**

III.Marks for implementation and calculation

Implementation of experiment 10 marks

1. Equivalent mass of the primary standard substance; 2. Calculation of normality of primary standard; 3. Table of standardization of intermediate; 4. Calculation of normality of the inter mediate ; 5. Table for estimation ; 6. Calculation of normality of the given solution ;7. Equivalent mass of the compound / ion in the given solution; 8. Calculation of weight in the whole of the given solution.
   8 points : 20 marks ; 6-7 points : 18 marks ;4-5 points : 16marks ; 3 points : 15 marks ;2 points :14 marks

IV Result of volumetric analysis:

a. For double burette titration the results shall be evaluated either by average method or by graphical method in consultation with the internal examiner.
b. The reported value (R.V) of each candidate shall be compared with the skilled value (S.V) and the theoretical value (T.V) and calculate the error percentage.
c. For the estimation of calcium, candidates can report two values. The reported values (R.V) of each candidate shall be compared with both the skilled value (S.V) and theoretical value (T.V) and calculate the error percentage.
d. For the estimation of ferrous iron by double burette method, the candidates can report two values. The reported values (R.V.) of each candidates shall be compared with both the skilled values (S.V.) and theoretical value (T.V.) and calculate the error percentage. Please note that the reported permanganometric value of the candidate shall be compared with the permanganometric skill value& the reported dichrometric value of the candidate shall be compared with the dichromatric skill value.
e. Up to 1.5% error:**10 marks;** between 1.51-2.0%: **9 marks;** between 2.01-2.5%:**8 marks;** between 2.51-3.00%:**7 marks;** between 3.01-3.5% **6 marks;** between 3.51- 4.0%: **5 marks;**4.0% and above: **4 marks**.

V. **Record**: the records shall be valued and the both the examiners should affix their datedsignatures on itsfacing sheet. Submission of bona fide record, containing minimum 13 experiments recorded , is mandatory for appearing the practical examination.

21-22 experiments : 10 marks ;19 -20 experiments: 9 marks;17-18 experiments :8 marks ;15-16 experiments : 7marks ;13 -14 experiments : 6mark .

VI. Viva-voce: At least 10 questions (one mark each) shall be asked from Volumetric analysis

For pharmaceutical chemistry –I

I. Procedure and principle on pharmaceutics practical : procedure writing may be selected from the following list and written in the score sheet.

- Estimation of calcium in blood
- Estimation of urea in urine
- Estimation of cholesterol in blood
- Estimation of urea in blood

Evaluation of procedure writing: 1. Chemistry 2. Methods 3. Requirement4. Reagent 5.any other relevant point **(5 points : 20 marks ; 4 points : 16 marks ;3 points : 12marks ; 2 points : 8 marks ; 1 points :4 mark)**

II. Major experimentmay be selected from the following list.

1. Estimate the Titerable acidity of given sample of urine
2. Estimation of Reducing sugar of urine
3. To estimate the Protein content in milk

Marks for calculation, implementation and result of major experiment

- The reported value (R.V) of each candidate shall be compared with the skilled value (S.V) and the theoretical value (T.V) and calculate the error percentage.

  Implementation - 5 mark andcalculation -5 mark

Result : Up to 1.5% error:**10 marks;** between 1.51-2.0%:**9 marks;** between 2.01-2.5%:**8 marks;** between 2.51-3.00%:**7 marks;** between 3.01-3.5% 6 **marks;** between 3.51- 4.0%: **5 marks;**4.0% and above: **4 marks**.

III Minor experiment

A. **For Paper chromatography**
   - **Preparation of paper - 3marks**
   - **Neatness of 2 spots - 4 marks**
   - **Rf value -3marks**
B. **Analysis of urine**
   - **Systematic procedure -3marks**
   - **Identification test for abnormal content-3marks**
   - **Chemistry of reaction -4marks**

I V.**Viva-voce**: At least 10 questions (one mark each) shall be asked from Biochemistry

V .Record: The records shall be valued and the both the examiners should affix their dated signatures on its facing sheet. Submission of bona fide record, containing minimum 10 experiments recorded , is mandatory for appearing the practical examination :

12-10 experiments : 10 marks ;9-8 experiments: 8marks; 7-6 experiments :6 marks ;6-5experiments : 4marks ;5-4 experiments : 2mark .

Scheme of valuation :

Sl.No	Item	Max Marks
I	Synopsis	20
II	Calculation, implementation and result of Major experiment (5+5+10)	20
III	Calculation and implementation of Minor experiment 10 for each	20
IV	Viva-voce	10
V	Record	10

UNIVERSITY OF CALICUT

II SEMESTER B.VocPHARMACEUTICAL CHEMISTRY PRACTICAL EXAMINATION APRIL…..

GUIDELINES FOR PRACTICAL EXAMINATION

- Out of eight questions mark one question in section A and ask the candidate to choose the experiment by lot.
- Choose atleast five different experiments for abatch

QUESTION No:1$K_f$by Cryoscopic method

1. Take solid solvent in a boiling tube marked 1A(about 3/4th full). For different student's mark $1A_1$, $1A_2$……
2. Take solute in a test tube marked mass 1B (about1/2full). for Different students mark $1B_1$, $1B_2$……
3. Mark a different molecular mass for solute 1B in the question paper
4. Mark weightof solvent (between 6gand 9g)

QUESTION No:2Molecular mass by cryoscopic method

1. Take the solid solvent in aboiling tube marked 2A(about 3/4th full)
2. Take a solute in a test tube marked 2B
3. Mark a different k_f value for the solvent 2A
4. Mark weight of solvent (between 6g and 9g)

Solvent	**K_f**	**Solute (Mol.Mass)**
Diphenyl	8.00	Naphthalene (128) p-dichlorobenzene (147) diphenyl amine (169)
Naphthalene	6.95	Diphenyl(154) (128) p-dichlorobenzene (147) diphenyl amine (169)

QUESTION No:3 K_t by transition temperature

1. Take a solid solvent in a boiling tube marked 1A (about 3/4th full)
2. Take a solute in a test tube marked 1B (about ½ full)
3. Mark a different Molecular mass for the solute in the question paper

Solvent	**K_t**	**Solute (Mol.Mass)**
sodium thiosulphate	4.26	glucose(180)
sodium acetate	3.50	glucose(180)

Points for valuation of the method of question no.1,2,3

1)A definite weight of solvent is taken in a boiling tube fitted with a cork carrying a thermometer and stirrer. 2) Heated in a water bath to melt. 3)kept in air jacket with constant stirring 4)note the temperature at regular intervals 5) plot the temperature against time(cooling curves) 6) determine the freezing point/ transition temperature 7) the experiment is repeated by adding a known weight of solute 8) determine the freezing point/transition temperature as before 9) conduct a duplicate 10)Kt is calculated using the equation explain the terms.

Scheme of valuation question no:1,2,3

Sl.No	**Mark distribution**	**Max. Marks**
1	Procedure: 10 points 2 marks each	20
2	Cooling curves : 3 cooling curves:**10 marks** : 2 cooling curves:**7marks** 1 cooling curves**5 marks**	10
4	Duplicate	10
5	Calculation :4 points	10
	K_t/M results : results within 10% error :**10marks** 10.1% error to 11% error :**9marks** 11.1%to 12% error :**8marks**. 12.1% to 13% error **7marks** 13.1%to14%: **6marks** 14.1% to 15 % error 5 **marks.** 15.1%to 16% error :**4marks** 16.1%to 17% error : **3marks** 17.1% to 18% error :**2marks** 18.1%to19% error : **marks** above 19% error : **marks**	10
6	Record	10
7	Viva	10

QUESTION No:4 composition of binary mixture by viscometry

1. Provide 30%glycerine and consider as 100%.prepare different compositions, preferably between 40% and 60% (a total volume of 50ml 0r 100ml in a dry standard flask) and provide as unknown composition to the candidates.
2. Candidates are asked to prepare at least 5 compositions 0f 3A and 3 B in range 20-80%

Points for evaluation of procedure for question No.:4

1.prepare mixtures of different composition in the range of 20-80% of A and B.2. take a definite quantity of each mixture in a dry viscometer. 3. Find out time of flow of each mixtures two times.4. take the average time of flow 5.determine the density fo the mixture 6. Plot the product of density of time against composition.7. repeat the experiment with the same amount of unknown mixture. 8. The composition is obtained from the graph 9.any relevant point

Scheme of valuation for question 4

Sl.No.	Questions	Mark distribution	Max marks
1	procedure	9 points	20
2	Values of density and time flow	Determination of 6 t and d values: **20marks** 5t and d values :**18marks** 4 t nad d :**16 marks** 3t and d values :**14 marks** 2t and d values **12marks** 1 t and d value : **10marks**	20
4	Graph	Graph with 5 points: **10 marks** graph with 4 points : **7marks** graph with 2 points :**5 mark**	10
5	result	Values which differ upto ±5 from given composition:**10marks** : differ between ±5.1 and±6: **9 marks** differ between ±6.1 and±7: **8marks**. differ between ±7.1 and±8: **7marks.,** differ between ±8.1 and±9: **6marks.,** differ between ±9.1 and±10: **5marks.** Above ±10 : **4marks**	10
6	viva		10
7	record		10

QUESTION No:5Miscibility : phenol-Nacl system

1. Provide 2% NaCl solution to the candidates as consider as 1%. Candidates are ask to prepare 0.2, 0.3,0.4,0.5,0.6 and 0.8% of NaCl solution to a volume of 50mlor 100ml in dry std. flask .prpare different compositions,preferably between 0.4% and 0.6% (a total volume of 50ml or 100ml) in a dry standard flask)and provide as unknown composition to the candidates
2. Also provide 90% phenol

Points for evaluation of procedure for question no.5

1) Prepare 5 different standard solutions of NaCl in the range(0.2 to 0.8) 2) A definite volume of phenol and an equal volume of NaCl solution are mixed in a boiling tube fitted with a thermometer and stirrer 3)the boiling tube is kept in a water bath 4) Temperature is increased gradually and the solution kept stirring. 5) Note the temperature at which the turbidity disappear.

6) cool and note the reappearance of turbidity.7) the mean temperature is the miscibility temperature 8) plot miscibility temperature against % of NaCl solution. 9) Repeat the experiment using unknown mixture and the unknown composition is obtained from the graph. 10)any relevant point.

Scheme of valuation for question 5

Sl.No.	Questions	Mark distribution	Max marks
1	**procedure**	20 points	20
2	**Determination for miscibility temperature**	Determination of 6 miscibility temperature :**20marks** 5miscibility temperature :**18marks** 4 miscibility temperature :**16marks** 3 miscibility temperature :**14marks** 2 miscibility temperature :**12marks** 1 miscibility temperature :**10marks**	20
4	**Graph**	Graph with 5 points: **10 marks** graph with 4 points : **7marks** graph with 2 points :**5 mark**	10
5	**result**	Values which differ upto ±0.05 from given composition:**10marks** : differ between ±0.05.1 and±0.06: **9 marks** differ between ±0.06.1 and±0.07: **8marks**. differ between ±0.07.1 and±0.08: **7marks.,** differ between ±0.08.1 and±0.09: **6marks.,** differ between ±0.09.1 and±0.020: **5marks.** Above ±0.020 : **4marks**	10
6	**Viva**		10
7	**Record**		10

QUESTION No:6 points for evaluation of procedure

1.Provide 5 different standard solutions of NaCl in the range 0.2to0.8. 2.A definite volume of phenol and an equal volume of NaClsolution are mixed in a boiling tube fitted with a thermometer and stirrer.3.The boiling tube is kept in a water bath.4.Temperature is increased gradually and the solution kept stirring.5.Note the temperature at which the turbidity disappears. 6.Cool and note the reappearance of turbidity. 7.The mean temperature is the miscibility temperature. 8.Plot miscibility temperature against % of NaClsolution. 9.Repeat the experiment using unknown mixture and the unknown composition is obtained from the graph 10any relevant point.

QUESTION No:7 points for evaluation of procedure

1.Makeup the given HCL solution to 100ml 2.The glass electrodessetupwith 50ml of the made upHCl solution 3.It is coupled with a standard calomel electrode which is connected to a digital potentiometer and the EMT measured.4.A burette is set with the given NaOH solution 5. Add 1ml of NaOH in to the beaker containing HCL, stirred using a glass rod and

EMF is again measured 6. Repeat the experiment after adding aliquots of 1ml NaOH each time measuring EMF 7.A graph is plotted with EMF on the y axis and volume of NaOH on the X axis 8. From the graph, the equivalence point is noted. .9Also plot……as a function of volume of NaOH 10.The volume of NaOH corresponding to the maximum point on the curve is noted which given the equivalence pointandKnowing the volume of NaOH at the equivalence point, the concentration of HCL can be calculated.

QUESTION No:8 points for evaluation of procedure

Make up the given HCL solution to 100ml 2. Transfer 50mlof made up solution into 100ml beaker 3. Immense the conductivity cell in the solution. 4.measure the conductance of the solution 5. Add 1ml of given NaOH solution from burette6. Stir the solution and determine the conductance.7 the addition of alkali is repeated in amount of 1ml each time measuring the conuctance8.plot the graph between volume of alkali added and conductance 9. Extrapolate the straight line portions of the titration curve and get the point of intersection of two lines which gives end point.10. from the end point the concentration of NaOH can be calculated.

Marks for procedure writing Question No:6,7,8

10points – 20 marks,2 marks each

Viva-voce: At least 10 questions (one mark each) shall be asked from Physical chemistry

Record: the records shall be valued and the both the examiners should affix their dated signatures on its facing sheet. Submission of bona fide record, containing minimum 20 experiments recorded , is mandatory for appearing the practical examination.

20-18 experiments : 10 marks ;17-16 experiments: 9 marks; 15-14experiments :8 marks ;13-12experiments : 7marks ;12-11 experiments : 6mark .

SDC2INT01INTERNSHIP

Internship and the major project should be carried out in the industry, not necessarily with industry partner. The major idea for internship is to implement the things learned and to get a real life experience. The Evaluation process follows 100% external assessment (Except for Broadcasting and Journalism).

1. There will be internship/project at the end of 2nd and 4th semesters and an internship for the whole sixth semester.

2. Every student will be assigned an internal guide, allotted from the parent department concerned or an expert available in the college appointed by the principal or the head of the department.

3. The student has to make regular discussions with the guide while choosing the subject/area and throughout the life time of the project

. 4. At least three reviews should be conducted to evaluate the progress of work.

5. An evaluation team is constituted for conducting the evaluation. The team consist of external examiner, allotted by the university from the approved examination panel, representative from the industry and a faculty.

6. Students should submit a report of their work. A valid certificate from the organization should be produced as a proof that the work is carried out in the respective organization.

7. Students are required to demonstrate the working model of their work (if possible) to the panel of examiners. A viva will be conducted based on the report and students are supposed to clarify the queries regarding their work.

8. Mark distribution for internship assessment.(Except for Broadcasting and Journalism).

Distribution Marks

Content and relevance or Dissertation 60
Viva 20
Presentation 20

UNIVERSITY OF CALICUT
III SEMESTER B.VocPHARMACEUTICAL CHEMISTRYPRACTICAL EXAMINATION NOVEMBER.
GUIDELINES TO EXAMINERS

For Organic Chemistry Practical

1. Organic preparation

1. Procedure for organic preparation may be chosen from the following list
   - Acetanilide to p-nitroacetanilide
   - . Toluene to benzoic acid
   - Ethylbenzoate to benzoic acid
   - Aniline to tribromoaniline
   - Acetanilide to p-bromoacetanilide
   - Aniline to acetanilide
   - Aniline to phenylazo-β-naphthol
2. For conducting organic preparation any of the following may be asked. a) acetanilide to p-bromoacetanilide b) acetanilide to p-nitroacetanilide c) benzamide to benzoic acid d)benzaldehyde to benzoic acid
3. For different batches give different organic preparations
4. Students must exhibit the dry crude and recrystalized samples of the prepared organic compound

2.Organic analysis

1. Microscale analysis must be adopted for organic qualitative analysis

2. One of the following compounds may be given in numbered micro test tubes.Naphthalene, phenol, benzoicacid,pthalicacid, cinnamic acid, salicylic acid, methylsalicylate, benzaldehyde, acetophenone, benzamide, urea, glucose, p-dichlororbenzene, aniline and nitrobenzene.

3. students shall suggest a solid derivative of the given organic compound and write its method of preparation. prepare the derivative suggested by the examiner and exhibit.

Scheme of valuation of organic preparation & analysis

Sl.No	Questions	Mark distribution	Total marks
I	**Questions on organic analysis**	**9questions**	**9**
II	**Questions on reagent preparation**	Requirements: **: 1marks** Methods: **: 2 marks**	**3**
III	**Procedure for organic preparation**	Chemical equation for the reaction: **3 marks** requirements : **2marks** methods:**3 marks**recrystalization :**2 marks**	**10**
IV	**Organic preparation**	Yield **4 marks;** color**:2 marks**dryness**:2marks**recrystalization**: 2marks**	**10**
V	**Analysis of organic compound**	Aliphatic/aromatic **: 2 marks** saturated/unsaturated: **: 2 marks** detection of elements: **: 2 marks** Identification of functional group :**3 marks** chemistry of identification test**: 3 marks** confirmatory test of functional group**3 marks** chemistry of confirmation test **: 3marks** suggestion of derivative**1 mark** method of preparation of derivative**:2**display of derivative : **2 marks** chemistry of derivative preparation: **: 2 marks** systematic procedure **: 3 marks**	**28**
VI	**Viva**		**10**
VII	**Record**		**10**

For pharmaceutics practical-II

I. Procedure and principle on pharmaceutics practical : procedure writing may be selected from the following list and written in the score sheet.

- Linimentsand emulsions(dry gum method)
- Emulsions(dry gum method)and paste
- Linimentsand lotions
- Ointment and Paste

Evaluation of procedure writing; 5 points 10 marks (10x2=20)

Ointment: 1.melt 2.heat 3. dissolve 4. Addition of oleaginous phase to aqueous phase 5. Remove heat
Emulsion;1. Acacia mixed with oil 2. Quantity of oil,water and gum calculate 3. Acacia mixed with oil 4. Mixture triturated 5. Emulsion transferred into beaker and label.
Paste: 1. Trituration method 2.zinc powder and starch powder passed through sieve 3. Melt soft paraffine 4. Powder taken 5.Triturated with melted base
Lotion; 1.add ingredients to oil 2. Disperse active ingredient 3.prepare water phase 4mix the oil and water
Liniments: 1. Mix oleic acid with oil 2.dilute with water 3. Add oil 4.dissolve amoniumchloride in water 5. Add emulsion

II. Major experiment on pharmaceutics practical : may be selected from the following list

- Paracetamol
- Phenytoin

III. **Minor experimenton pharmaceutics practical : may be selected from the following list**

- Calamine lotion
- Turpentine Liniment

IV Viva-voce: At least 10 questions (one mark each) shall be asked from Pharmaceutics

V Record: the records shall be valued and the both the examiners should affix their dated signatures on its facing sheet. Submission of bona fide record, containing minimum 12experiments recorded , is mandatory fo appearing the practical examination **12-10 experiments : 10 marks ;9-10 experiments: 8marks; 8-7 experiments :6 marks ;6-5 experiments : 4marks ;4-3 experiments : 2mark .**

Scheme of valuation

Sl no	Item	Max Marks
I	Synopsis 5points each : (10x2)	20
II	Major experiment preparation ,yield and dryness(10+5+5 respectively)	20
III	Minor experiment : container selection , label and evaluation of product (6+4+10)	20
IV	Viva-voce	10
V	Record	10

UNIVERSITY OF CALICUT

IV SEMESTER B.VocPHARMACEUTICAL CHEMISTRYPRACTICAL EXAMINATION APRIL…..

GUIDELINES TO EXAMINERS

For Inorganic Chemistry Practical-III

Mixture analysis:

1. Prepare different inorganic mixture for each student (mixture must be well ground in mortar before giving the student)
2. Microscale analysis must be adopted
3. Conduct the cation analysis using the residue of sodium, carbonate extract
4. Since ammonium nitrate (which is necessary for the preparation of ammonium molybdate reagent) is not commercially available, phosphate anion must be avoided.
5. Combination of salts causing insoluble products must be avoided(eg: avoid mixing of sulphate with I and V^{th} group cation).
6. Two cation belonging to the same group may be avoided
7. The anion may be chosen from the following list.
   Carbonate, sulphate, nitrate, fluoride, chloride, bromide, borate, acetate and oxalate
8. The cations may be selected from the following list
   Pb^{2+} Al^{3+} $Zn^{2+}$$Mn^{2+}$ Co^{2+} Ni^{2+} Ba^{2+} Sr^{2+} Ca^{2+} Mg^{2+} and NH_4^+

Inorganic Preparation

1. Procedure for inorganic preparation may be chosen from the following list: Ferric alum: Potash alum: Mohr's salt, Nickal(II) dimethylglyoximate. Microcosmic salt and tetraaminecopper(II)sulphate
2. For conducting inorganic preparation any of the following may be asked: Potash alum, Mohr's salt, microcosmic saltand tetraaminecopper(II)sulphate.

Viva-voce: At least 10 questions (one mark each) shall be asked from Inorganic Chemistry

Record: the records shall be valued and the both the examiners should affix their dated signatures on its facing sheet. Submission of bona fide record, containing minimum 20 experiments recorded , is mandatory for appearing the practical examination **20 - 18experiments : 10 marks ;17-15 experiments: 9 marks; 14-12 experiments :8marks,11-9 experiments ;7 marks 8-6 experiments; 6marks5-3 experiments; 5 marks2-1 experiments;4marks**

Scheme of valuation

SlNo.	Mark Distribution	Max.Marks
I	**Question of qualitative analysis**	**6**
II	**Procedure for inorganic preparation**	**10**
III	**Identification tests for ion: 1 each for two anions two cations**	**4**
	Confirmation tests for ions 1 for two anions two cations	**4**
	Identification for cation group	**8**
	Chemistry of identification tests: 3 marks each for two anions two cations	**12**
	Chemistry of identification tests: 3 marks each for two anions two cations	**12**
	Systematic procedure	**4**
V	**Viva-voce**	**10**
VI	**Record**	**10**

Pharmaceutics Practical_III

I. Identification of spotters: 2 ponits each (5x2=10) identify the organs displayed

Evaluation of procedure writing:1.Name,2. Function 3. Characters 4. Location 5uses

II. **For synopsis may be chosen from the list (10 marks)**

- Antibiotic disc diffusion
- Examination for motility of bacteria by hanging drop

Evaluation of procedure writing: 5 points 10 marks

- Antibiotic disc diffusion: 1.prepare the inoculums 2. Adjust turbidity 3. Dipping sterile swab 4. Streak 5. Dry
- Examination for motility of bacteria by hanging drop:1. Place drop in cover slip 2. Place water drop 3.invert slide 4. Stick the slide 5.examine microscopy.

III. Major experiment:

- **For staining of bacteria**
- **For culture preparation: MacKonkey agar/Endos agar/Nutrient agar**

IV. **Minor experiment can be chosen from**

RBC Count/ WBC Count

V. Viva-voce:At least 10 questions (one mark each) shall be asked from Microbiology and Human Anatomy

VI Record: the records shall be valued and the both the examiners should affix their dated signatures on itsfacing sheet. Submission of bona fide record, containing minimum 12experiments recorded , is mandatory for appearing the practical examination **12-10 experiments : 10 marks ;9-7 experiments: 8 marks; 6-4 experiments :6 marks ;3-2 experiments : 4marks ;1 experiments : 2mark**

Scheme of valuation

Sl.No	Item	Max Marks
I	Identification spotters 2 marks each	10
II	Synopsis 5 points	10
III	Major experiment 15 marks for each • For staining of bacteria Preparation of slide- 4 marks Microscope adjustment -4 marks Clarity of the result -7 marks • For culture preparation Preparation – 4 marks Dryness – 4marks Streaking -7 marks	30
IV	Minor experiment Slide preparation -3marks Microscope adjustment -3marks Clarity of result – 4marks	10
V	Viva –voce	10
VI	Record	10

SDC4INT02 INTERNSHIP

Internship and the major project should be carried out in the industry, not necessarily with industry partner. The major idea for internship is to implement the things learned and to get a real life experience. The Evaluation process follows 100% external assessment (Except for Broadcasting and Journalism).

1. There will be internship/project at the end of 2nd and 4th semesters and an internship for the whole sixth semester.
2. Every student will be assigned an internal guide, allotted from the parent department concerned or an expert available in the college appointed by the principal or the head of the department.
3. The student has to make regular discussions with the guide while choosing the subject/area and throughout the life time of the project
. 4. At least three reviews should be conducted to evaluate the progress of work.
5. An evaluation team is constituted for conducting the evaluation. The team consist of external examiner, allotted by the university from the approved examination panel, representative from the industry and a faculty.
6. Students should submit a report of their work. A valid certificate from the organization should be produced as a proof that the work is carried out in the respective organization.
7. Students are required to demonstrate the working model of their work (if possible) to the panel of examiners. A viva will be conducted based on the report and students are supposed to clarify the queries regarding their work.
8. Mark distribution for internship assessment.(Except for Broadcasting and Journalism).

Distribution Marks

Content and relevance or Dissertation 60
Viva 20
Presentation 20

UNIVERSITY OF CALICUT

V SEMESTER B.VocPHARMACEUTICAL CHEMISTRYPRACTICAL EXAMINATION NOVEMBER

GUIDELINES TO EXAMINERS

For medicinal chemistry practical

I. **Synopsis :**may be chosen from the following list
Synthesis of Hippuran,merchurochrome,phenytoin.paracetamol,Isoniazid
Evaluation of procedure writing:1. Principle2. Chemical equation for the reaction 3. requirements 4. Methods 5. Relevant point
5 points 20marks4points :16marks 3points: 12marks 2points: 8 marks 1 point: 4 marks

II. **Major experiment:** may be chosen from the following list
- Aspirin
- Ascorbic acid

Titremtricassay :- 30 Marks

Weighing of assay sample to be done.Strength of titrant solution to be provided.
Implementation of the whole experiment 5 marks

Evaluation of assay done based on percentage error of result
0%-1% error – 25marks
1%-2% error - 20 marks
2%-3% error - 15 marks
3%-5% error - 10 marks
4%-10% error -5 marks
Above 10% error 3 marks given to the candidate

III. **Limit test:**may be chosen from the following list
- Nitrate
- Chloride
- sulphate

The test sample should be provided in the original raw material form
The candidate should be aware of sampling techniques**.**
Marks awarded based on general presentation 5 marks
Analytical interpretation of result 5 marks

IV. Viva-voce: At least 10 questions (one mark each) shall be asked from Medicinal Chemistry

V. Record: the records shall be valued and the both the examiners should affix their dated signatures on its facing sheet. Submission of bona fide record, containing minimum 12experiments recorded , is mandatory for appearing the practical examination 12-10 experiments : examination **12-10 experiments : 10 marks ;9-8 experiments: 8 marks; 7-6 experiments :6 marks ;5-4 experiments : 4marks ;3-2 experiments : 2mark**

Scheme of valuation

Sl.No	Item	Max Marks
I	**Synopsis max five points**	**20**
II	**Major experiment** **implementation of experiment 5 marks, result and output 25marks**	**30**
III	**Minor experiment** **on general presentation 5 marks** **Analytical interpretation of result 5 marks**	**10**
IV	**Viva –voce**	**10**
V	**Record**	**10**

For Pharmaceutical chemistry practical-IV

I. Synopsis : may be chosen from the following list

- **Isolation of pectin from carrot**
- **Acid value of oil**

Evaluation of procedure writing:

- **Isolation of pectin from carrot**: 1.cut small pieces 2.P^H adjust with 4 by adding citric acid 3. Heat to 1 hr 4. Filter and add acid 5.wahed ,dried and weighed
- **Acid value of oil**: 1. Weigh the oil and transfer in conical flask 2. Add alcahol 3. Heat 4. Indicator 5.tirate against KOH 5. Endpoint.

II. **spotters: 2 marks each , 2X5=10 marks**

Evaluation of spotters: Name,family,morphology,constituents,use

III. Major experiment **(30 marks)**

Photochemical analysis of Trigaduchooranam

IV.Minor experiment can be chosen from following list (**10 marks)**

- Extraction and isolation of starch from potato
- Extraction of casein from milk
- Isolation of pectin from orange peel

IV. **Viva-voce**: At least 10 questions (one mark each) shall be asked from Pharmacognosy

V. **Record**: the records shall be valued and the both the examiners should affix their dated signatures on its facing sheet. Submission of bona fide record, containing minimum 12experiments recorded , is mandatory for appearing the practical examination **12-10 experiments : 10 marks ;9-8 experiments: 8 marks; 7-6 experiments :6 marks ;5-4 experiments : 4marks ;3-2 experiments : 2mark**

Scheme of valuation

Sl.No	Item	Max Marks
I	Synopsis maximum of 5points	10
II	Identification of spotters 2X5	10
III	Major experiment Systematic procedure:- 10 marks Identification tests for content:- 10marks Chemistry of the reaction: 10marks	30
IV	Minor experiment To perform the experiment – 5 marks Yield of experiment – 5marks	10
V	Viva –voce	10
VI	Record	10

SDC6INT03 INTERNSHIP

Internship and the major project should be carried out in the industry, not necessarily with industry partner. The major idea for internship is to implement the things learned and to get a real life experience. The Evaluation process follows 100% external assessment (Except for Broadcasting and Journalism).

1. There will be internship/project at the end of 2nd and 4th semesters and an internship for the whole sixth semester.
2. Every student will be assigned an internal guide, allotted from the parent department concerned or an expert available in the college appointed by the principal or the head of the department.
3. The student has to make regular discussions with the guide while choosing the subject/area and throughout the life time of the project
. 4. At least three reviews should be conducted to evaluate the progress of work.
5. An evaluation team is constituted for conducting the evaluation. The team consist of external examiner, allotted by the university from the approved examination panel, representative from the industry and a faculty.
6. Students should submit a report of their work. A valid certificate from the organization should be produced as a proof that the work is carried out in the respective organization.
7. Students are required to demonstrate the working model of their work (if possible) to the panel of examiners. A viva will be conducted based on the report and students are supposed to clarify the queries regarding their work.
8. Mark distribution for internship assessment.(Except for Broadcasting and Journalism).

Distribution Marks

Content and relevance or Dissertation 60
Viva 20
Presentation 20

UNIVERSITY OF CALICUT

B.Voc PHARAMACEUTICAL CHEMISTRY PRACTICAL EXAMINATION

INSTRUCTIONS TO EXAMINERS

1. Strict secrecy should be maintained in all matters regarding examination work.
2. The scheme of valuation must be strictly followed so as to ensure uniformity
3. Examination will be conducted in two sessions , FN 9.30 AM-12.30PM & AN 13.0PM-4.30PM(on Fridays 2.00pm-4.00pm)
4. Extension of examination time may be granted only on genuine grounds. In any case maximum permitted extension shall not exceed 30 minutes.
5. The changes in schedule should be avoid as far as possible and will be permitted only on valid reasons and with the written recommendation of chief superintent/principal. The recommendation letter should also be sent to the chairman along with marklist.
6. No single examiner is given to the charge of conducting the examination. Both the internal and external examiners are equally responsible for the examination work, However evaluation and viva-voce shall be done by external examiner
7. Examiners must see that they reach sufficiently early at the centre and remain throughout the session.
8. Candidates shall not be allowed to attend the examination without hte duly certified –laboratory record, having minimum 75% experiments. All records must be punched.
9. The score sheet shall be tied as the facing sheet at the time of receiving answer book.
10. From this year procedure of experiments shall not be supplied to the students.
11. **Preparation of mark sheet**
    a. For each batch, one mark list and a duplicate are to be prepared. Separate mark list are to be prepared for separate batches.

b. Register number of candidates must be entered serially in the ascending order
c. Absentees should be marked as ABSENT in the re ink against their name and number

12.Packing and forwarding of valued answer book

a. Valued answer book of each batch along wit one questionpapaer and skilled report should be packed separately and the following information should be inscribed on the cover

1. Name of examination 2.name of centre 3.batch4. register number of candidatespresent 6. Register number of absenttes 7. Total number of answer books in the packet 8. Name of examiners

13.Forwarding of mark list

The **original and duplicate mark list should be sent (if by post registraed post/speed post only) to the chair man in his <u>Home Address</u>** (both the answer and mark list must be sent to the chairman within 2 days after the examination duty

14.Remuneration rate

1)preparing for the exam Rs. 3.00 per candidate per exam 2) conducting, superintending and judging the merit of the candidate Rs.6.00 per candidate per exam 3) record valuation Rs.3.00 per candidate 4)project and viva Rs.6.00 per candidate .5)Mileage allowance Rs.2.00 per Km 6)DA: Rs.400.00

With regards,

Chairman, Board of Examinations

B.Voc PHARAMACEUTICAL CHEMISTRY

MODEL QUESTION PAPER FOR PRACTICAL

SEMESTER I-VI

(2018 Admn onwards)

UNIVERSITY OF CALICUT

I SEMESTER B.VocPHARMACEUTICAL CHEMISTRY PRACTICAL EXAMINATION NOVEMBER…..

SDC1IC03(P) INORGANIC CHEMISTRY PRACTICAL –I

Time: 3Hrs Maxmarks:80

PART A

I. **Answer all the questions in the score sheet in the space provided (10 marks)**

II. **Answer the question in the space provided. (10 marks)**

III. **Estimate volumetrically (by conventional method) the mass of Fe^{3+} in the whole of the given solution of ferric alum, being provided with pure Mohr's salt and approximately 0.1 N $K_2Cr_2O_7$**

(10 marks)

IV. **Implementation and Calculation**

(30marks)

PART B

V. **Record**

(10marks)

VI. **Viva-voce (10 marks)**

……

…….

UNIVERSITY OF CALICUT

I SEMESTER B.Voc PHARMACEUTICAL CHEMISTRY PRACTICAL EXAMINATION NOVEMBER…..

SDC1IC03(P) INORGANIC CHEMISTRY PRACTICAL –I

Time :3 Hrs Maxmarks:80

Name:	**Date:**
Reg.No	**Volumetric solution no:**
Centre:	

SCORE SHEET

SlNo	Item	Max Marks	Marks awarded
I	Question on volumetric analysis	10	
II	Procedure	10	
III	Implementation and calculation	30	
IV	Result and output	10	
V	Record	10	
VI	Viva-voce	10	

Question No:I(Answer all)

1. Calculate the mass of ……required to prepare…….. …ml of its ……N solution
2. Calculate the normality of ……solution when……..g of it is dissolved in water in a ……ml standard flask
3. When……..ml ……N…… solution is diluted to ……ml the normality of the resulting solution will be……
4. Name the indicator used for the titration of……against ……
5. Write the structure of indicator……
6. The titration of ……..solution against…… is a neutralization/redox /precipitation/ complex metric titration
7. What is the role of ……in the estimation of …… during permagnometry/dichrometry/idometry/argentometery/complexometry titration
8. Write the balanced chemical equation for the titration of ……solution against……..
9. Name two dibasic acid
10. Define the term normality **(10 Marks)**

Question No:II

Give a brief outline of the method for the volumetric estimation of …….. in the whole of the given solution of ……by double burette method/conventional method being provided with pure…….. (give at least 8 points on the back side of score sheet) **(10 Marks)**

UIVERSITY OF CALICUT

I SEMESTER B.VocPHARMACEUTICAL CHEMISTRY PRACTICAL EXAMINATION NOVEMBER…..

SDC1PH01 (P) PHARAMCEUTICS PRACTICAL –I

Time :3 Hrs Maxmarks:80

PART A

I. Answer the question in the score sheet.
(20 marks)

II. Major experiment

Estimate the Titerable acidity of given sample of urine (20 marks)

III. Minor experiment

- **Separation of amino acid using paper chromatographic technique(10 marks)**
- **Chemical analysis of given sample of urine. Find out the abnormality present in it.**

(10 marks)

PART B

IV. Viva-voce
(10 marks)

V. Record
(10 marks)

……

…….

UNIVERSITY OF CALICUT

I SEMESTER B.VocPHARMACEUTICAL CHEMISTRY PRACTICAL EXAMINATION NOVEMBER…..

SDC1PH01 (P) PHARAMCEUTICS PRACTICAL –I

Time :3 Hrs Maxmarks:80

Name:	**Date:**
Reg.No	
Centre:	

SCORE SHEET

Sl.No	Item	Max Marks	Marks awarded
I	Synopsis	20	
II	Calculation, implementation and result of Major experiment	20	
III	Calculation and implementation of Minor Experiment	20	
IV	Viva-voce	10	
V	Record	10	

Question No: 1 Synopsis

Write the Principle and procedure involved in the Estimation of ……..(written on the score sheet).

(20 Marks)

UNIVERSITY OF CALICUT

II SEMESTER B.Voc PHARMACEUTICAL CHEMISTRYPRACTICAL EXAMINATION APRIL…..

SDC2PC02 (P) PHYSICAL CHEMISTRY PRACTICAL

Time :3 Hrs Maxmarks:80

1. **Write in the first fifteen minutes the procedure for the question marked one in Section A**
2. **conduct the experiment for the question marked in Section B and record the data and results nearly and systematically**

Section A

1. **Determine the cryoscopic constant (K_f) of the given solid solvent 1A…….solute 1 B……. of molecular mass…… is given. Conduct a duplicate experiment. Draw the coling curves for the solvent & the two trials. Report two K_f values. Weight of pure solvent to be taken initially is …g**
2. **Detremine the molecularmass (M) of the given solute 2B by rast method. K_f of the solvent 2A is ……. Conduct a duplicate experiment. Draw the cooling curves for the solvent & the two trials. Report two M values. Weight of pure solvent to be taken initially is ……g**
3. **Determine the transition temperature constant (K_t)of crystalline 3A …….solute 3B ……of molecular mass ……..is given. Conduct a duplicate experiment. Draw the cooling curves for the solvent & the two trials. Report two (K_t) values. Weight of pure solvent to be taken initially is ……g**
4. **Determine the composition of the given binary mixture of 4A…& 4B……using viscometer with at least five mixtures of known composition**
5. **Determine the miscibility temperature of at least five mixtrures of standared aqueous solution of sodium chloride and phenol & determine the concentration of given solution 6A ……graphically**
6. **Determine the composition of the given binary mixture of 4A…& 4B……using refractometer with at least five mixtures of known composition**
7. **By the potentiometric titration standardize the the given HCl 7A…… solution using the given ……..N NaOH solution. Plot a graph with EMF and volume of NaOH. Also plot ΔE/ΔV as a function of volume of NaOH**

8. By conductometric titration (a) standardize the given HCl (8A…….) solution with the given ……N NaOH solution

Section B

1. **Q.No1 Section A**
2. **Q.No2 Section A**
3. **Q.No3 Section A**
4. **Q.No4 Section A**
5. **Q.No5 Section A**

UNIVERSITY OF CALICUT

II SEMESTER B.VocPHARMACEUTICAL CHEMISTRY PRACTICAL EXAMINATION APRIL…..

SDC2PC02 (P) PHYSICAL CHEMISTRY PRACTICAL

Time :3 Hrs Maxmarks:80

Name:	**Date:**
Reg.No	**Question**
no:	
Centre:	

SCORE SHEET

Sl.No	Q.No 1&2	Max marks	Marks awarded	Q,No 3&4	Max marks	Marks awarded
1	Procedure	20		Procedure	20	
2	Cooling curve	10		T and d values/miscibility temperature	20	
3	K_f/K_t	10		result	10	
4	Duplicate	10		graph	10	
5	Calculation	10				
6	Viva-voce	10		Viva-voce	10	
7	Record	10		record	10	

1.Copy down the marked question in section B and write its procedure within 10 minutes *(give at least 8points)*

(20 Marks)

UNIVERSITY OF CALICUT

II SEMESTER B.Voc PHARMACEUTICAL CHEMISTRYPRACTICAL EXAMINATION APRIL…..

SDC2INT01 INTERNSHIP

UNIVERSITY OF CALICUT

III SEMESTER B.Voc PHARMACEUTICAL CHEMISTRYPRACTICAL EXAMINATION NOVEMBER…..

GEC3PHY01 PHYSICS-I

Time :3 Hrs Maxmarks:80

Name:	**Date:**
Reg.No	
Centre:	

SCORE SHEET

Sl.No.	Item	Max marks	Marks awarded
1	Theory	20	
2	Implementation *(adjustment(10), tabulation+ observation 20)*	30	
3	Calculation and result	10	
4	Viva-voce	10	
5	Record	10	

Do the marked one

1. **Determine the Young's modulus materials of subjecting it to uniform bending by measuring the depression using optic liver**
2. **Determine the rigidity modulus material of given wire using Torsion pendulum**
3. **Determine the moment of Inertia of flywheel**
4. **Determine the coefficient of viscosity of given liquid**
5. **Determine the surface tension of given liquidby capillary rise method**

UNIVERSITY OF CALICUT

III SEMESTER B.VocPHARMACEUTICAL CHEMISTRY PRACTICAL EXAMINATION NOVEMBER…..

SDC3PH02 PHARAMCEUTICS PRACTICAL –II

Time :3 Hrs Maxmarks:80

PART A

I. Answer the question in the score sheet.
(20Marks)

II.Major experiment **(20Marks)**

Synthesis of organic medicinal compounds of ……

III.Minor experiment **(20 Marks)**

Prepare,dispense and label of……..

PART B

IV.Viva-voce

(10Marks)

V.Record

(10Marks)

……
……

UNIVERSITY OF CALICUT

III SEMESTER B.VocPHARMACEUTICAL CHEMISTRY PRACTICAL EXAMINATION NOVEMBER…..

SDC3PH02 PHARAMCEUTICS PRACTICAL –II

Time :3 Hrs Maxmarks:80

Name: **Date:** **Reg.No** **Centre:**

SCORE SHEET

Sl no	Item	Max Marks	Marks awarded
I	Synopsis	20	
II	Major experiment preparation ,yield and dryness	20	
III	Minor experiment : container selection, label and evaluation of product	20	
IV	Viva-voce	10	
V	Record	10	

Question No:I Synopsis

Write the Principle, procedure, use, dose and label requirements of……. (Written on score sheet)

(20 marks)

UNIVERSITY OF CALICUT

III SEMESTER B.VocPHARMACEUTICAL CHEMISTRYPRACTICAL EXAMINATION NOVEMBER…..

SDC30C02(P)ORGANIC CHEMISTRY PRACTICAL

Time :3 Hrs Maxmarks:80

PART A

I. Question on organic analysis (9 marks)

II. Question on reagent preparation (3marks)

III. Procedure for organic preparation (10 marks)

IV. Convert the whole of the given……into……exhibit the crude and re crystalized samples for inspection (10 marks)

V. Analyze qualitatively and symmetrically given organic compound by microscale analysis with the view of identifythe following (a) detect the element present in it (b) find out whether the compound is aliphatic or aromatic (c) copound is saturated on unsaturated (d) identify and confirm the functional group (e) suggest a suitable derivative and ive its method of preparation (f) prepare derivative suggested by examiner and exhibit (g) write the systematic procedure of analysis including chemistry of identification test, conformation test and derivative preparation

(28 marks)

PART B

VI. Viva-voce (10 marks)

VII. Record (10 marks)

……

UNIVERSITY OF CALICUT

III SEMESTER B.VocPHARMACEUTICAL CHEMISTRY PRACTICAL EXAMINATION NOVEMBER…..

SDC30C02(P)ORGANIC CHEMISTRY PRACTICAL

Time :3 Hrs Maxmarks:80

Name:	**Date:**
Reg.No	**compound no:**
Centre:	

SCORE SHEET

Sl.No	Questions	Total marks	Marks awarded
I	Questions on organic analysis	9	
II	Questions on reagent preparation	3	
III	Procedure for organic preparation	10	
IV	Organic preparation	10	
V	Analysis of organic compound	28	
VI	Viva-voce	10	
VII	Record	10	

I.Question on organic analysis

1. The formula of……is
2. ……can be used for the derivative preparation of ……
3. When……is treated with ……,the compound formed has the structural formula……..
4. The formula of the …….. colured precipitate/solution formed in the identification/confirmation test for ……. Functional group is ……..
5. The formula of the …… Colour precipitate /solution formed in the Lassaigne's test for ……is……
6. Structure of……
7. confirmatory test of……..
8. chemistry of…….reaction

9.identification test for……. **(9 marks)**

II. Question on reagent preparation

10..How is Borshe's reagent/Schiff's reagent/Tollent reagent /Fehling's solution/Phenophthalein/methyl orange/ N-phenylanthra anilic acid/neutral $FeCl_3$ prepared in the laboratory (written on the score sheet)(points: requirement and method) **(3marks)** **III.Procedure of organic preparation**

11. Write the procedure for conversion of…… Into ……on the backside of the score sheet.

(points: chemical equation, reqirments,method ,recrystalization) **(10marks)**

UNIVERSITY OF CALICUT

IV SEMESTER B.Voc PHARMACEUTICAL CHEMISTRYPRACTICAL EXAMINATION APRIL…..

SDC4PHY04(P) PHYSICS PRACTICAL-II

Time :3 Hrs Maxmarks:80

Name:	**Date:**
Reg.No	
Centre:	

SCORE SHEET

SlNo:	Item	Max Marks	Marks awarded
1	Theory	20	
2	Implementation *(adjustment(10), tabulation+observation 20)*	30	
3	Calculation and result	10	
4	Viva-voce	10	
5	Record	10	

1. **Determine the resistivity of given wire using cary fosters bridge**
2. **Calibrate the given voltmeter using potentiometer**
3. **Construct the half wave and full wave rectifier. Measure ripple factor for various load resistance**
4. **Determine the refractive index of given liquid and glass**
5. **Determine the moment of given magnet using deflection magnetometer arranged in tan A position**

UNIVERSITY OF CALICUT

IV SEMESTER B.VocPHARMACEUTICAL CHEMISTRYPRACTICAL EXAMINATION APRIL…..

SDC4IC05(P)INORGANIC CHEMISTRY PRACTICAL-III (CHE6B17(P))

Time :3 Hrs Maxmarks:80

Part A

I. Answer all the questions on the score sheet (6 marks)

II. Answer the question in the space provided (10 marks)

III. Analyze qualitatively the given mixture by microsacle analysis to identify and confirm the two cation and two anion present in it. Record the data systematically including chemistry of identification and confirmation test (44marks)

Part B

IV. Viva-voce (10 marks)

V. Record (10 marks)

UNIVERSITY OF CALICUT

IV SEMESTER B.VocPHARMACEUTICAL CHEMISTRY PRACTICAL EXAMINATION APRIL…..

SDC4IC05(P)INORGANIC CHEMISTRY PRACTICAL-IIICHE6B17(P)

Time :3 Hrs Maxmarks:80

Name:	**Date:**
Reg.No	**mixture**
no:	
Centre:	

SCORE SHEET

SlNo.	Mark Distribution	Max.Marks	Marks awarded
I	Question of qualitative analysis	6	
II	Procedure for inorganic preparation	10	
III	Identification tests for ions:	4	
	Confirmation tests for ions	4	
	Identification for cation group	8	
	Chemistry of identification tests:	12	
	Chemistry of confirmation tests:	12	
	Systematic procedure	4	
IV	Viva-voce	10	
V	Record	10	

I. Questions on qualitative analysis

1. The……. colored precipitate/solution formed in the identification/conformation test for ……ions due to the formation of…….
2. When……ion is treated with ……The product formed has the formula……
3. The formula of……is……..
4. The formula of the complex formed by the reaction between…….and……..is ……
5. Confirmatory test for……..
6. Chemistry of ……..reaction.. **(6 marks)**

II.Procedure writing

7. Write a brief outline (written on the back side of score sheet)of the method used for the preparation of the double salt/complex ……..**(10 marks)**

UNIVERSITY OF CALICUT

IV SEMESTER B.Voc PHARMACEUTICAL CHEMISTRYPRACTICAL EXAMINATION APRIL…..

SDC4PH03(P) PHARMACEUTICS PRACTICAL – III

Time :3 Hrs Max marks:80

PART A

I. Answer all the questions on the score sheet (10 marks)

II. Answer the question in the space provided (10 marks)

III. Major Experiment (15x2=30 marks)

- **Identification and staining of bacteria**
- **Prepare the culture of ……. agar**

IV.Minor experiments do the marked one (10marks)

- **RBC Count/ WBC Count**

PART B

V.Viva-voce (10 marks)

VI.Record (10 marks)

……

UNIVERSITY OF CALICUT

IV SEMESTER B.VocPHARMACEUTICAL CHEMISTRY PRACTICAL EXAMINATION APRIL…..

SDC4PH03(P) PHARMACEUTICS PRACTICAL – III

Time :3 Hrs Maxmarks:80

Name:	**Date:**
Reg.No:	
Centre:	

SCORE SHEET

Sl.No	Item	Max Marks	Marks awarded
I	Identification spotters 2 marks each	10	
II	Synopsis	10	
III	Major experiment 15 marks for each	30	
IV	Minor experiment	10	
V	Viva –Voce	10	
VI	Record	10	

Question No I .Identification/Spotters

Identify any five items of model and write their characteristics (written on score sheet) **(10 marks)**

Question No: II .Synopsis

Write the principle and procedure of …… (written on score sheet)

(10 marks)

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I V SEMESTER B.Voc PHARMACEUTICAL CHEMISTRYPRACTICAL EXAMINATION NOVEMBER…..

SDC4INT02 INTERNSHIP

UNIVERSITY OF CALICUT

V SEMESTER B.VocPHARMACEUTICAL CHEMISTRY PRACTICAL EXAMINATION NOVEMBER…..

SDC5MC02(P) MEDCINAL CHEMISTRY PRACTICAL (P)

Time :3 Hrs Maxmarks:80

PART A

I. Answer the question in the space provided (20 marks)

II. Major experiment (30 marks)

Perform the assay of following marked one

- **Aspirin**
- **Ascorbic acid**

III. Minor experiment (10 marks)

- **Do the Limit Test of ……**

Part B

IV. Viva-voce (10 marks)

V. Record (10 marks)

……

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V SEMESTER B.VocPHARMACEUTICAL CHEMISTRYPRACTICAL EXAMINATION NOVEMBER…..

SDC5MC02(P) MEDCINAL CHEMISTRY PRACTICAL (P)

Time :3 Hrs Maxmarks:80

Name:	**Date:**
Reg.No	
Centre:	

SCORE SHEET

Sl.No	Item	Max Marks	Marks awarded
I	Synopsis	20	
II	Major experiment	30	
III	Minor experiment	10	
IV	Viva –voce	10	
V	Record	10	

Question No I Synopsis

1. Write the Principle and procedure involved in the preparation of ……. (written on the score sheet)

(20 marks)

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V SEMESTER B.VocPHARMACEUTICAL CHEMISTRY PRACTICAL EXAMINATION NOVEMBER…..

SDC5PH04 (P) PHARMACEUTICS PRACTICAL –IV

PART A

I. Answer the question in the space provided (20 marks)

II. Spotters

- **Identification Biological Source Chemical Constituents and uses of any five organized and unorganized drugs displayed (10 marks)**

i. Major experiment

(30 marks)

- **Do the Phytochemical analysis of given extractof trigadu**

III. Minor experiment do the extraction of……..

(10marks)

PART B

IV. Viva-voce

(10marks)

V. Record

(10marks)

……

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V SEMESTER B.Voc PHARMACEUTICAL CHEMISTRYPRACTICAL EXAMINATION NOVEMBER…..

SDC5PH04 (P) PHARMACEUTICS PRACTICAL –IV

Time :3 Hrs
Maxmarks:80

Name:	**Date:**
Reg.No	
Centre	

SCORE SHEET

Sl.No	Item	Max Marks	Marks awarded
I	Synopsis	10	
II	Identification of spotters	10	
III	Major experiment	30	
IV	Minor experiment	10	
V	Viva –voce	10	
VI	Record	10	

Question No I Synopsis

1. Write the Principle and procedure involved in the ……

(10Marks)

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VI SEMESTER B.Voc PHARMACEUTICAL CHEMISTRYPRACTICAL EXAMINATION APRIL…..

SDC6INT03

MAJOR INTERNSHIP

UNIVERSITY OF CALICUT

B.Voc PHARAMACEUTICAL CHEMISTRY

QUESTION BANK

PRACTICAL EXAMINATION

SEMESTER I -VI

SEMESTER I

SDC1IC03(P) INORGANIC CHEMISTRY PRACTICAL –I

Question No:1(Answer all)

11. Calculate the mass of ……required to prepare……. …ml of its ……N solution
12. Calculate the normality of ……solution when…….g of it is dissolved in water in a ……ml standard flask
13. When……..ml ……N…….HCl solution is diluted to ……ml the normality of the resulting solution will be……
14. Name the indicator used for the titration of…….against ……
15. Write the structure of indicator
16. The titration of ……..solution against……. Is a neutralization/redox/precipitation/ complex metric titration
17. What is the role of ……in the estimation of …… during permagnometry/dichrometry/idometry/argentometery/complexometry titration
18. Write the balanced chemical equation for the titration of ……solution against……..
19. Name dibasic acid
20. Define normality

Question No:2

Give a brief outine of the method for the volumetric estimation of ……in the whole of the given solution of ……..by double burette method/conventional method being provided with pure……

1. Estimation of Ca in $CaCl_2$ solution given pure oxalic acid (conventional method)
2. Estimation of Cu in Copper sulpahte solution given pure $K_2Cr_2O_7$ (conventional Method)
3. Estimation of Mg in $MgSO_4$ solution given pure $ZnSO_4$ crystals(conventional method)
4. Estimation of iron in ferrous sulphate solution given pure Mohr's salt(double burette method)
5. Estimation of oxalic acid given pure Mohr's salt (double burette method)

Question No:3

1. Estimation of Zn^{2+}/Mg^{2+} in the whole of the given solution (conventional method)
2. Estimation of Fe^{2+}/$FeSO_4.7H_2O$/Mohr's salt (double burette method)
3. Estimation of ferric ion (convention method)

SDC1PH01 (P) PHARAMCEUTICS PRACTICAL –I

Question No: 1 Synopsis

Principle and procedure involved in the following marked one

1. Estimation of calcium in blood
2. Estimation of urea in urine
3. Estimation of cholesterol in blood
4. Estimation of urea in blood

Question No: 2 Major experiment do the marked one

4. Estimate the Titerable acidity of given sample of urine
5. Estimation of Reducing sugar of urine
6. To estimate the Protein content in milk

Question No: III Minor experiment

1. Separation of amino acid using paper chromatographic technique
2. Chemical analysis of given sample of urine. Find out the abnormality present in it.

SEMESTER II

SDC2PC02 (P) PHYSICAL CHEMISTRY PRACTICAL

1. Write in the first fifteen minutes the procedure for the question marked one in Section B
2. conduct the experiment for the question marked in Section A and record the data and results nearly and systematically

Section A

1. Determine the cryoscopic constant (K_f) of the given solid solvent 1A……solute 1 B……. of molecular mass…… is given. Conduct a duplicate experiment. Draw the coling curves for the solvent & the two trials. Report two K_f values. Weight of pure solvent to be taken initially is ……g
2. Detremine the molecularmass (M) of the given solute 2B by rast method. K_f of the solvent 2A is ……Conduct a duplicate experiment. Draw the coling curves for the solvent & the two trials. Report two M values. Weight of pure solvent to be taken initially is ……g
3. Determine the transition temperature constant (K_t)of crystalline 3A ……solute 3B ……of molecular mass ……..is given.Conduct a duplicate experiment. Draw the coling curves for the solvent & the two trials. Report two (K_t) values. Weight of pure solvent to be taken initially is ……g
4. Determine the composition of the given binary mixture of 4A…& 4B……using viscometer with atleast five mixtures of known composition
5. Determine the miscibility temperature of at least five mixtrures of standared aqueous solution of sodium chloride and phenol & determine the concentration of given solution 6A ……graphically
6. Determine the composition of the given binary mixture of 4A…& 4B……using refractometer with atleast five mixtures of known composition
7. By the potentiometric titration standardize the the given HCl 7A…… solution using the given ……..N NaOH solution. Plot a graph with EMF and volume of NaOH. Also plot $\Delta E/\Delta V$ as a function of volume of NaOH
8. By conductometric titration (a) standardize the given HCl (8A……) solution with the given ……..N NaOH solution (b) standardize the given NaOH (8B…….) solution with the given ……..N HCl solution

Section B

1. Q.No1 Section A
2. Q.No2 Section A
3. Q.No3 Section A
4. Q.No4 Section A
5. Q.No5 Section A
6. Q.No6 Section A
7. Q.No7 Section A
8. Q.No8(a)Section A
9. Q.No8(b) Section A

SDC2INT01 INTERNSHIP

SEMESTER III

GEC3PHY01 PHYSICS-I

6. Determine the Young's modulus materials of subjecting it to uniform bending by measuring the depression using optic liver
7. Determine the rigidity modulus material of given wire using Torsion pendulum
8. Determine the moment of Inertia of flywheel
9. Determine the coefficient of viscosity of given liquid

SDC30C02(P)ORGANIC CHEMISTRY PRACTICAL

Question on organic analysis

9. The formula is……
10. ……can be used for the derivative preparation of …….
11. When…….is treated with ……,the compound formed has the structural formula…….
12. The formula of the …….. colured precipitate/solution formed in the identification/confirmation test for …….. Functional group is ……..
13. The formula of the …….. Colourprecipitate /solution formed in the Lassaigne's test for …….. is……
14. The structure of ……..compound
15. The reagent used in the conformation test of ……
16. The chemistry of …….reaction
17. Structure of Phenophthalein/methyl orange

Question on reagent preparation

18. How is Borshe's reagent/Schiff's reagent/Tollent reagent /Fehling's solution/Phenophthalein/
    methyl orange/ N-phenylanthraanilic acid/neutral $FeCl_3$ prepared in the Procedure of organic preparation
19. Procedure for organic preparation may be chosen from the following list
    - Acetanilide to p-nitroacetanilide
    - Toluene to benzoic acid
    - Ethylbenzoate to benzoic acid
    - Aniline to tribromoaniline
    - Acetanilide to p-bromoacetanilide
    - Aniline to acetanilide
    - Aniline to phenylazo-β-naphthol

20. Organic analysis

One of the following compounds may be given in numbered micro test tubes.Naphthalene, phenol, benzoicacid,pthalicacid, cinnamic acid, salicylic acid, methylsalicylate, benzaldehyde, acetophenone, benzamide, urea, glucose, p-dichlororbenzene, aniline and nitrobenzene

21. For conducting organic preparation any of the following may be asked.

- acetanilide to p-bromoacetanilide
- acetanilide to p-nitroacetanilide
- benzamide to benzoic acid
- d)benzaldehyde to benzoic acid

SDC3PH02 PHARAMCEUTICS PRACTICAL -II

Question No:1Synopsis

Principle, procedure, use, dose and label requirements of ANY TWO preparations of following

1. Ointments/Paste
2. Liniments/emulsions
3. Emulsions/paste
4. Liniments/creams
5. Liniments/lotions

Question No:2Major experiment

Synthesis of any one of following organic medicinal compounds

1. Aspirin
2. Paracetamol
3. Phenytoin

Question No: 3Minor experiment

Prepare any one of the following ,dispenseand label

1. ORS
2. Calamine lotion
3. Turpentine Liniment

SEMESTER IV

SDC4PHY04(P) PHYSICS PRACTICAL-II

6. Compare the moments of the given two magnets using Starl's vibration magnetometer
7. Determine the resistivity of given wire using cary fosters bridge
8. Calibrate the given voltmeter using potentiometer
9. Construct the half wave and full wave rectifier. Measure ripple factor for various load resistance
10. Determine the refractive index of given liquid and glass
11. Determine the moment of given magnet using deflection magnetometer arranged in tan A position

IV SEMESTER B.Voc PRACTICAL EXAMINATION APRIL…

INORGANIC CHEMISTRY PRACTICAL-III

Questions on qualitative analysis

II. The…….. coloured precipitate/solution formed in the identification/conformation test for ……ions due to the formation of…….

III. When……ion is treated with ……. The product formed has the formula……..

IV. The formula of……..is……..

V. The formula of the complex formed by the reaction between…….and……..is ……

VI. The structure of……

VII. Confirmatory test for……..
..

VIII. Procedure for inorganic preparation

Write a brief outline of the method used for the prepararion of the double salt/complex

- : Ferric alum: Potash alum: mohr's salt, Nickal(II) dimethylglyoximate. Microcosmic salt and tetraaminecopper(II)sulphate

IX. Analyze qualitatively the given mixture by microsacle analysis to identify and confirm the two cation and two anion present in it.

- The anion may be chosen from the following list.
    - Carbonate, sulphate, nitrate, fluoride, chloride, bromide, borate, acetate and oxalate
- The cations may be selected from the following list
    - Pb^{2+} Cu^{2+} Bi^{3+} Cd^{2+} Fe^{3+} Al^{3+} $Zn^{2+}$$Mn^{2+}$ Co^{2+} Ni^{2+} Ba^{2+} Sr^{2+} Ca^{2+} Mg^{2+} and NH_4^+

X. Prepare ,filter,dry and exhibit the complex /double salt……

- Potash alum, Mohr's salt, microcosmic saltand tetraaminecopper(II)sulphate.

SEMESTER IV

SDC4PH03(P) PHARMACEUTICS PRACTICAL - III

Question No I .Identification/Spotters

Any five items/spotters - Include Bone/model/chart/tissue slides

Question No: II .Synopsis –

- includes principle / procedure of any experiment

1. Antibiotic sensitive test-disc diffusion

2. Examination of bacteria for motility –Hanging drop method

Question No. III. Major Experiment

1. Identification and staining of bacteria
2. Preparation of endo's agar/nutrient agar/Mcconkey agar

Question No IV Minor experiments

Hemoglobin /Blood grouping /RBC Count/ WBC Count

SDC4INT02 INTERNSHIP

SEMESTER V

SDC5MC02(P) MEDCINAL CHEMISTRY PRACTICAL(P)

Question No I Synopsis

Principle /procedure involved in the experiment

Question No II. Major experiment

(B)Synthesis of following medicinal compound

1. Hippuran
2. Mercurochrome
3. Phenytoin
4. Aspirin
5. Paracetamol
6. isoniazid

Question No III. Minor experiment

Limit Test of chloride,nitrate, sulphate

SDC5PH04 (P) PHARMACEUTICS PRACTICAL -IV

Question No I Synopsis

2. isolation of pectin from carrot
3. acid value of oil
4. saponification value oil

Question No II Spotters

Identification Biological Source Chemical Constituents and uses of any five organized and unorganized drugs

Nuxvomica ,Vinca ,Ginger ,Vasaka ,Nutmeg ,Cardom ,Cumin ,Clove ,Cinnamon ,Aloe

Question No III Major Experiment

Phyto chemical analysis of given t extract

Question No IV Minor Experiment

1. Extraction and isolation of starch from potato
2. Extraction of casein from milk
3. Isolation of pectin from orange peel

SEMESTER VI

MAJOR PROJECT