File Ref.No.24795/GA - IV - J2/2013/CU

UNIVERSITY OF CALICUT

Abstract

BSc Programme in Geography- under Choice Based Credit Semester System (UG)-Revised Syllabus for 2014 admissions onward-Approved-implemented-w.e.f 2014 admission-Orders issued.

G & A - IV - J

U.O.No. 10144/2014/Admn Dated, Calicut University.P.O, 01.11.2014

Read:-1. U.O.No.GA1/J2/3601/08 Vol.II dated 19.06.2009
2. U.O.No.GA1/J2/5166/08 dated 30.06.2009
3. U.O.No.GA1V/J2/5166/08 dated 30.11.2010
4. Minutes of the meeting of the Board of Studies in Geography held on 22.09.2014
5. Remarks of the Dean of the Faculty of Science
5. Orders of the Vice Chancellor dated 29-10-14 in the file of even no.

ORDER

As per University Order read as first, the Choice Based Credit Semester System was inplemented in all UG Programmes in affiliated colleges of the University of Calicut w.e.f 2009 admission.

Vide paper read as second, the syllabus of BSc Programme in Geography was implemented from 2009 admission onwards.

Vide paper read as third ,the revised scheme and syllabus of BSc Programme in Geography was implemented from 4th semester onwards w.e.f 2009 admission.

The Board of Studies in Geography, vide paper read as fourth, resolved to approve the Revised Syllabus of BSc Programme in Geography w.e.f 2014 admissions. The Dean, Faculty of Science also approved the item vide paper read as fifth.

The Vice Chancellor considering the exigency, exercising the powers of the Academic Council, has approved the resolution of Board of Studies, to implement the syllabus, subject to ratification by the Academic Council.

Sanction has, therefore, been accorded for implementing the Revised Syllabus of BSc Programme in Geography with effect from 2014 admissions.

Orders are issued accordingly. Syllabus is available in the University Website: **www.universityofcalicut.info**.

Muhammed S
Deputy Registrar

To

All affiliated Colleges under the University of Calicut

Forwarded / By Order

Section Officer

UNIVERSITY OF CALICUT

B.Sc. GEOGRAPHY

CORE AND COMPLEMENTARY PROGRAMMES

STRUCTURE, SCHEME and SYLLABUS

2014 Admission Onwards

B.Sc. DEGREE PROGRAMME (GEOGRAPHY CORE)

COURSE STRUCTURE

Semester	Course Code	Course Title	Instructional hours		Credit
			Total	Per Week	
I	A1	Common Course I – English	72	4	4
	A2	Common Course II – English	90	5	3
	A7	Common Course III – Language other than English	72	4	4
	GRY1B01	Core Course I-Origin and Structure of the Earth	54	3	2
	GRY4B01(P)	Core Course Practical I - Representation of Geographical Data and Weather Map Analysis	36	2	*
	GRY1C01.1	Complementary I- Development of Geography	36	2	2
	GRY4C01(P)	Complementary I- Practical I - Resource Mapping Techniques.	36	2	*
	GRY1C02	Complementary II- Statistical Methods	54	3	3
		Total	**450**	**25**	**18**
II	A03	Common Course IV – English	72	4	4
	A04	Common Course V – English	90	5	3
	A08	Common Course VI – Language other than English	72	4	4
	GRY2B02	Core Course II – Fundamentals of Geomorphology	54	3	3
	GRY4B01(P)	Core Course Practical I - Representation of Geographical Data and Weather Map Analysis	36	2	*
	GRY2C01.2	Complementary I - Soil Geography	36	2	2
	GRY4C01(P)	Complementary I, Practical I - Resource Mapping Techniques.	36	2	*
	GRY2C02	COMPLEMENTARY II - Regression Analysis, Time series and Index numbers	54	3	3
		Total	**450**	**25**	**19**
III	A 05	Common Course VI – English	90	5	4
	A 09	Common Course VIII - Language other than English	90	5	4
	GRY3B03	Core Course III - Climatology	72	4	3
	GRY4B01(P)	Core Course Practical I- Representation of Geographical Data and Weather Map Analysis	72	4	*
	GRY3C01.3	Complementary I- Geography of Water Resources	36	2	3
	GRY4C01(P)	Complementary-I, Practical I - Resource Mapping Techniques.	36	2	*
	GRY3C02	Complementary II- Probability	54	3	3
		Total	**450**	**25**	**17**

IV	A06	Common Course IX – English	90	5	4
	A10	Common Course X - Language other than English	90	5	4
	GRY4B04	Core Course IV – Oceanography	72	4	3
	GRY4B01(P)	Core Course Practical I- Representation Geographical Data and Weather Map Analysis	72	4	3
	GRY4C01.4	Complementary I- Spatial Planning and Development	36	2	3
	GRY4C01(P)	Complementary -I, Practical I - Resource Mapping Techniques.	36	2	2
	GRY4C02	COMPLEMENTARY II - Testing of Hypothesis	54	3	3
		Total	**450**	**25**	**22**
V	GRY5B05	Core Course V - Human Geography	36	2	3
	GRY5B06	Core Course VI - Methodology of Geographical Studies	54	3	3
	GRY5B07	Core Course VII - Cartography	36	2	3
	GRY5B08	Core Course VIII- Fundamentals of Remote Sensing	36	2	3
	GRY5B09	Core Course IX - Fundamentals of Geographic Information System	54	3	3
	GRY5D01	Open Courses 1.1. Physical Geography 1.2. A Geographical Appraisal of Natural Heritage Management 1. 3. Fundamentals of Remote Sensing	54	3	2
	GRY6B02(P)	Core Course Practical II-Map Projections and Geoinformatics	72	4	*
	GRY6B03(P)	Core Course Practical III- Topographical Map Analysis and Surveying	72	4	*
	GRY6B(PR)	Project	36	2	*
		Total	**450**	**25**	**17**
VI	GRY6B10	Core Course X - World Regional Geography	54	3	3
	GRY6B11	Core Course XI – General Geography of India	54	3	3
	GRY6B12	Core Course XII- Geographical Appraisal of Kerala	54	3	3
	GRY6B13	Core Course XIII – Biogeography	54	3	4
	GRY6B14(E)	Core Course XIV- Elective-Introduction to Disaster Management	54	3	4
	GRY6B02(P)	Core Course Practical II-Map Projections and Geoinformatics	72	4	4
	GRY6B03(P)	Core Course Practical III- Topographical Map Analysis and Surveying	72	4	3
	GRY6B(PR)	Course Project & Tour Report*	36	2	3
		Total	**450**	**25**	**27**

**Study Tour Report may be evaluated with Core Course Practical III*

CREDIT AND MARKS DISTRIBUTION FOR EACH SEMESTER

Total Credits: 120 **Total Marks: 3600**

Semester	Course	Credits	Marks
I	Common course: English	4	100
	Common course: English	3	100
	Common course: Additional Language	4	100
	Core Course-Origin and Structure of the Earth	2	100
	Complementary Course I- Development of Geography	2	80
	Complementary course II (Statistics): Statistical Methods	3	100
	Total	**18**	**580**
II	Common course: English	4	100
	Common course: English	3	100
	Common course: Additional Language	4	100
	Core Course - II – Fundamentals of Geomorphology	3	100
	Complementary Course I - Soil Geography	2	80
	COMPLEMENTARY Course II (Statistics) - Regression Analysis, Time series and Index numbers	3	100
	Total	**19**	**580**
III	Common course: English	4	100
	Common course: Additional Language	4	100
	Core Course III - Climatology	3	100
	Complementary I- Geography of Water Resources	3	80
	Complementary II (Statistics)- Probability	3	100
	Total	**17**	**480**
IV	Common Course IX – English	4	100
	Common Course X - Language other than English	4	100
	Core Course - IV – Oceanography	3	100
	Core Course: Practical I- Representation Geographical Data and Weather Map Analysis	3	100
	Complementary I- Spatial Planning and Development	3	80
	Complementary I-Practical I - Resource Mapping Techniques.	2	80
	COMPLEMENTARY II (Statistics)- Testing of Hypothesis	3	100
	Total	**22**	**660**
V	Core Course V- Human Geography	3	100
	Core Course - VI - Methodology of Geographical Studies	3	100
	Core Course - VII - Cartography	3	100
	Core Course -VIII - Fundamentals of Remote Sensing	3	100
	Core Course- IX- Fundamentals of Geographic Information System	3	100
	Open course - 1. Physical Geography 2. A Geographical Appraisal of Natural Heritage Management 3. Fundamentals of Remote Sensing	2	50
	Total	**17**	**550**

VI	Core Course- X- World Regional Geography	3	100
	Core Course - XI – General Geography of India	3	100
	Core Course - XII – Geographical Appraisal of Kerala	3	100
	Core Course - XIV – Biogeography	4	100
	Core Course XV-Elective- 1. Introduction to Disaster Management	4	100
	Core Course: Practical II- Map Projections and Geoinformatics	4	80
	Core Course: Practical III- Topographical Map Analysis and Surveying	3	80
	Project	2	75
	Study Tour	1	15
	Total	**27**	**750**

Credit Distribution for Common, Core, Complementary & Open Courses of B.Sc. Geography Programme

Semester	**Common Course**		**Core Course**		**Complementary Course**			**Open Course**	**Total**
	English	**Language**	**Theory**	**Practical**	**Cartography**		**Statistics**		
					Theory	**Practical**			
I	4+3	4	2		2		3		**18**
II	4+3	4	3		3		3		**19**
III	4	4	3		3		3		**17**
IV	4	4	3	3	2	2	3		**22**
V			3+3+3+3+3					2	**17**
VI			3+3+3+3+4	4+4+2*+1**					**27**
Total	**22**	**16**	**42**	**14**	**10**	**2**	**12**	**2**	**120**
*** Project; ** Tour Report**									

Mark Distribution and Indirect Grading System

Mark system is followed instead of direct grading for each question. After external and internal evaluations marks are entered in the answer scripts. All other calculations, including grading, will be done by the university using the software. Indirect Grading System in 7 point scale is followed. Each course is evaluated by assigning marks with a letter grade (A+, A, B, C, D, E or F) to that course by the method of indirect grading.

Distribution of Marks

Sl. No	Course	Marks
1	English	600
2	Additional Language	400
3	Core Course-Geography	1750
4	Complementary Course I: Geography and Resource Management	400
5	Complementary Course II: Statistics	400
6	Open Course	50
	Total Marks	**3600**

Seven Point Indirect Grading System

% of Marks	**Grade**	**Interpretation**	**Grade Point Average**	**Range of Grade Points**	**Class**
90 and Above	A*	Outstanding	6	5.5 - 6	First Class With Distinction
80 to below 90	A	Excellent	5	4.5 - 5.49	
70 to below 80	B	Very Good	4	3.5 - 4.49	First Class
60 to below 70	C	Good	3	2.5 -3.49	
50 to below 60	D	Satisfactory	2	1.5 - 2.49	Second Class
40 to below 50	E	Pass / Adequate	1	0.5 - 1.49	Pass
Below 40	F	Failure	0	0 -0.49	Fail

CORE COURSE STRUCTURE

Total Credits: 56 (Internal 20%; External 80%)

Semester	Course Code	Course Title	Total hour	Hours/ week	Credit	Marks
I	GRY1B01	Core Course I-Origin and Structure of the Earth	36	2	2	**100**
	GRY4B01(P)	Core Course Practical I - Representation Geographical Data and Weather Map Analysis	36	2	**Exam in IV sem**	
II	GRY2B02	Core Course II - Fundamentals of Geomorphology	36	2	3	**100**
	GRY4B01(P)	Core Course Practical I - Representation Geographical Data and Weather Map Analysis	36	2	**Exam in IV sem**	
III	GRY3B03	Core Course III - Climatology	72	4	3	**100**
	GRY4B01 (P)	Core Course Practical I- Representation Geographical Data and Weather Map Analysis	36	2	**Exam in IV sem**	
IV	GRY4B04	Core Course IV – Oceanography	72	4	3	**100**
	GRY4B02(P)	Core Course Practical I- Representation Geographical Data and Weather Map Analysis	36	2	3	**100**
V	GRY5 B 05	Core Course V- Human Geography	54	3	3	**100**
	GRY5B06	Core Course VI – Methodology of Geographical Studies	54	3	3	**100**
	GRY5B07	Core Course VII - Cartography	36	2	3	**100**
	GRY5B08	Core Course VIII - Fundamentals of Remote Sensing	36	2	3	**100**
	GRY5B09	Core Course IX- Fundamentals of Geographic Information System	36	2	3	**100**
	GRY6B02(P)	Core Course Practical II- Map Projections and Geoinformatics	72	4	**Exam in VI Sem**	
	GRY6B03(P)	Core Course Practical III- Topographical Map Analysis and Surveying	72	4	**Exam in VI Sem**	
		Core Course Project	36	2	**Evaln: in VI sem**	
VI	GRY6B10	Core Course X- World Regional Geography	54	3	3	**100**
	GRY6B11	Core Course XI – Geography of India	54	3	3	**100**
	GRY6B12	Core Course XII –Geographic Appraisal of Kerala	54	3	3	**100**
	GRY6B13	Core Course XIII – Biogeography	54	3	4	**100**
	GRY6B14	Core Course XIV- Elective-Introduction to Disaster Management	54	3	4	**100**
	GRY6B02(P)	Core Course Practical II- Map Projections and Geoinformatics	72	4	4	**80**
	GRY6B03(P)	Core Course Practical III- Topographical Map Analysis and Surveying	72	4	3	**80**
	GRY6B(PR)	Project & Tour Report*	36	2	3	**90 (75+15)**
				Total	**56**	**1750**

CORE COURSE THEORY- EVALUATION SCHEME

The evaluation scheme for each course contains two parts: *viz*., internal evaluation and external evaluation. Maximum marks from each unit is prescribed in the syllabus.

1. INTERNAL EVALUATION

20% of the total marks in each course are for internal evaluation. The Colleges shall send only the marks obtained for internal examination to university.

Table 1: Components of Evaluation

Sl. No.	Components	Marks
1	Attendance	5
2	Test Papers: I & II	5 + 5
3	Assignment	2
4	Seminar / Viva	3
Total		**20**

Table 2: Percentage of Attendance and Eligible Marks

% of Attendance	Marks
Above 90%	5
85 -89%	4
80-84%	3
76-79%	2
75%	1

Table 3:Pattern of Papers

Duration	Pattern	Total number of questions	Number of questions to be answered	Marks for each question	Marks
1.5 Hours	One Word	4	4	1	4
	Short Answer	5	4	2	8
	Paragraph	5	4	3	12
	Problem	4	2	3	6
	Essay	2	1	10	10
				Total Marks*	**40**
****90% and above =5, 80 to below 90% =4.5, 70 to below 80% =4, 60 to below 70% =3.5, 50 to below60% =3, 40 to below50% =2, 35 to below40% =1. Below 35% =0***					

2. EXTERNAL EVALUATION

External evaluation carries 80% marks, University examinations will be conducted at the end of each semester.

Table 1:Pattern of Questions Paper

Duration	Pattern	Total number of questions	Number of questions to be answered	Marks for each question	Marks
3 Hours	One Word or One Phrase or True /False	10	10	1	10
	Short Answer	7	7	2	14
	Paragraph	7	5	4	20
	Problem	7	4	4	16
	Essay	4	2	10	20
				Total Marks	**80**

CORE COURSE PROJECT: EVALUATION SCHEME

Project evaluation will be conducted at the end of sixth semester.

Table 1: Internal Evaluation

Sl.No	***Criteria***	***Marks***
1	***Punctuality***	***2.5***
2	Skill in doing project work	2.5
3	Project presentation	5
4	Viva voce	5
	Total	**15**

Table 2:External Evaluation

Sl. No.	**Criteria**	**Marks**
1	Contents and Relevance of the Project	15
2	Project Report	15
3	Project Presentation	15
4	Viva voce	15
	Total	**60**

Study Tour: Visit to places/locations of Geographical significance in South India for a duration not exceeding seven days. The visits can also be split into two or three spells of field visits. Individual report/reports to be prepared for the visits describing the geographical learning and experiences accompanied by photographs.

COMPLEMENTARY COURSE I STRUCTURE

GEOGRAPHY AND RESOURCE MANAGEMENT

Total Credits: 12 (Internal: 20%; External: 80%)

Semester	Course code	Course Title	Total hours	Hours/ week	Credit	Marks
1	GRY1C01.1	Complementary I- Development of Geography	36	2	2	**80**
	GRY4C01(P)	Complementary I-Practical I - Resource Mapping Techniques.	36	2	Exam in IV sem.	
2	GRY2C01.2	Complementary I - Soil Geography	36	2	2	**80**
	GRY4C01(P)	Complementary I-Practical I - Resource Mapping Techniques.	36	2	Exam in IV sem.	
3	GRY3C01.3	Complementary I- Geography of Water Resources	54	3	3	**80**
	GRY4C01(P)	Complementary I-Practical I - Resource Mapping Techniques.	36	2	Exam in IV sem.	
4	GRY4C01.4	Complementary I- Spatial Planning and Development	54	3	3	**80**
	GRY4C01(P)	Complementary I-Practical I - Resource Mapping Techniques.	36	2	2	**80**
Total					**12**	**400**

COMPLEMENTARY COURSE THEORY: EVALUATION SCHEME

The evaluation scheme for each course contains two parts: *viz., internal and external evaluation. Maximum marks from each unit is prescribed in the syllabus*

1. INTERNAL EVALUATION

20% of the total marks in each course are for internal evaluation. The colleges shall send only marks obtained for internal examination to the university.

Table 1: Components of Evaluation

Sl. No.	*Components*	*Marks*
1	Attendance	4
2	Test papers: I & II	4+4
3	Assignment	2
4	Viva-Voce	2
	Total Marks	**16**

Table 2 Percentage of Attendance and Eligible Marks

% of Attendance	Marks
Above 90%	4
85 -89%	3.2
80-84%	2.4
76-79%	1.6
75%	0.8

Table 3: Pattern of Papers

Duration	Pattern	Total number of questions	Number of questions to be answered	Marks for each question	Marks
1.5 Hours	One Word	4	4	1	4
	Short Answer	4	4	2	8
	Paragraph	4	2	3	6
	Problem	4	2	3	6
	Essay	2	1	8	8
				Total Marks*	**32**
***80% and above =2, 60 to below 80% =1.5, 50 to below 60% =1, 35 to below 50% =0.5, Below 35% =0**					

2. EXTERNAL EVALUATION

External evaluation carries 80% marks, University examination will be conducted at the end of each semester

Table 1: Pattern of Question Papers

Duration	Pattern	Total number of questions	Number of questions to be answered	Marks for each question	Marks
3 Hours	One Word or One Phrase or True /False	10	10	1	10
	Short Answer	7	7	2	14
	Paragraph	5	3	4	12
	Problem	5	3	4	12
	Essay	4	2	8	16
				Total Marks	**64**

OPEN COURSE STRUCTURE

(FOR STUDENTS OTHER THAN B.Sc.GEOGRAPHY)

Total Credits: 2 (Internal 20%; External 80%)

Semester	Course code	Open course Title	Total hours	Hours/ week	Marks
V	GRY5D 01	1. Physical Geography	54	3	50
	GRY5 D 02	2. A Geographical Appraisal of Natural Heritage Management			
	GRY5 D 03	3. Fundamentals of Remote Sensing			

OPEN COURSE: EVALUATION SCHEME

The evaluation scheme contains two parts: *viz.,* internal evaluation and external evaluation

1. INTERNAL EVALUATION

20% of the total marks are for internal evaluation. The colleges shall send only the marks obtained for internal examination to the university.

Table 1: Components of Evaluation

Sl.No.	Components	Marks
1	Attendance	**2.5**
2	Test Papers I & II	**2.5+2.5**
3	Assignment/Viva	**2.5**
	Total Marks	**10**

Table 2 Percentage of Attendance and Eligible Marks

% of Attendance	Marks
Above 90%	2.5
85 -89%	2
80-84%	1.5
76-79%	1
75%	0.5

Table 3: Pattern of Papers (Internal)

Duration	Pattern	Total number of questions	Number of questions to be answered	Marks for each question	Marks
1 Hours	One Word	4	4	1	4
	Short Answer	2	1	2	2
	Paragraph	4	2	3	6
	Essay	2	1	8	8
				Total Marks*	**20**

80% and above =2.5, 60 to below 80% =2, 50 to below 60% =1.5, 40 to below 50% =1, 35% to below 40% = 0.5, Below 35% =0

2. EXTERNAL EVALUATION

External evaluation carries 80% marks, University examination will be conducted at the end of 5th semester

Table 1: Pattern of Question Papers

Duration	Pattern	Total number of questions	Number of questions to be answered	Marks for each question	Marks
3 Hours	One Word or One Phrase or True /False	6	6	1	6
	Short Answer	5	5	2	10
	Paragraph	6	4	4	16
	Essay	3	1	8	8
				Total Marks	**40**

UNDERGRADUATE PROGRAMME IN GEOGRAPHY
(B.Sc. Geography)

SYLLABUS

CORE COURSES

UNDERGRADUATE PROGRAMME IN GEOGRAPHY (B.Sc. Geography)

SYLLABUS

SEMESTER I

GRY1B01 ORIGIN AND STRUCTURE OF THE EARTH

Instruction Hours : THREE hours / Week **Credit: 2**

Module	Theme	Contents
1	**Origin and Interior of The Earth**	• Introduction to Physical Geography, Terminologies and Definitions. • Scope, Content and trends in Physical geography. • Origin of Earth - Explanation through Nebular, Planetesimal, Binary Star & Tidal theories. • Basic Concepts - (uniformitarianism, Geologic Structure, Geomorphic Processes, Geomorphic Stage, Relief, Complexity of Geomorphic Evolution, Pleistocene Climate, Appreciation of World Climates, Historical Extensions) • Forces and Earth Movements.- Emphasis on Endogenetic forces. • Geological Time Scale (GTS).
2	**Continental Drift**	• Structure and Interior of Earth. • Tetrahedral Theory - Critical Evaluation. • Continental Drift Theory - Critical Evaluation. • Developments leading to Plate tectonics - Convection Current, Sea Floor Spreading, Palaeomagnetism.
3	**Plate Tectonics & Volcanism**	• Theory of Plate Tectonics - Geometric and Kinematic parts. • Evidences of Plate Movement. • The Driving Mechanism. • Critical Evaluation of the Theory of Plate Tectonics. • Volcanism.
4	**Plate Tectonics and Mountain Building**	• Mountain building Processes. • The Geosynclinal theory. • Fold Mountain Orogeny and Plate Tectonics. • Orogeny and Continental Accretion.
5	**Plate Tectonics and Earthquakes**	• Origin and Evolution of Earth's Crust. • Isostasy. • Earthquakes and Plate Tectonics. • Factors controlling Landform Development.

REFERENCES

1. Web Resources

a. http://www.physicalgeography.net/
b. http://en.wikipedia.org/wiki/Physical_geography
c. http://www.geography-site.co.uk/pages/physical.html
d. http://ppg.sagepub.com/
e. http://www.earthonlinemedia.com/ebooks/tpe_3e/contents.html

2. Suggested Readings

#	Book Name	Author
1	Introduction to Physical Geography	Arthur N Strahler
2	Physical Basis of Geography	Woolridge & RS Morgan
3	The Earth, its origin & physical composition	H Jeffrey
4	Physical Geography	F J Monkhouse
5	Physical Geography	Lake P
6	Physical Geography	Morris Davis
7	Elements of Geography	Finch & Trewartha

SEMESTER II

GRY2B02 FUNDAMENTALS OF GEOMORPHOLOGY

Instruction Hours : THREE hours / Week **Credit: 3**

Module	Theme	Contents
1	**Forces and Earth Movements**	• Introduction to Landforms -First, Second and Third order. • Terminologies and Definitions. • Forces and Earth Movements -Endogenetic, Exogenetic and Extra-terrestrial Processes • Weathering and Erosion • Erosion and Change in Slope.
2	**Landforms associated with Fluvial Action**	• Running water as agent of Erosion and deposition. • Role of Geology & Structure. • Drainage System - Pattern. • Erosional Landforms. • Depositional Landforms. • Stages of Erosion. • Rejuvenation. • Normal Cycle of Erosion - young, mature, old.
3	**Landforms associated with Groundwater and Wind**	• Action of Water in Karst Topography. • Erosional & Depositional Karst Landforms. • Wind as an Agent of Erosion and Deposition. • Erosional and Depositional Landforms by Wind Action.
4	**Coastal Landforms**	• Wave Action - Erosional and Depositional. • Role of Current and Tides in Coastal Landfroms. • Types of Coastlines - Emerged, Submerged, Dalmatian, Ria and Fjord Coastlines.
5	**Landforms Associated with Glacial Action**	• Glacier Action. • Types of Glaciers. • Erosional and Depositional landforms.

REFERENCES

1. Web Resources

a. http://www.physicalgeography.net/
b. http://en.wikipedia.org/wiki/Physical_geography
c. http://www.geography-site.co.uk/pages/physical.html
d. http://ppg.sagepub.com/
e. http://www.earthonlinemedia.com/ebooks/tpe_3e/contents.html

2. Suggested Readings

#	Book Name	Author
1	Introduction to Physical Geography	Arthur N Strahler
2	Physical Basis of Geography	Woolridge & RS Morgan
3	The Earth, its origin & physical composition	H Jeffrey
4	Physical Geography	F J Monkhouse
5	Physical Geography	Lake P
6	Physical Geography	Morris Davis
7	Elements of Geography	Finch & Trewartha
8	Principle of Geomorphology	Thornbury

SEMESTER III

GRY3B03 CLIMATOLOGY

Instruction Hours : FOUR hours / Week **Credit: 3**

Module	Theme	Contents
1	**Weather and Climate**	• Climatology- branch of geography, Definition. • Atmosphere- Significance, Composition and layered structure. • Weather and Climate. • Climatic elements- Insolation- Characteristics, Controlling factors. • Temperature-controlling factors. • Distribution- Horizontal and vertical. • Heat budget. • Measurement of temperature- Diurnal, Annual and Seasonal ranges of temperature. • Temperature inversion.
2	**Atmospheric Pressure and Winds**	• Atmospheric pressure- Controlling factors. • Distribution- Vertical, Horizontal. • Surface Pressure belts- seasonal shifting and its effect. • Winds- Controlling factors. • Types of winds-planetary winds, Seasonal winds, Local winds • Monsoons- Formation and characteristics.
3	**Humidity and Forms of Condensation**	• Humidity- Significance of water vapour. • Relative humidity. • Hydrologic cycle. • Evaporation- controlling factors. • Condensation-forms. • Fog- formation and types. • Clouds - Formation. • significance to weather. • Precipitation- formation and types.
4	**Air Masses, Fronts and Atmospheric Disturbances**	• Air masses- Definition. • Source region, classification. • Fronts-definition, formation, types. • Atmospheric disturbances- cyclones, anticyclones and their characteristics.
5	**Climate Change**	• Human influence on climate; • Air Pollution and Ozone depletion, • Climatic Change - Greenhouse effect and Global warming

REFERENCES

1. Web Resources

a. http://www.physicalgeography.net/
b. http://en.wikipedia.org/wiki/Physical_geography
c. http://www.geography-site.co.uk/pages/physical.html
d. http://ppg.sagepub.com/
e. http://www.earthonlinemedia.com/ebooks/tpe_3e/contents.html

2. Suggested Readings

#	Book Name	Author
1	Atmosphere, Weather and Climate	Barry R.G. and Chorley R.J
2	Climatology	Lal D.S
3	Introduction to Physical Geography	Strahler, A.N
4	Physical Geography	Lake Philip
5	General Climatology	Critchfield H
6	An Introduction to Climate, International (Student's edition)	Trewartha G.T.
7	Principles of Physical Geography	Dasgupta, A. and Kapoor A.N
8	The Climate of the Earth.	Lydolph, Paul, E

SEMESTER IV

GRY4B04 Oceanography

Instruction Hours : FOUR hours / Week **Credit: 3**

Module	Theme	Contents
1	**Historical Review and Development of Oceanography**	• Geographer and Oceanography. • Early Explorations and Development of Oceanography. • Oceanography as a Systemic Science. • Scope of learning Oceanography. • Major Oceans - Distribution and extend of all Oceans and Marginal Seas. • Oceanographic Institutions. • Oceans; International Cooperation and Development challenges.
2	**Geomorphology of the Ocean Bottom and Ocean deposits**	• Origin of Earth's Oceans • Ocean Bottom Topography - Pacific, Atlantic, Indian, Arctic Oceans. • Plate Tectonic and Ocean Floor. • Ocean Deposits. • Coral Reefs - Types • Theories of Coral formation.
3	**Physical and Chemical properties of Ocean water**	• Composition of Sea Water and its Salinity. • Horizontal and Vertical Distribution of Salinity. • Ocean water Temperature. • Horizontal and Vertical Distribution of Temperature. • Ocean Water Density and Distribution. • Global Thermostatic effects. • Climate Change and Sea level.
4	**Movements of Ocean Water**	• Waves. • Tides. • Ocean Currents. • Upwelling and Downwelling. • Thermohaline Circulation. • El Nino and La Nina. • Ocean Extremes - Tsunami.
5	**Resources of the oceans and International Cooperation**	• Physical Resources. • Biological Resources. • Marine Energy. • Exclusive Economic Zone. • United Nations and international Law of the Seas. • Environmental Concerns - Oil Sleek, Waste Islands, Coastal pollution.

REFERENCES

1. Web Resources

a. http://www.physicalgeography.net/
b. http://en.wikipedia.org/wiki/Physical_geography
c. http://www.geography-site.co.uk/pages/physical.html
d. http://ppg.sagepub.com/
e. http://www.earthonlinemedia.com/ebooks/tpe_3e/contents.html
f. http://oceanworld.tamu.edu/resources/ocng_textbook/PDF_files/book.pdf

2. Suggested Readings

#	Book Name	Author
1	**Ocean Science**	Keith Stowe
2	Introduction To Physical Oceanography	Robert H. Stewart
3	Essentials of Oceanography	Alan P. Trujillo, Harold V. Thurman
4	Introduction to Physical Geography	A N Strahler
5	Essentials of Oceanography	Alan P Trujillo

SEMESTER V

GRY5B05 Human Geography

Instruction Hours : TWO hours / Week **Credit: 3**

Module	Theme	Contents
1	**Foundation in Human Geography**	• Meaning ,Nature, Scope and content of Human Geography • Principles of Human geography. • Approaches of Human geography. • Development of Human geography.
2	**Cultural Regions**	• Stages of Human development- Primitive culture- Hunting and Food gathering- Pastoral nomadism- subsistence farming- Industrial revolution- Technological Era. • Major Races of the World and its distribution. • Major Languages of the World and its distribution. • Major Religions of the world and its distribution. • Geographic Pattern of Culture- World cultural regions
3	**Man and Environment**	• Man-environment relations- Forms of Human adaptation to the environment- Cold region-Eskimos, Hot region-Bushmen, Plateau-Masai, Mountains-Nomads.
4	**Population**	• Population- World Distribution and Density • Factors influencing spatial distribution of population- physical, economic and social • Concepts of Over population, Under population, Optimum population, Zero population growth. • Theories- Malthusian Theory. • Demographic Transition model. Migration- Types- Internal and International.
5	**Geo-Politics**	• Frontiers and Boundaries- Heartland and Rimland Theories. • India and its Neighbours

REFERENCES

1. Web Resources

a. http://www.prb.org/
b. http://en.wikipedia.org/wiki/Human_geography
c. http://www.learner.org/resources/series85.html
d. http://www.hugeog.com/
e. http://phg.sagepub.com/

2. Suggested Readings

#	Book Name	Author
1	Human Geography	Majid Husain
2	Human Geography	R.Jagannathan
3	Human Geography concepts and Issues	Vaishali Singh
4	Human Geography	S.K.Shelar
5	Human Geography	Peter Danils
6	Population Geography	K.Chakraworthy
7	Fundamentals of Human Geography	L.R.Singh
8	Human Migration a social phenomenon	AmalDatta
Scientific Papers and Reports		
1	Dudley Kirk, "Demographic Transition Theory," Population Studies, Vol. 50, No. (November) 1996), pp. 381–87.	
2	Population Reference Bureau, 2006 World Population Data Sheet, http://www.prb.org/ pdf06/06WorldDataSheet.pdf, pp. 5, 9.	

SEMESTER V

GRY5B06 Methodology of Geographical Studies

Instruction Hours : THREE hours / Week **Credit: 3**

Module	Theme	Contents
1	**Geography as a Science**	• Geography as a Science. • Approaches to the study of Geography- Systematic and Regional, Environmental and Humanistic. • Four traditions in Geography- Earth Science tradition, Man – land tradition, Spatial tradition and Area studies tradition.
2	**Models and Paradigms**	• Data, Information and knowledge. • Types of Knowledge- Practical, Theoretical, and Scientific knowledge. • Science & Its characteristics. • Fact, concept, hypothesis, theories, laws, and Models in the geographical explanation. • Paradigms in geography.
3	**Data Collection**	• Identification of problems from Local geography- Field work- Data collection- primary data • Methods of collection – Observation methods, interview, Schedules and Questionnaire and case study method- Secondary data -Published and unpublished sources – Selection of appropriate methods for data collection - problems in data collection
4	**Sampling**	• Sampling- purposes and principles of sampling-key terms in sampling. • Population, sample, sampling frame, sampling estimate and sampling error- Types of sampling- Probability sampling. • Simple random sampling, stratified, systematic, multi-stage, and cluster sampling-Non probability sampling- incidental, purposive, quota, and judgment sampling
5	**Geographical Analysis**	• Methods of Geographical analysis- Data analysis – Tabulation, Representation, Diagrams, Thematic Maps, role of Hypothesis, Interpretation, Generalization. • Preparation of Report –Layout ,and Types of report. • Reference. • Bibliography.

REFERENCES

1. Web Resources

a. http://www.ccs.neu.edu/course/is4800sp12/resources/qualmethods.pdf
b. http://www.st-andrews.ac.uk/~dib2/science.html
c. http://web.natur.cuni.cz/geografie/vzgr/monografie/modelling/modelling_dostal2.pdf.
d. http://118.97.161.124/perpus-fkip/Perpustakaan/Geography/Metodologi/Metode%20Penelitian%20Geografi.pdf

2. Suggested Readings

#	Book Name	Author
1	Geography – A Modern Synthesis	P. Haggett
2	Geography as a fundamental research discipline	Ackerman -
3	Explanation in Geography	Harvey D
4	Science in Geography Series 1-4	McCullagh
5	Qualitative Research Methods in Human Geography	Iain Hay
6	Handbook of Qualitative Research	Denzin NK, Lincoln YS
7	Research into Social Issues: Methodological Guidelines	Nkwi P, Nyamongo I, Ryan G. Field
8	*Nature of Geography: A Critical Survey of Current Thought in the Light of the Past*,	Richard Hartshorne
9	The Production of Space.	Henri Lefebvre's
10	Perspective on the Nature of Geography	Hartshorne R
11	Changing nature of Geography	Minshell R
12	Maps and Diagrams	Monkhouse FJ, Wilkinson
Journal		
1	Journal of Geography	

SEMESTER V

GRY5B07 Cartography

Instruction Hours : TWO hours / Week **Credit: 3**

Module	Theme	Contents
1	**History and Scope of Cartography**	• Meaning and Definition • Overview - Historic Development of Cartography • Nature and Scope of learning Cartography • History of Maps • Properties of Maps - Scale, Direction and Shape • Institutions of Cartography • Survey of India - The Great Trigonometric Survey
2	**Earth as a Cartographic Problem**	• Geodesy - Definition and Meaning • Two Models of Earth - Mathematical (Spheroid) and Physical (Geoid) • Datum - Horizontal and Vertical Datum • Geographic and Projected Map Projections • Role of Cartography and Geodesy in Spatial Data Infrastructure - National Spatial Data Infrastructure
3	**Classification of Maps**	• Classification of Maps • Cartographic Coverage of The World • Survey of India Maps Topographic Maps - Classification and Naming and Numbering Scheme • Conventional Signs and Symbols Used by Survey of India
4	**Map Making Process**	• Map Making Processes • Surveying - Geodetic and Plane Surveying, Remote Sensing, Aerial Photography and Global Positioning System • Collection and Interpretation of Statistical Data • Map Design and Layout • Lettering and Toponomy • Mechanics' of Map Construction
5	**Visualization**	• Terrain Mapping • Mapping Weather and Climate Data • Mapping Socio-economic Data • Thematic Mapping • Special Purpose Maps

REFERENCES

1. Web Resources

a. http://www.ccs.neu.edu/course/is4800sp12/resources/qualmethods.pdf
b. http://en.wikipedia.org/wiki/Cartography
c. http://www.britannica.com/EBchecked/topic/97492/cartography
d. http://www.geography.wisc.edu/histcart/
e. http://www.incaindia.org/
f. *www.surveyofindia.gov.in*

2. Suggested Readings

#	Book Name	Author
1	Fundamentals of Cartography	Rameshwar Prasad Misra, A. Ramesh
2	The Mapmakers	John Noble Wilford
3	The Mapmakers	Mark S. Monmonier
4	Social Cartography: Mapping Ways of Seeing Educational Change	Timothy Scrase

SEMESTER V

GRY5B08 Fundamentals of Remote Sensing

Instruction Hours : TWO hours / Week **Credit: 3**

Module	Theme	Contents
1	Overview of Remote Sensing	• Definition and Overview of Remote Sensing • History and Evolution of Remote Sensing • Remote Sensing Systems • Electromagnetic Radiation (EMR) - Terms and Definitions, Laws of Radiation, EM Spectrum, Sources of EMR • Interaction between EM R and matter - Reflection, Absorption and Transmission. • Interactions between EM Radiation and Atmosphere, Atmospheric windows
2	Remote Sensing Systems	• Remote Sensing Systems - Active and Passive Systems, Imaging and Non Imaging Systems, • Principles of Thermal Remote Sensing including its use • Principles of Microwave Remote Sensing (imaging and non imaging) • Concept of Resolutions in Remote Sensing - Spatial, Spectral, Radiometric and Temporal
3	Earth Observation	• Orbits and Platforms for Earth Observation • Earth Observation Satellites (LANDSAT, SPOT, IRS, IKONOS) and their characteristics • Sensors for Stereo Data (MOMS, CARTOSAT) and their characteristics • Satellite based Indian Remote Sensing Programme
4	Data Products	• Data Reception, Processing and Data Products Generation • Remote Sensing data products- Aerial Photos and Satellite Imageries
5	Applications of Remote Sensing	• Introduction to Application of Remote Sensing • Application of Remote Sensing in Agriculture • Application of Remote Sensing in Disaster Management • Application of Remote Sensing in Environment Conservation

REFERENCES

1. Web Resources

a. http://www.itc.nl/~bakker/rs.html
b. www.ccrs.nrcan.gc.ca/resource/tutor/fundam/index_e.php
c. rst.gsfc.nasa.gov/
d. http://www.r-s-c-c.org/rscc/v1m1.html
e. www.isprs.org
f. www.spaceimaging.com
g. www.landsat.usgs.gov
h. www.spotimage.fr
i. www.nrsa.gov.in
j. IRS 1C handbook: http://www.euromap.de/docs/doc_013.html
k. IRS P6 Users handbook. http://www.nrsa.gov.in/IRS_Docu ments/Handbook/Resourcesat-1_handbook_HTML
l. asterweb.jpl.nasa.gov

2. Suggested Readings

#	Book Name	Author
1	Remote Sensing and Image Interpretation	Lillesand Thomas M. & Kiefer Ralph
2	Introduction to Remote Sensing	Campbell John B
3	Remote Sensing and Principles and Image Interpretation	Floyd F. Sabins
4	Manual of Remote Sensing	-
5	Fundamentals of Remote Sensing	George Joseph
6	Computer Processing of Remotely sensed Images: An Introduction	Paul M. Mather

SEMESTER V

GRY5B09 Fundamentals of Geographic Information System

Instruction Hours : THREE hours / Week **Credit: 3**

Module	Theme	Contents
1	**Foundation in GIS**	• Spatial Thinking in Geography. • Geography and GIS. • Terminologies and their Use :- Understanding GI Science, GI Technology and GI System. • Scope of GIS. • History and Origin of GIS. • Components of GIS. • Geo-information Software's - Proprietary/ Open Source. • GIS Communities:- Contributing Technologies. • GIS Web Resources - Bhuvan, Google Earth and other resources listed. in teaching /learning and web resources.
2	**Modelling Real world – Data modeling and data structures**	• Introduction Modelling the real World. • Identifying Spatial Objects. • Data Models. • Vector Features. • Topology :- Polygon Topology, Network Topology, Linear Referencing. • Raster Surfaces : Exploring Thematic Raster Representation. • Scale and Resolution.
3	**Geographic Data – Data Sources and Data Acquisition**	• Introduction to Geographic data and Measuring Space. • Field or ground or terrestrial Surveying. • Global Positioning System. • Remote Sensing – Platforms, Sensors and Types of Data. • Vectorization - Converting Raster to Vector Data. • Georeferencing. • Metadata – Standards and significance, Data catalogues. • Ethics of Using GIS Data and Legal Standards – Indian Standards.
4	**Geo-Database Management System**	• Database Management System. • Data Elements, Data Structures and Data Organisation. • Relational Database Management System. • Data Modelling – Models, Conceptual Data models, Logical Data Models, Physical Data Models, Data Modelling Notations. • GIS and Database Management.
5	**Geographic Analysis and Application of GIS**	• Spatial Thinking – Fundamental Concepts of Geography and Geographic Analysis in GIS. • Spatial Analysis - Buffer, Overlay and Network Analysis. • Spatial Interpolation. • Raster Surfaces Analysis. • Application of GIS in Water Resources. • Application of GIS in Health. • Application of GIS in Disaster Management.

REFERENCES

1. Web Resources

a. Case Studies

i. Water Resources

- http://en.wikipedia.org/wiki/GIS_and_hydrology
- http://www.esri.com/industries/water_resources
- http://pacewater.com/services/stormwater-management/gis-waterresource-hydraulics/

ii. Health

- http://www.phfi.org/our-activities/research-a-centres/key-areas/health-system-and-policy/203-application-of-geographic-information-systems-gis-to-public-health-practice-in-india
- http://www.cdc.gov/gis/applications.htm
- http://www.esri.com/news/arcuser/0499/umbrella.html
- http://en.wikipedia.org/wiki/GIS_and_public_health

iii. Disaster Management

- http://www.osdma.org/ViewDetails.aspx?vchglinkid=GL024&vchplinkid=PL049
- http://www.geospatialworld.net/Paper/Application/ArticleView.aspx?aid=985
- http://www.esri.com/industries/public-safety/emergency-disaster-management/gis-used
- http://www.directionsmag.com/articles/analysis-which-gis-technology-to-use-for-disaster-management/332986

b. Online references

- http://en.wikipedia.org/wiki/List_of_geographic_information_systems_software
- http://www.pasda.psu.edu/tutorials/gisbasics.asp
- https://www.youtube.com/user/GISTutorials
- http://hcl.harvard.edu/libraries/maps/gis/tutorials.cfm
- http://www.gistutor.com/
- http://www.startup.unigis.net
- http:// www.training.esri.com

c. Tools of the trade

- http://bhuvan.nrsc.gov.in/bhuvan_links.php
- Google Earth
- *https://maps.google.co.in/*
- http://www.openstreetmap.org
- http://maps.bing.com
- http://explorer.arcgis.com

2. Suggested Readings

#	Book Name	Author
1	Geographic Information System and Science	Paul A Longley, M F Goodchild, D J Maguire, David W Rhind
2	Concepts And Techniques of Geographic Information Systems	Lo.C.P., Yeung. K.W. Albert
3	Principles of Geographical Information systems	Burrough P A P A McDonnell
4	An Introduction to Geographical Information Systems	Haywood.L, Comelius.S and S. Carver
5	Introduction to Geographic Information Systems	Chang,Kang-tsung

SEMESTER VI

GRY6B10 World Regional Geography

Instruction Hours : THREE hours / Week **Credit: 3**

Module	Theme	Contents
1	**Concept of a Region**	• World Regional Geography – content and scope. • Terminologies and Definitions. • Concept of a Region. • Types of regions – Natural, Cultural, Functional Regions. • Planning regions-micro and macro regions. • Approaches to regionalization.
2	**Natural Regions**	• Natural regions- Space relationships- relief, climate, drainage, flora and fauna. • Location and characteristics of the natural regions of the low. latitudes- Equatorial forests or Amazon type. • Equatorial highlands of Ecuador type.
3	**Tropical Regions**	• Tropical rainforest region or Caribbean type. • Tropical monsoon region or India type. • Tropical grassland region or Sudan type. • Tropical desert region or Sahara type.
4	**Temperate Regions**	• Natural regions of the middle latitudes- Warm temperate west margin region or Mediterranean type. • Warm temperate east margin region or China type. • Cool temperate maritime region or West European type. • Cool temperate east margin region or St. Lawrence type. • Cool temperate grassland region or Prairie type.
5	**The Taiga, and Tundra**	• Natural regions of high latitudes. • Coniferous forest region or Taiga type; • Cold desert region or Tundra type; • Icecap region.

REFERENCES

1. Web Resources

a. http://www.earthonlinemedia.com/ebooks/tpe_3e/contents.html
b. http://en.wikipedia.org/wiki/Regional_geography
c. http://www.saylor.org/site/textbooks/World%20Regional%20Geography.pdf
d. http://www.saylor.org/courses/geog101/

2. Suggested Readings

#	Book Name	Author
1	World Regional Geography	Oliver H Heitzelman & Richard M Highsmith J R
2	e-Study Guide for: Fundamentals of World Regional Geography	Joseph Hobbs
3	The World Today: Concepts and Regions in Geography	H. J.De Blij and Peter O. Muller
4	Geography of the World's Major Regions	John Peter Cole
5	Temperate and Boreal Rainforests of the World: Ecology and Conservation	Dominick A. DellaSala
6	Certificate Physical and Human Geography	Goh Cheng Leong

SEMESTER VI

GRY6B11 General Geography of India

Instruction Hours : THREE hours / Week **Credit: 3**

Module	Theme	Contents
1	**Unity in Diversity**	• India - location and its strategic significance. • A land of unity in diversity. • Physiographic regions. • Drainage systems
2	**Climate, Vegetation and Soil**	• Indian climate- characteristics-factors influencing climate. • Monsoons- formation and characteristics. • El-Nino and La-Nina effect. • Rainfall distribution. • Western disturbance and seasons. • Natural vegetation – types and distribution. • Major soil types and distribution. • Biogeographical Zones.
3	**Indian agriculture**	• Indian agriculture - salient features • Production and distribution of major crops- Rice, Wheat, Cotton, Sugarcane, Rubber, Tea and Coffee. • Green revolution and its impacts, problems of Indian agriculture and their solution. • Agricultural regions of India.
4	**Resources and Industry**	• Mineral resources. • Metallic minerals- iron ore, manganese, bauxite, -non metallic minerals- mica, limestone and gypsum, energy resources. • Coal, petroleum, natural gas, -solar ,wind and atomic energy • Conservation of resources . • Industry - locational factors . • Status of selected industries- iron and steel, cotton textile, and ship building industry.
5	**Peopling India and Trade & Transport**	• Population- growth, distribution, density, Problems. • Transportation- Roadways, Railways and Airways. • Foreign trade of India and its salient features.

REFERENCES

1. Suggested Readings

#	Book Name	Author
1	India a Regional Geography	Singh R L
2	India, Pakistan & Celon	Spate O H K
3	India Year Book	Govt. of India
4	Gazatteer of India	Govt. of India
5	Geography of India	Gopal Singh
6	India-A Comprehensive Geography	Khullar, D

SEMESTER VI

GRY6B12 Geographical Appraisal of Kerala

Instruction Hours : THREE hours / Week **Credit: 3**

Module	Theme	Contents
1	**Land and Climate**	• Location- Absolute and relative. • Physiographic divisions. • Climate- Temperature and Rainfall distribution, Influence of Arabian Sea and Western Ghats. • Monsoons in Kerala - Distribution and Impact • Geology. • Soil types. • Drainage- Pattern, characteristics. • Major rivers basins. • Natural vegetation - Types and distribution • Biosphere Reserves, National Parks and Wildlife sanctuaries
2	**Agriculture**	• Agriculture- favourable conditions. • Irrigation- role of reservoirs. • Areas and production of paddy, coconut, rubber, tea, & spices. • Problems of Kerala's agriculture - highlighting Urban and Infrastructure Development, its impact.
3	**Resources**	• Mineral resources-occurrence, distribution. • Rare earths and their distribution. • Power resources – hydroelectric projects- potential and production – thermal power generation. • Marine resources – fisheries. • Favourable conditions for fishing. • Fishing villages – importance of fishing in the economy of Kerala;. • Problems in fishing sector.
4	**Industries**	• Overview of Industrial development in Kerala • Industries in Kerala: locational factors and Limitation • Major industries - Cottage and small scale industries – SEZ; • IT Sector in Kerala -Opportunities for growth • Tourism Industry- Major tourist centers. • Problems and Prospects in Tourism Sector
5	**Aspects of Population, Urban and Infrastructure Development**	• Population- growth and distribution. • Structure- density, literacy, sex-ratio. • Occupational structure. • Migration and its impacts. • Urbanization- trend, major urban centres, Urban Development Programmes. • Transportation Network - Roads, Railways, Waterways and Airways and Mass Rapid Transport System (MRTS) in Cities of Kerala.

REFERENCES

1. Suggested Readings

#	Book Name	Author
1	Geography of Kerala	Dr. George Kurian
2	Economy of Kerala	Karunakaran and Sankaranarayanan
3	Resource Atlas of Kerala	CESS, Trivandrum
4	Gazetteer of Kerala	Govt. of Kerala
5	Geology of Kerala	Dr. K. Soman
6	Water Atlas of Kerala	CWRDM

SEMESTER VI

GRY6B13 Biogeography

Instruction Hours : THREE hours / Week **Credit: 4**

Module	Theme	Contents
1	**Basic Principles**	• Biogeography- content and scope. • Meaning of ecology, ecosystem, environment. • Basic Ecological Principles. • Darwin's theory of Evolution.
2	**Ecosystem**	• Concepts of Habitat, Biome, community, Ecotone and ecological niche. • Biosphere and energy: Energy sources, energy flow, food chains and food webs.
3	**Biomes**	• Concept of biodiversity- Types of diversity- Species diversity, ecosystem diversity and genetic diversity. • Hotspots; Biomes- definition, types. • Major biomes- distribution and characteristics of i) forest biome, ii) grassland biome, iii) desert biome and iv) icecap biome.
4	**Conservation**	• Conservation of biodiversity- need for conservation; • Causes for destruction- natural and manmade, effect on biodiversity due to global climatic change, desertification, deforestation, overgrazing, modern agriculture and industries.
5	**Conservation Methods**	• Conservation methods-national parks, sanctuaries, biosphere reserves and international laws. • Biodiversity conservation strategies in India. • Case Study

REFERENCES

1. Web Resources

a. http://www.biogeography.org/
b. http://en.wikipedia.org/wiki/Biogeography
c. http://onlinelibrary.wiley.com/journal/10.1111/%28ISSN%291365-2699

2. Suggested Readings

#	Book Name	Author
1	Geography as a fundamental discipline	Ackerman E A
2	The Citizen's Fifth Report on Environment	CSE India
3	Biogeography	Brett R. Riddle, James H. Brown, Robert J. Whittaker, Mark V. Lomolino
4	Frontiers of Biogeography	Mark V. Lomolino, Lawrence R. Heaney
5	Biogeography Of Microscopic Organisms: Is Everything Small Everywhere?	Fontaneto

SEMESTER VI

GRY6B14 Elective-Introduction to Disaster Management

Instruction Hours : THREE hours / Week **Credit: 4**

Module	Theme	Contents
1	**Natural Hazards**	• Introduction to Natural hazards. • Definitions. • Classification. • Impact on the environment and society. • Geography and Disaster Management (scope from Geographers perspective). • National and international Institutions. • An overview of Anthropogenic Disasters.
2	**Geo-tectonic hazards**	• Earthquakes. • Volcanoes. • Landslides. • Distribution, Vulnerability and Risk. • Consequences, Impact and Challenges. • Planning for Resilience.
3	**Hydrological Extremes**	• Introduction to Hydrological Extremes. • What are Floods?. • Describing Floods and Impact (how and why - including floods caused by geological activities like earthquake, landslides, volcanic activity and manmade). • Vulnerability & risk (natural regions Perspective). • Describing Floods (with example of flood prone regions of India), Consequences. • What is Drought?. • Characteristics. • Drought Types. • Describing Droughts - (with example of drought prone regions of India). • Flood and Drought Mitigation. • Flood and Drought Forecasting, Management. • Planning for Resilience.
4	**Mitigation and Management**	• Disaster Preparedness • Disaster Response and Disaster Management. • Rehabilitation, Reconstruction and Recovery • Risk Assessment and Vulnerability Analysis. • Community Awareness and Participation. • Role of Government - National Disaster Management Framework (India). • Role of voluntary organizations and Individuals.
5	**Geo - information Technology and Disasters**	• Predicting Natural Hazards and Technology • Applications of Remote Sensing • Applications of Global Positioning System • Applications of Geographic Information System. • Warning Systems. • Case Studies from India

REFERENCES

1. Web Resources

a. http://en.wikipedia.org/wiki/Emergency_management
b. http://www.wcpt.org/disaster-management/what-is-disaster-management
c. http://www.ndmindia.nic.in/
d. http://www.ndma.gov.in/en/

2. Suggested Readings

#	Book Name	Author
1	Geographical Hazard	Majid Hussain
2	Environmental Education And Disaster Management	Pandey S K
3	Disaster Science And Management	Tushar Bhattacharya
4	Disaster Management Future Challenges and Opportunities	Jagbir Singh
5	Introduction to Environmental Impact Assessment	John Glasson

UNDERGRADUATE PROGRAMME IN GEOGRAPHY (B.Sc. Geography)

SYLLABUS

CORE PRACTICALS

UNDERGRADUATE PROGRAMME IN GEOGRAPHY (B.Sc. Geography)

SYLLABUS

CORE PRACTICAL I

GRY4B01(P) REPRESENTATION OF GEOGRAPHICAL DATA AND WEATHER MAP ANALYSIS

No. of contact hours : 2hrs(1st &2nd Sem), 4hrs (3rd &4th Sem) / week No: of credits : 3

Module	Contents
1	• Maps – classification - components - map preparation - Isopleths, Choropleth, chorochromatic and Choroshematic Map - using recent socio-economic data.
2	• Scales – Definition – Representation of scales – Plain, Diagonal, Comparative, Time scale & Vernier Scale
3	• Direction- Latitude and Longitude-Time calculation - Longitude and time, IST and date line Grid of latitudes and longitudes and location of places on maps. • Enlargement and Reduction (Mechanical or Graphical methods) • Basin area or Administrative area measurement (Using planimeter or graphical method).
4	• Reading recording and analysis of data obtained from Barometer, Hygrometer and Maximum-minimum Thermometer. • Weather map analysis a. Analysis and interpretation of pressure and wind system, temperature b. Distribution, precipitation and sky condition c. Preparation of weather maps of India for different seasons of the year d. Drawing of isobaric patterns and associated weather- cyclone, e. anticyclone, ridge, trough, wedge, secondary depression, col.
5	• Data Representation Using Spreadsheet: Arrangement into Ascending and Descending Order; Cartograms Construction of climatic & statistical diagrams a. Line graph b. Poly graph c. Simple bar diagram d. Compound bar diagram e. Pie Diagram f. Doughnut Chart g. Band graph h. Ergo graph i. Pyramid diagram j. Wind Rose diagram k. Hythergraph l. Taylors Climograph m. Radar Diagram n. Three dimensional Representation - Sten-de-Geer & Stil Gen Baur Method

CORE PRACTICAL II

GRY6B02(P) MAP PROJECTION and GEOINFORMATICS

No. of contact hours : FOUR hours (V & VI Semester) / week **No: of credits : 4**

Module	Contents
	Map Projections
1	i. Maps – grids of latitude and longitudes. ii. The globe and maps – their merits and demerits. iii. Developable and non-developable surfaces. iv. Classification of map projections. v. Types – Graphical construction – Properties and uses of :- a. Zenithal – Equi-distant & Equal area projection – Gnomonic, Stereographic, Orthographic b. Conical – Simple conical, Two standard parallel c. Cylindrical – Equi-distant, Equal-area
	Application of GIS and GPS
2	i. Capturing Location of a Place Using GPS; ii. Georeferencing and Vectorization of a Map iii. Creating Polygon, Network and TIN Topology table and diagram
3	Finding Attribute Values of a Raster (using Open Source Software LandSerf- http://www.landserf.org/)
4	Spatial Analysis - Buffer, Network and Overlay Preparing Thematic Map
	Interpretation of Remote Sensing data
5	i. Interpretation of Aerial Photograph Preparing Land use Map

CORE PRACTICAL III

GRY6B03(P) TOPOGRAPHIC MAP ANALYSIS AND SURVEYING

No. of contact hours : FOUR Hours (V and VI Semester) / week **No: of credits : 3**

Modules	Content
Methods of relief representation.	
1	a. Qualitative- hachure's, hill shading, layer tint b. Quantitative- contours, form lines, spot height, bench mark, triangulation station
Representation of following features by contours	
2	Representation of following features by contours- uniform slope, concave slope, convex slope, terraced slope, conical hill, plateau, ridge, V-shaped valley, U-shaped valley, waterfall cliff. Concept of slopes – Gradient – Significance of Horizontal & vertical scales Calculation of gradient from topographic sheets. a. Identification of ground features using local area toposheet b. Measurement of Area by Graphical Method / Planimeter c. Construction of Profiles: Superimposed, Projected and Composite d. Stream Frequency and Drainage Density e. Average Slope (Wentworth's method) f. Interpretation of Relief, Drainage and Vegetation Characteristics g. Interpretation of Settlement, Transport and Communication Systems h. Relationship between Physical and Cultural Elements
Surveying and Mapping	
3	Preparation of plan - Chain and Tape Survey - Open traverse, closed traverse and area calculation
4	Plane Table Survey - Radiation and Intersection Methods - Prismatic Compass Survey - Open Traversing and Intersection Methods
5	Dumpy Leveling - Profile drawing Instruments & Determination of Height by Indian Clinometer

REFERENCES

1. Suggested Readings

#	Book Name	Author
1	Elements of Practical Geography	R L Singh
2	Fundamentals of Cartography	Rameshwar Prasad Misra, A. Ramesh
3	Advanced Practical Geography	Pijushkanti Saha, Partha Basu

UNDERGRADUATE PROGRAMME IN GEOGRAPHY (B.Sc. Geography)

SYLLABUS

COMPLEMENTARY COURSE

UNDERGRADUATE PROGRAMME IN GEOGRAPHY (B.Sc. Geography)

SYLLABUS

COMPLEMENTARY I GEOGRAPHY and RESOURCE MANAGEMENT

Course 1

GRY1C01.1 - Development of Geography

No. of contact hours : TWO Hours / week **No: of credits : 2**

Module	Theme	Contents
1	**Introduction to Geography**	• Meaning and definition of Geography • Nature and scope of Geography • Approaches and themes in Geography • Traditions in Geography
2	**Evolution of Geography - Ancient Period**	• Contribution of Greeks • Contribution of Roman • Contribution of Arabs • Contribution of Indians
3	**Dichotomies in Geography**	• Determinism • Possibilism • Neo determinism • Positivism • Radicalism
4	**Quantitative Revolution and Spatial Thinking**	• Quantitative Revolution • Kunh's Model of Scientific Revolution • Concept of Spatial Thinking • Evolution of Spatial Concept and theories
5	**Models in Geography**	• Models and modeling in Geography • Typology of Models • Systems Approach in Geography

REFERENCES

1. Web Resources

a. http://www.physicalgeography.net/fundamentals/1a.html
b. http://en.wikipedia.org/wiki/History_of_geography
c. http://www.eolss.net/sample-chapters/c01/e6-14-01-01.pdf
d. http://people.wku.edu/charles.smith/essays/SMITH89.htm
e. http://meta-carto-semiotics.org/uploads/mcs_vol5_2012/MCS_Vol5_2012_Hess.pdf
f. https://www.academia.edu/1824398/Spatial_Thinking

2. Suggested Readings

#	Book Name	Author
1	Perspectives on Nature of Geography	Hartshone, R
2	Evaluation of Geographical thought	Husain, M
3	Philosophy and Human Geography	johston, R.J.;
4	The Arts and Science of Geography Integrated Readings	Dikshit, R. D
5	The Geography of Puranas	Ali, S.M
6	Spatial Organization : The Geographer's View of the world	Abler, Ronald; Adams, John S. Gould, Peter
7	Introduction to scientific Reasoning in Geography	Amedeo, Douglas
8	The future of Geography	Johnston, R. H
9	The Changing Nature of Geography	Mishull, R

COMPLEMENTARY I GEOGRAPHY and RESOURCE MANAGEMENT

Course 2

GRY1C01.2 - Soil Geography

No. of contact hours : TWO Hours / week **No: of credits : 2**

Module	Theme	Contents
1	**Introduction to Soil Geography**	• Meaning, scope and content of soil geography • Nature of soil Geography • Relationship of Soil Geography with Pedology • Significance of Soil Geography
2	**Formation and Properties of Soil**	• Factors influencing soil formation. • Process of soil formation and development. • Characteristics of soil profile • Components of soil. • Physical properties of soil – texture and structure. • Chemical properties of soil - pH, Organic Matter, NPK and other soil properties.
3	**Soil classification**	• Soil classifications • Zonal system of classification • Comprehensive system of classification – Marbut's & USDA • Classification Soils of India • Major soil groups in Kerala
4	**Soil erosion and Conservation**	• Soil erosion types - Mass Wasting • Soil conservation and its importance • Principles of soil conservation
5	**Soil Management**	• Concept of Soil Management • Need of Soil Management • Methods of Soil Management

REFERENCES

1. Web Resources

a. http://www.physicalgeography.net/fundamentals/10t.html
b. http://en.wikipedia.org/wiki/Soil_science
c. http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/survey/geo/
d. http://www.iiss.nic.in/index.html
e. http://www.nbsslup.in/
f. http://www.pedosphere.com/resources.cfm#cssc
g. http://www.fao.org/soils-portal/soil-survey/soil-classification/en/

2. Suggested Readings

#	Book Name	Author
1	Geography And Soil Properties	Pitty A.F.
2	Introduction to The Principles And Practice of Soil Science	White R.E.
3	Soils - Process and Response	Fenwick I. M. and Knapp B.J
4	Soil And Geomorphology	Birkeland P.W
5	The Nature And Properties of Soils. Macmillan Publishing Company	Brady N.C
6	Geomorphology And Time	Thomas J.B. and Brunsden
7	Geography of Soil	Bunting B.T. (
8	Soil Geography, David and Charles	Cruickshank J.
9	Fundamentals of Soil Science	Foth H.D and Turk L.M
10	Soils : Their Properties and Management	Charman P.E.V and Murphy B.W

COMPLEMENTARY I GEOGRAPHY and RESOURCE MANAGEMENT

Course 3

GRY1C01.3 - Geography of Water Resources

No. of contact hours : TWO Hours / week **No: of credits : 3**

Module	Theme	Contents
1	**Introduction to Hydrology**	• Meaning and Scope • The hydrologic cycle • Heat balance and water budget
2	**Surface Hydrology**	• Runoff – controlling factors – Runoff cycle. • Infiltration, evaporation. • Transpiration and Stream flow. • Annual hydrograph and river regime.
3	**Groundwater Hydrology**	• Meaning • Physical and chemical properties • Storage and movement • Groundwater flow: general characteristics • Subsurface distribution of water • Groundwater basin development
4	**Hydrologic measurements and data Sources**	• Units of measurement • Sources of hydrologic data • Measurements hydrologic variables
5	**Water conservation and Governance**	• Traditional water harvesting and management • Water Parliament - Case Study • Interlinking of Rivers • National Water Policy

REFERENCES

1. Web Resources

a. http://video.nationalgeographic.com/video/env-freshwater-whycare
b. http://en.wikipedia.org/wiki/Water_resources
c. http://www.cwrdm.org/
d. http://www.cwc.nic.in/

2. Suggested Readings

#	Book Name	Author
1	Hydrology: Principles, Analysis and Design	Raghunath, H.M
2	Hydrology in Practice	Van Nostrand Reibhold
3	Modern Physical Geography	Strahler, A.A. and Strahler
4	Introduction to Hydrology	Viessman, W. and Lewis
5	Hydrology: An Introduction.	Wilfried, B.,
6	Handbook of Applied Hydrology	Chow, V.T

COMPLEMENTARY I GEOGRAPHY and RESOURCE MANAGEMENT

Course 4

GRY1C01.4 - Spatial Planning and Development

No. of contact hours : TWO Hours / week **No: of credits : 3**

Module	Theme	Contents
1	**Geographical Space**	• Understanding space and place • Organizing space • Spatial Planning Terminologies • Need for Spatial Planning • Challenges for Spatial Planning • Goals of Spatial Planning • Institutions in Spatial Planning • Scope and role of Geographer in Spatial Planning
2	**Principles and Process of Spatial Planning**	• The Principles of Spatial Planning :- The Democratic Principle, The Subsidiarity Principle, The Participation Principle, The Integration Principle, The Proportionality Principle, The Precautionary Principle • The Process / System of Spatial Planning:- Planning Tools, Policy formulation, Regulations, Implementation • Relevance of Spatial Planning for Kerala (from perspective of Rur-Urban growth Management) - Case Study • Government Schemes and Policies (National and State)
3	**Land use and Watershed Planning**	• Terminologies, Concepts and attributes • Principles of land use planning • Land capability classifications and methods • Concept of Watershed (Geo-hydrological unit) • Watershed as a Spatial planning unit • Integrated watershed management Programme (Case Study from Kerala / India)
4	**Human Development Plan**	• Concept of human development • Basic indicators of human development • Poverty line and measures of poverty alleviation • Measurement of human development. • Case Study from Kerala / India
5	**New Paradigms in Planning**	• Theories of balanced growth, limits to growth and beyond the limits • Environment and Natural Resource conservation in Spatial planning, • UN Millennium development goal • UN Agenda 21 • Planning for Sustainable development

REFERENCES

1. Web Resources

a. http://en.wikipedia.org/wiki/Spatial_planning
b. http://www.unece.org/fileadmin/DAM/hlm/documents/Publications/spatial_planning.e.pdf
c. http://www.mlit.go.jp/kokudokeikaku/international/spw/general/india/index_e.html
d. http://www.landuseindia.in/live/hrdpmp/hrdpmaster/hrdp-asem/content/e48335/e48799/e48940/e54451/e54457/PlanningSysteminIndiaWS19Mar2013Kulshrestha.pdf
e. http://www.townplanning.kerala.gov.in/pages/ldp/ch1.pdf

2. Suggested Readings

#	Book Name	Author
1	*The New Spatial Planning*	Haughton, G., Counsell, D and Vigar, G
2	*Urban Complexity and Spatial Strategies*	Healey, P
3	*Conceptions of Space and Place in Strategic Spatial Planning*	Davoudi, S and Strange,
4	European Union Spatial Policy and Planning	D. Williams, R. H. Williams, Richard H. Williams
5	Spatial Planning Systems of Britain and France: A Comparative Analysis	-

UNDERGRADUATE PROGRAMME IN GEOGRAPHY (B.Sc. Geography)

SYLLABUS

COMPLEMENTARY COURSE

PRACTICAL

UNDERGRADUATE PROGRAMME IN GEOGRAPHY (B.Sc. Geography)

SYLLABUS

COMPLEMENTARY COURSE I

PRACTICAL I

GRY4C01(P) Resource Mapping Techniques

No. of contact hours : TWO Hours / (I to IV Semester) / Week **No: of credits : 2**

Modules	Content
1	• Resource Mapping - Manual cadastral mapping of local area resources a. Physical features b. Cultural Features
2	• Watershed demarcation • Preparation of Local area drainage map • Stream order Classification
3	• Drawing Soil Profile • Soil Sampling Methods • Soil Sample Collection
4	• Mapping local hazard hotspots a. Accident prone areas b. Flood / Drought prone area
5	• Local area land use Map preparation

REFERENCES

1. Web Resources

a. http://www.nios.ac.in/media/documents/316courseE/E-JHA-30-10A.pdf
b. http://mnre.gov.in/sec/solar-assmnt.htm
c. https://openknowledge.worldbank.org
d. http://www.bercyproject.org/Mobilization.aspx
e. http://nrdms.gov.in/panchayat_level_resource.asp

2. Suggested Readings

#	Book / Report / Scientific Paper	Author
1	Panchayat Resource Mapping to Panchayat-level Planning in Kerala: An Analytical Study (can be downloaded from http://www.cds.ac.in/krpcds/publication/downloads/chatto.pdf)	Srikumar Chattopadhyay, P. Krishna Kumar & K. Rajalekshmi
2	Participatory Natural Resources Mapping- A case study of Bhitara Panchayat in Banni Grassland, Kachchh, Gujarat (can be downloaded from http://www.cabi.org/isc/FullTextPDF/2011/2011)3189201.pdf)	J B Shah, A M Patel & P N Joshi
3	Standards For Bio-Geo Database Vol I & II	Nisha Mendiratta R Siva Kumar K S Rao
4	Application of GIS in decentralised planning – A free software approach. (can be downloaded from http://www.spc.tn.gov.in/SLUB_STUDIES_PDF/Study_11.pdf)	Jaisen. N.D. Centre for Ecological Sciences, IISc, Bangalore.

UNDERGRADUATE PROGRAMME IN GEOGRAPHY (B.Sc. Geography)

SYLLABUS

OPEN COURSE

UNDERGRADUATE PROGRAMME IN GEOGRAPHY (B.Sc. Geography)

SYLLABUS

Semester V - OPEN COURSE

GRY5D01- 1. PHYSICAL GEOGRAPHY

Instructional hours: 3 / week **Credit:2**

Module	Theme	Contents
1	Evolution Geography	• Geography- Definition and scope • Major Branches- physical, human, regional, economical and environmental.
2	Geomorphology	• Origin of the earth. • Interior of the earth. • Earth movements- epierogenic and orogenic. • Folding and Faulting. • Volcanoes. • Earthquakes. • Weathering. • Denudation-Agents
3	Climatology	• Atmosphere and its importance. • Composition and structure. Temperature. • Pressure belts and Wind systems. • Clouds and rainfall types. • Cyclones and anti-cyclones. • Major climatic types.
4	Oceanography	• Major oceans, distribution. • Relief of ocean floor. • Physical properties of ocean water- Temperature. • Salinity. • Ocean deposits. • Ocean currents, El Nino and La Nino. • Waves and tides.
5	Biogeography	• Biogeography- Origin and types of soils. • Major biomes of the world. • Ecosystem and food chain. • Environmental degradation and conservation.

REFERENCES

1. Web Resources

a. http://www.physicalgeography.net/
b. http://en.wikipedia.org/wiki/Physical_geography
c. http://www.geography-site.co.uk/pages/physical.html
d. http://ppg.sagepub.com/
e. http://www.earthonlinemedia.com/ebooks/tpe_3e/contents.html

2. Suggested Readings

#	Book Name	Author
1	Certificate Physical and Human Geography	Goe Cheng Leong
2	Physical Geography through Diagrams	R B Bunnet
3	A Text book of Geomorphology	Dayal, P
4	Climatology	Lal, D.S.,
5	Modern Physical Geography	Strahler. A.H., and Strahler.A.N
6	Biogeography	Robinson, H.,
7	Human and Economic Geography	Leong, G. C. and Morgan, G. C
8	Physical Basis of Geography	Woolridge & RS Morgan
9	The Earth, its origin & physical composition	H Jeffrey
10	Physical Geography	F J Monkhouse
11	Physical Geography	Lake P
12	Physical Geography	Morris Davis
13	Elements of Geography	Finch & Trewartha

Semester V

Open Course

GRY5D01-2. A Geographical Appraisal of Natural Heritage Management

Instructional hours: 3 / week **Credit:2**

Modules	Theme	Contents
1	**Natural Heritage Resources of the World**	• UNESCO Definition • Other Definitions – Govt. of India (MoEF), State level Definitions, Biodiversity Conservation Board, WWF, UNEP etc.. • Bio-geographical Zones of World World Natural Heritage Sites (UNESCO) Bio-geographical Zones of India Natural Heritage Sites in India (UNESCO)
2	**Challenges faced by natural heritage sites**	• Global Challenges • National Level (India) • State Specific (Kerala)
3	**Policy, Guidelines for Conservation**	• In Situ • Ex-situ • Govt. of India laws and Initiatives (MoEF Programmes) • UNESCO Guidelines and Initiatives • State Level Initiatives (Kerala)
4	**Mapping Natural Heritage Sites**	• Introduction to Maps • Field techniques • Introduction to GIS • Introduction to GPS
5.	**Spatial Planning and Natural Heritage Management**	• UNESCO Guidelines • Spatial Planning Concepts • Natural Heritage Management – Best Practices (global) • Natural Heritage Management – Best Practices (India) • Developing Management Plan and Framework

REFERENCES

1. Web Resources

a. http://en.wikipedia.org/wiki/Natural_heritage
b. http://en.wikipedia.org/wiki/World_Heritage_Site
c. http://whc.unesco.org/en/naturalheritagestrategy/
d. http://www.nbaindia.org/
e. http://envfor.nic.in/
f. http://www.intach.org/divi-natural-heritage.asp?links=dnlh1

2. Suggested Readings

#	Book Name	Author
1	The Book of Nature: The Natural Heritage According to UNESCO	Andrew Kirk (contributor)
2	Managing Natural World Heritage	UNESCO
3	Adapting to change – N° 30 – The State of Conservation of World Heritage Forests in 2011	UNESCO

Semester: V
GRY5D01 -3. Fundamentals of Remote Sensing

Instructional hours: 3 / week **Credit: 2**

Module	Theme	Contents
1	**Overview of Remote Sensing**	• Definition and Overview of Remote Sensing • History and Evolution of Remote Sensing • Remote Sensing Systems • Electromagnetic Radiation (EMR) - Terms and Definitions, Laws of Radiation, EM Spectrum, Sources of EMR • Interaction between EM R and matter - Reflection, Absorption and • Transmission. • Interactions between EM Radiation and Atmosphere, Atmospheric windows
2	**Remote Sensing Systems**	• Remote Sensing Systems - Active and Passive Systems, Imaging and Non Imaging Systems, • Principles of Thermal Remote Sensing including its use • Principles of Microwave Remote Sensing (imaging and non imaging) • Concept of Resolutions in Remote Sensing - Spatial, Spectral, Radiometric and Temporal
3	**Earth Observation**	• Orbits and Platforms for Earth Observation • Earth Observation Satellites (LANDSAT, SPOT, IRS, IKONOS) and their characteristics • Sensors for Stereo Data (MOMS, CARTOSAT) and their characteristics • Satellite based Indian Remote Sensing Programme
4	**Data Products**	• Data Reception, Processing and Data Products Generation • Remote Sensing data products- Aerial Photos and Satellite Imageries
5	**Applications of Remote Sensing**	• Introduction to Application of Remote Sensing • Application of Remote Sensing in Agriculture • Application of Remote Sensing in Disaster Management • Application of Remote Sensing in Environment Conservation

REFERENCES

1. Web Resources

m. http://www.itc.nl/~bakker/rs.html
n. www.ccrs.nrcan.gc.ca/resource/tutor/fundam/index_e.php
o. www.rst.gsfc.nasa.gov/
p. http://www.r-s-c-c.org/rscc/v1m1.html
q. www.isprs.org
r. www.spaceimaging.com
s. www.landsat.usgs.gov
t. www.spotimage.fr
u. www.nrsa.gov.in
v. IRS 1C handbook: http://www.euromap.de/docs/doc_013.html
w. IRS P6 Users handbook. http://www.nrsa.gov.in/IRS_Documents/Handbook/Resourcesat-1_handbook_HTML
x. asterweb.jpl.nasa.gov

2. Suggested Readings

#	Book Name	Author
1	Remote Sensing and Image Interpretation	Lillesand Thomas M. & Kiefer Ralph
2	Introduction to Remote Sensing	Campbell John B
3	Remote Sensing and Principles and Image Interpretation	Floyd F. Sabins
4	Manual of Remote Sensing	-
5	Fundamentals of Remote Sensing	George Joseph
6	Computer Processing of Remotely sensed Images: An Introduction	Paul M. Mather