



UNIVERSITY OF CALICUT

Abstract

General & Academic- B.Voc Programme in Agriculture under Modified B.Voc Regulations 2014 -Scheme and Syllabus with effect from 2018 Admission onwards- Implemented- Orders Issued.

G & A - IV - J

U.O.No. 15512/2019/Admn

Dated, Calicut University.P.O, 02.11.2019

*Read:-*1) U.O.No. 7404/2018/Admn dated 19.06.2018

2) Item No.1 in the minutes of the B.Voc Regulations Committee held on 13.09.2018

3) Minutes of the meeting of the Board of Studies in B.Voc Agriculture held on 19.08.2019

4) Remarks of the Dean, Faculty of Science Dated 31.09.2019

5) Item No.I.11 in the minutes of the meeting of LXXX Academic Council held on 05.10.2019

ORDER

The modified B.Voc Regulations has been implemented vide paper read as (1) and vide paper read as (2) the B.Voc Regulations Committee decided to place the syllabi of new B.Voc Programmes which are sanctioned by UGC, in various colleges under University of Calicut, before various Boards of Studies for approval.

The Board of Studies in B.Voc Agriculture held on 19.08.2019 vide paper read as (3) approved the syllabus of B.Voc Agriculture as per modified B.Voc Regulations 2014 w.e.f 2018 admissions.

Vide paper read (4) Dean, Faculty of Science approved the minutes of the the meeting of the B.Voc Agriculture held on 19.08.2019 and the same approved by the Academic Council vide paper read (5). The Vice Chancellor has accorded sanction to implement Scheme and Syllabus of B.Voc Programme in Agriculture.

Sanction is therefore accorded for implementing the Scheme and Syllabus of B.Voc Programme in Agriculture under modified B.Voc Regulations 2014, in the University w.e.f 2018 admissions.

Orders are issued accordingly.

(Syllabus appended)

Biju George K

Assistant Registrar

To

Principals of the Colleges offering BVoc Programme in Agriculture

Copy to: PS to VC/PA to R/PA to CE/JCE VII/JCE 1/EX & EG/GA I F/Library/SF/DF/FC

Forwarded / By Order

Section Officer

UNIVERSITY OF CALICUT

**Curriculum for B. Voc. Programme in
AGRICULTURE**

2018-19

UGC Sponsored B. Voc. Programmes

The University Grants Commission (UGC) had launched a scheme for skills development based higher education as part of college/university education, leading to Bachelor of Vocation (B.Voc.) degree with multiple entry and exit points. The B.Voc. programme is focused on universities and colleges providing undergraduate studies which would also incorporate specific job roles along with general education. This would enable the graduates completing B.Voc to make a meaningful participation in accelerating India's economy by gaining appropriate employment, becoming entrepreneurs and creating appropriate knowledge.

PROGRAMME OBJECTIVES

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

- a) To provide judicious mix of skills relating to a profession and appropriate content of General Education.
- b) To ensure that the students have adequate knowledge and skills, so that they are work ready at each exit point of the programme.
- c) To provide flexibility to the students by means of pre-defined entry and multiple exit points.
- d) 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.
- e) To provide vertical mobility to students coming out of 10+2 with vocational subjects

GENERAL PROGRAMME STRUCTURE

The B. Voc Programme is designed to bridge the potential skill gap identified. The curriculum in each of the years of the programme would be a suitable mix of general education and skill development components.

GENERAL EDUCATION COMPONENTS

- a The general education component provides emphasis to Communication skill, Presentation skill, Health and Safety, Industrial Psychology, Environmental awareness, Entrepreneurship development and other relevant subjects in the field.
- b An option for additional language should be provided which enhances the employability outside the state.
1. General Education Components should not exceed 40% of the curriculum
- d All B.Voc Programme should follow the General education component pattern listed below (Common English Courses and Additional language courses of LRP programmes of CUCBCSSUG

No	Semester	Course No	Course Code	Paper
1	1	1.1	GEC1EG01	English A01
2	1	1.2	GEC1ML02	Additional Language A07- Malayalam
			GEC1HD02	Additional Language A 07- Hindi
3	2	2.1	GEC2EG04	English A02
4	2	2.2	GEC2ML05	A08- Malayalam
			GEC2HD05	A08- Hindi
5	3	3.1	GEC3EG07	English A03
6	4	4.1	GEC4EG10	English A04

SKILL DEVELOPMENT COMPONENTS

- a) This component should match the skill gap identified.
- b) At least 50% of Skill Development Component should be allotted to practical and can grow up to 60% based on the nature of the course. The practical component can be carried out in the college and/or the industry partner premises.

LEVELS OF AWARDS

B. Voc is programme with multiple exits. Following table shows the various certificates and their duration

Awards	Duration
Diploma	2 Semester
Advance Diploma	4 Semester
B. Voc Degree	6 Semester

1. Students are free to exit at any point in the duration of the programme.
2. Only those students who successfully complete the courses and clear the examination are eligible for the certificate.
3. Separate certificate will be awarded for each year for successful candidates.
4. Students who fail in any course may be allowed to move the higher level but won't be eligible for any certificates until he/she clears previous courses.

5. B. Voc degree will confer to those who successfully complete the diploma, higher diploma and internship.

CONDITIONS FOR ADMISSIONS

ELIGIBILITY

- The admission to B Voc programme will be as per the rules and regulations of the University for UG admissions.
- Basic eligibility for B.Voc is 10+2 and above in any stream (No age limit)
- The eligibility criteria for admission shall be as announced by the University from time to time.
- Separate rank lists shall be drawn up for reserved seats as per the existing rules.
- Grace Marks may be awarded to a student for meritorious achievements in co-curricular activities such as Sports/Arts/ NSS/NCC/ Student Entrepreneurship.
- Preferred subjects and index mark calculations will be decided by the respective Boards of Studies.

DIPLOMA HOLDERS

Diploma holders (after 10+2) in the parent courses, approved by the University, who satisfies eligibility criteria can be admitted to the higher diploma(3 rd semester) based on the availability of the seats and is under the sole discretion of the principal of the college/ B. Voc consortium.

RESERVATION/QUOTA

A maximum of 50 students can be admitted to one B. Voc programme. The students can be admitted only to the first semester (except for diploma holders). No students are admitted directly to the Third and Fifth semester in any circumstance except for diploma holders. Diploma holders may be permitted to third semester directly as mentioned above.

The reservation rules for Government/Aided Colleges are as same as that of the regular UG programmes conducted in colleges affiliated to this university.

FEES STRUCTURE

1. The course fee and examination fee for the first three years will be decided by the University. The details of the fee structure for various courses are attached in the annexure 2.
2. The college can collect Caution deposit, PTA fund, special fees, university fees, sports fee etc according to the norms provided by the university at the time of admission.
3. After third year, with the consent of university/UGC, the college can conduct the same programme in self-financing mode (provided UGC not granting further funds).
4. The course fee and examination fee (Regular/ improvement/ supplementary) structure in self financing mode will be decided by the University.

REGISTRATION/RE-REGISTRATION

Every candidate should register for all subjects of the Semester-End examinations of each semester. A candidate who does not register will not be permitted to attend the Semester-End examinations; he/she shall not be permitted to attend the next semester. A candidate shall be eligible to register for any higher semester, if he/she has satisfactorily completed the course of study and registered for the examination. He/she should register for the semester at the start of the semester before the stipulated date. University will notify the starting and closing dates for each semester.

RE-JOINING THE PROGRAMME

1. Rejoining the course will be allowed to only if the candidate has secured a minimum CGPA of 2.5.
2. The candidate should remit the fees prevailing that time.
3. B. Voc governing council will take the decision regarding the rejoining.

COURSE CALENDAR

The B. Voc programme conducted by the affiliated institutions follows a separate calendar from the conversational degree/ PG programme. The programme is distributed over six semesters and each semester constitute 90 working days inclusive of examination.

Note: Within a week after the commencement of classes of each semester, Head of each Institution should forward the list of students, details of faculty members allotted from the college and from industry partners along with their qualification and year of experience, to the University. Also, Head of each Institution shall ensure the availability of sufficient number of faculty members having experience and qualifications in the institution.

ASSESSMENT OF STUDENTS

Assessment of students for each subject will be done by internal continuous assessment and Semester-End examinations. This dual mode assessment will be applicable to both Theory and Practical courses except for internship and project. Total marks in theory course reflect 80 marks external and 20 marks internal assessments. The mark division for practical courses are 20 marks internal and 80 marks external. For internship and project, there is no internal assessment. (Except for Broadcasting and Journalism, annexure attached).

Sl No	Courses	Internal	External
1	Theory	20	80
2.	Practical	20	80
3.	Internship/Project	0	100

INTERNAL

Internal assessment shall be conducted throughout the semester. It shall be based on internal examinations, assignments (such as homework, problem solving, group discussions, quiz, literature survey, seminar, team project, software exercises, etc.) as decided by the faculty handling the course, and regularity in the class. Assignments of every semester shall preferably be submitted in Assignment Book, which is a bound book similar to laboratory

record. The mark distribution to award internal continuous assessment marks for theory subject should be as follows:

Assessment	Mark
Test papers (minimum two, best two out of three is preferred)	10
Assignments (minimum two) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.	5
Regularity in the class	5

The mark distribution to award internal continuous assessment marks for practical subject should be as follows:

Assessment Type	Mark
Evaluation in the lab and Rough Record	10
End-semester Test	4
Viva	1
Regularity	5

Note:

1. No candidate will be permitted to attend the end-semester practical examination unless he/she produces certified record of the laboratory.
2. Full credit for regularity in the class can be given only if the candidate has secured minimum 90% attendance in the subject. Attendance evaluation for each course is as follows

Attendance	Marks
90% and Above	5
85 to 89.9%	4
80 to 84.9%	3
76 to 79.9%	2
75 to 75.9 %	1

EXTERNAL

- Semester- End examinations for theory and practical courses will be conducted by the University. There shall be University examinations at the end of each semester for both theory and practical. Failed or improvement candidates will have to appear for the Semester- End examinations along with regular students.
- At the starting of each semester, Colleges should prepare question bank (containing maximum questions from each module of various types mentioned in section 13 pattern of question paper.) for the external theory/practical examinations for all courses during that semester and will be sent to the university. University will prepare the question papers and answer keys for each course and will sent back to the college for conducting the examination.

- University will appoint a Chairman for each B.Voc Programme. Chairman will monitor the University Practical Examinations and Evaluation of Theory and Practical papers.
- For the evaluation of theory papers, Chairman should form a team consisting of a chief and required additional Examiners for each course.
- At the starting of each semester, Colleges should prepare a panel of External examiners for conducting Practical examinations. Chairman/University will appoint examiners from the panel proposed by colleges.
- Practical Examinations can be conducted and evaluated from the college or the industry partner premises. The team for conducting and evaluating practical exams should include an examiner appointed from the approved panel of faculties, and an internal examiner.
- Head of Institution/ Chief of Examination of the college should take necessary steps to prevent any malpractices in the Semester-End examinations. If any such instances are detected, they should be reported to the University without any delay.
- University will be issuing mark list, provisional/original certificates to the candidates.

INTERNSHIP AND PROJECT

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.

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

Distribution	Marks
Content and relevance of Dissertation	60
Viva	20
Presentation	20

MINIMUM FOR PASS

The successful completion of all the courses prescribed for the diploma/degree programme with E grade (40 %) shall be the minimum requirement for the award of diploma/degree.

Notes:

1. For Project/internship, the minimum for a pass shall be 50% of the total marks assigned to the respective examination.
2. A student who does not secure this pass marks in a subject will have to repeat the respective subject.
3. If a candidate has passed all examinations of B.Voc. Course (at the time of publication of results of last semester) except project/internship in the last semester, a re-examination for the same should be conducted within one month after the publication of results. Each candidate should apply for this Save-A-Year examination within one week after the publication of last semester results.

IMPROVEMENT/SUPPLEMENTARY

Candidates shall be allowed to improve the grade of any two theory courses in a semester. This can be done only in the immediate subsequent chance. If the candidate gets more than 10% mark variations in the improvement chance, marks scored in the improvement chance will be considered for grading of the course; otherwise marks scored in the first attempt will be retained. No candidate shall be permitted to improve the marks scored in practical examinations and internal continuous assessment.

ATTENDANCE

A candidate shall be permitted to appear for the Semester-End examinations only if he/she satisfies the following requirements:

- (a) He/she must secure not less than 75% attendance in the total number of working hours in each semester.
- (b) He/she must earn a progress certificate from the head of the institution stating that he/she has satisfactorily completed the course of study prescribed in the semester as required by these regulations.
- (c) His/her conduct must be satisfactory
It shall be open to the Vice Chancellor to grant condonation of shortage of attendance on the recommendation of the head of the institution in accordance with the following norms.

- The shortage shall not be more than 10%

- Shortage up to 20% shall be condoned once during the entire course provided such shortage is caused by continuous absence on genuine medical grounds.
- Shortage shall not be condoned more than twice during the entire course.

Candidate who is not eligible for condonation of shortage of attendance shall repeat the semester as per university norms.

PATTERN OF QUESTION PAPERS

The question papers of Semester-End examinations of theory subjects shall be able to perform achievement testing of the students in an effective manner. The question paper shall be prepared

- Covering all sections of the course syllabus and total marks from each module should be approximately same.
- Unambiguous and free from any defects/errors
- Emphasizing knowledge testing, problem solving & quantitative methods
- Containing adequate data/other information on the problems assigned (e) having clear and complete instructions to the candidates.

Duration of Semester-End examinations will be 3 hours. The pattern of questions for theory subjects shall be as follows

Section	Total No Of Questions	No of Questions to be Answered	Marks for each Question	Total Marks
A: Very Short/ Objective answer questions	10	10	1	10
B: Short answer questions	12	8	2	16
C: Short Essays	9	6	4	24
D: Essays	4	2	15	30
Total				80

And for practicals

Marks Distribution	Total Marks
Theory/ Algorithm/Flow diagram	20
Implementation	30
Result/Output	10
Record	10
Viva	10
Total	80

CREDIT SYSTEM

Each subject shall have a certain number of credits assigned to it depending upon the academic load and the nature and importance of the subject. The credit associated with each subject will be shown in the prescribed scheme and syllabi. Each course shall have an integer number of credits, which reflects its weightage.

- a) One Credit would mean equivalent of 15 periods of 60 minutes each, for theory, workshops/IT and tutorials;
- b) For internship/field work, the credit weightage for equivalent hours shall be 50% of that for lectures/workshops;
- c) For self-learning, based on e-content or otherwise, the credit weightage for equivalent hours of study should be 50% or less of that for lectures/workshops.

INDIRECT GRADING SYSTEM

- Indirect Grading System based on a 7 -point scale is used to evaluate the performance of students.
- 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.
- An aggregate of E grade with 40 % of marks (after external and internal put together) is required in each course for a pass and also for awarding a degree/diploma.
- Appearance for Internal Assessment and End Semester Evaluation are compulsory and no grade shall be awarded to a candidate if she/he is absent for Internal Assessment / End Semester Evaluation or both.
- For a pass in each course 40% marks or E grade is necessary.
- A student who fails to secure a minimum grade for a pass in a course is permitted to write the examination along with the next batch.
 - After the successful completion of a semester, Semester Grade Point Average (SGPA) of a student in that semester is calculated using the formula given below. For the successful completion of a semester, a student should pass all courses. However, a student is permitted to move to the next semester irrespective of SGPA obtained.
- SGPA of the student in that semester is calculated using the formula

$$\text{SGPA} = \frac{\text{Sum of the credit points of all courses in a semester}}{\text{Total credits in that semester}}$$

- The Cumulative Grade Point Average (CGPA) of the student is calculated at the end of a programme. The CGPA of a student determines the overall academic level of the student in a programme and is the criterion for ranking the students. CGPA can be calculated by the following

$$\text{CGPA} = \frac{\text{Total credit points obtained in six semesters}}{\text{Total credits acquired (180)}}$$

- SGPA and CGPA shall be rounded off to two decimal places. CGPA determines the broad academic level of the student in a programme and is the index for ranking students (in terms of grade points).
- An overall letter grade (Cumulative Grade) for the entire programme shall be awarded to a student depending on her/his CGPA

Marks scored	Grade	Remarks
90 and Above	A+	Outstanding
80 to 89	A	Excellent
70 to 79	B	Very Good
60 to 69	C	Good
50 to 59	D	Satisfactory
40 to 49	E	Adequate
Below 40	F	Failure

GRADE CARDS

The University shall issue to the students grade/marks card (by online) on completion of each semester, which shall contain the following information:

- Name of University
- Title of B.Voc Programme
- Semester concerned
- Name and Register Number of student
- Code number, Title and Credits of each course opted in the semester
- Internal marks, External marks, total marks, Grade point (G) and Letter grade in each course in the semester
- The total credits, total credit points and SGPA in the semester (corrected to two decimal places)

Percentage of total marks The final Grade/mark Card issued at the end of the final semester shall contain the details of all courses taken during the entire programme including those taken over and above the prescribed minimum credits for obtaining the degree. However, as already mentioned, for the computation of CGPA only the best performed courses with maximum grade points alone shall be taken subject to the minimum credits requirements (180) for passing a specific degree. The final grade card shall show the percentage of marks, CGPA (corrected to two decimal places) and the overall letter grade of a student for the entire programme. The final grade/mark card shall also include the grade points and letter grade of general course and skill developmental courses separately. This is to be done in a seven point indirect scale.

MONITORING CELLS/COMMITTEES

EXAMINATION MONITORING CELL

Head of the each institution should formulate an Examination Monitoring Cell at the institution for conducting and supervising all examinations including the internal examinations. The structure and their collective responsibilities will be as per the university norms.

GRIEVANCE CELL

Each college should setup a Grievance Cell with at least four faculty members to look into grievances of the students, if any.

ANTI-RAGGING CELL

Head of Institution shall take necessary steps to constitute anti-ragging committee and squad at the commencement of each academic year. The committee and the squad shall take effective steps as specified by the Honorable Supreme Court of India, to prevent ragging.

CLASS COMMITTEE

Head of institution shall take necessary steps to form a class committee for each class at the start of classes of each semester. This class committee shall be in existence for the semester concerned. The class committee shall consist of the Head of Department, Staff Advisor of the class, a senior faculty member of the department, a faculty member from another department, and three student representatives (one of them should be a girl).

There should be at least two meetings of the class committee every semester; it shall be the responsibility of the Head of Department to convene these meetings. The decisions of the Class Committee shall be recorded in a register for further reference. Each class committee will communicate its recommendations to the Head of Institution.

The responsibilities of the class committee are:

- a) To review periodically the progress and conduct of students in the class.
- b) To discuss any problems concerning any courses in the semester concerned.
- c) To identify weaker students of the class and suggest remedial measures.
- d) To review teaching effectiveness and coverage of syllabus.
- e) Discuss any other issue related to the students of the class

COLLEGE TRANSFER

College transfer is not allowed in any circumstances.

B. Voc degree is equal to any degree approved by University of Calicut

TRANSITORY PROVISION

Notwithstanding anything contained in these regulations, the Vice-Chancellor has the power to provide by order that these regulations shall be applied to any program with such necessary modification.

JOB ROLES PROPOSED TO BE COVERED IN EACH YEAR (ALONG WITH NSQF LEVEL) FOR B. Voc. AGRICULTURE

Duration	NSQF level	QP Codes and Job roles	Alignment details with NSDC
6 Months	4	<p>Qualification Pack: Agriculture Extension Service Provider Job Roles: An agriculture extension service provider gives talks, guidance and actual demonstrations on latest technologies related to agriculture. He/She also works with other experts in agriculture to learn more or even develop new methods that could advance production</p>	<p>Aligned with NSDC</p> <p>REFERENCE ID: AGR/Q7601 ALIGNED TO: NCO-2015/6116.0102</p>
1 Year	5	<p>Qualification pack: Agriculture Extension officer Job Roles: Assist the farmers in plantation crop cultivation. Support for improving the seed quality for enhanced production</p> <p>Qualification Pack: Nursery Manager for plantation crops Job Roles: site selection, propogation, production of quality planting material and hybrids. Lay out, planting, after care-irrigation and manure- and harvesting</p>	<p>Not aligned</p> <p>Not aligned</p>
2 Years	6	<p>Qualifications Pack- Agriculture Extension Executive. Job Roles: The person is responsible for working with Research and Development team in agriculture industries (including seed, fertilizer, pesticides, and micro irrigation industries) to satisfy the farmer needs. They understand and market the technology to be transferred to farmers by way of demonstrations and training. They also coordinate and motivate the farmers to adapt to modern methods for good returns.</p> <p>Qualifications Pack- Tissue culture Technician Job Roles: Setting up of tissue culture laboratory for developments of crop varieties</p> <p>Qualifications Pack- Crop Plantation manager Job Roles: Manage the overall running of plantation firms. Design Quality control measures for pest management and weed</p>	<p>Aligned with NSDC</p> <p>REFERENCE ID: AGR/Q7602 ALIGNED TO: NCO-2015/6116.0101</p> <p>Not aligned</p> <p>Not aligned</p>

		<p>management in plantation crops. Demonstrate various factors affecting the productivity and management of plantation crops.</p> <p>Qualifications Pack- Live stock farm manager. Job Roles: Setting up of live stock farms and management. Breeding and other caring of live stock animals. Poultry farm management-design, setting up and after care of poultry farms.</p>	Not aligned
3 Years	7	<p>Qualifications Pack- Agriculture officer Job Roles: A commercial enterpriser in various agriculture sectors. Bee keeping, Sericulture, Mushroom cultivation and floriculture. Vegetables Fodder crops Plantation crops etc.</p> <p>Qualifications Pack- Organic farming consultant Job Roles: Assist the entrepreneurs for setting up of an organic farming system. Provide proper guidance at multiple stages of cultivation. Provide awareness talks and demonstrations to promote organic farming practices. Support the farmers for marketing and exporting the products.</p> <p>Qualifications Pack- Agriculture Technical officer Job Roles: Link the gap between the farmers and Government in terms of Government policies related to Agriculture. Support the farmers for getting the financial assistance from the Government plans. Educate the farmers for proper utilization of agriculture aids. Follow up of financial assistance to empower the farmers.</p>	<p>Not aligned</p> <p>Not aligned</p> <p>Not aligned</p>

B. Voc Programme in Agriculture Syllabus Outline

C. No.	Course code	Course title	Hours/ week	Credits	Marks		
					Internal	External	Total
Semester I							
1.1	GEC1EG01	English A01	4	4	20	80	100
1.2	GEC1ML02 GEC1HD02	Additional Language A07 (Malayalam) Additional Language A07 (Hindi)	4	4	20	80	100
1.3	GEC1ES03	Fundamentals of Environmental Science	4	4	20	80	100
1.4	SDC1AG01	Fundamentals of Agronomy	4	4	20	80	100
1.5	SDC1AG02	Fundamentals of Horticulture	4	4	20	80	100
1.6	SDC1AG03	Fundamentals of Agricultural Engineering	4	4	20	80	100
1.7	SDC1AG04	Fundamentals of Agronomy and Horticulture – Practicals	6	6	20	80	100
Total			30	30			700
Semester II							
2.1	GEC2EG04	English A 02	4	4	20	80	100
2.2	GEC2ML05 GEC2HD05	Additional Language A08 (Malayalam) Additional Language A08 (Hindi)	4	4	20	80	100
2.3	GEC2HR06	Human Resource Management	4	4	20	80	100
2.4	SDC2AG05	Plantation Crops, Spices and Fruits	4	4	20	80	100
2.5	SDC2AG06	Fundamentals of Seed technology	4	4	20	80	100
2.6	SDC2AG07	Plantation Crops, Spices and Fruits and Seed technology-Practicals	5	5	20	80	100
2.7	SDC2AG08	Internship/Project (Cultivation of Crops)		5		100	100
Total			30	30			700
Semester III							
3.1	GEC3EG07	English A03	4	4	20	80	100
3.2	GEC3NS08	Basic Numerical Skills	4	4	20	80	100
3.3	GEC3TC09	Plant Tissue Culture & Biotechnology	4	4	20	80	100
3.4	SDC3AG09	Micropropagation of Plants- Practicals	5	5	20	80	100
3.5	SDC3AG10	Integrated Pest Management in Crops	4	4	20	80	100
3.6	SDC3AG11	Protected Cultivation of Horticultural Crops	4	4	20	80	100

3.7	SDC3AG12	Protected Cultivation of Horticultural crops and Pest Management-Practicals	5	5	20	80	100
Total			30	30			700
Semester IV							
4.1	GEC4EG10	English A04	4	4	20	80	100
4.2	GEC4IT11	Information Technology	4	4	20	80	100
4.3	GEC4SA12	Soil and Agricultural Microbiology	4	4	20	80	100
4.4	SDC4AG13	Weed Management and Fodder Crop Production	4	4	20	80	100
4.5	SDC4AG14	Livestock Farming	4	4	20	80	100
4.6	SDC4AG15	Weed Management , Fodder Crop Production and Livestock Farming-Practicals	5	5	20	80	100
4.7	SDC4AG16	Internship/Project (Cultivation of Rice)		5		100	100
Total			30	30			700
Semester V							
5.1	GEC5EM13	Environmental Microbiology and Biotechnology	4	4	20	80	100
5.2	GEC5FD14	Food and Dairy Microbiology	4	4	20	80	100
5.3	SDC5AG17	Commercial Vegetable Production	4	4	20	80	100
5.4	SDC5AG18	Agricultural Enterprises	4	4	20	80	100
5.5	SDC5AG19	Fundamentals of Organic Farming	4	4	20	80	100
5.6	SDC5AG20	Government Policies and Programmes Related to Agriculture	4	5	20	80	100
5.7	SDC5AG21	Commercial Vegetable Production, Agricultural Enterprises and Organic farming -Practicals	5	5	20	80	100
Total			30	30			700
Semester VI							
6.1	SDC6AG22	Major Internship/Main Project and Dissertation		30		700	700
Total				30		700	700
Total for General Courses				56	280	1120	1400
Total for Skill Development Courses				124	380	2220	2800
Grand Total				180	660	3340	4200

B. Voc Programme in Agriculture

Detailed Syllabus

SEMESTER I

Course No. 1.3

Course Code: GEC1ES03

Course Title: Fundamentals of Environmental Science

Credits: 4

Total Contact Hrs: 60 Hrs

Objectives:

- To enable the students to acquire knowledge on the importance of Environmental Science
- To equip the students as volunteers to guard the environment.

MODULE 1 (15 Hours)

1. Methodology and perspective of science. Types of knowledge, practical, theoretical and scientific knowledge. What is science, what is not science – Hypothesis – Theories and laws of science, observations, evidences and proofs.

2. Definition, Scope and Importance of Environmental Science: Multidisciplinary nature of the environmental Science; Scope and importance; Need of Environmental awareness Interrelationship of ecology with other disciplines. Introduction to global environmental problems.

3. Components of the environment:

a. The atmosphere or the air: Layers of Atmosphere , Composition of air; importance of atmosphere, meteorological conditions and air circulation.

b. The hydrosphere or water: Importance of water, distribution of fresh water at global, national and state level. Hydrological Cycle.

c. Lithosphere or the rock and the soil: Elementary composition of rocks in the earth crust. Types of rocks; Process of soil formation: Physical weathering, Chemical weathering of rocks; Role of soil in shaping the biosphere

MODULE 2 (15 Hours)

1. Environmental Factors:

a. Climatic Factors-Light, Temperature of Air (atmospheric temperature), Rainfall (precipitation), Humidity of air, atmosphere (gases and wind), fire.

b. Topographic Factors: height of mountains, direction of mountains and valleys, steepness of slope and exposure of slope

c. Edaphic factors: Soil-formation, soil profile, soil erosion, soil conservation

d. Biotic factors: Intraspecific interactions; Interspecific interactions: Neutralism, Commensalism, Mutualism, Parasitism, and Predation.

e. Ecological adaptations of plants (Hydrophytes, mesophytes, xerophytes, and halophytes) and animals (aquatic conditions-hydrocoles; amphibious conditions or sec. hydrocoles), terrestrial (mesocoles and xerocoles)

MODULE 3 (15 Hours)

Ecosystem: Definition; Components of ecosystem; Abiotic components: Light, Temperature, Pressure, Water, Wind, Soil; Biotic components: Energy flow in an ecosystem: Primary production, Secondary production; Food chain: Grazing food chain, Detritus food chain; Ecological pyramids: Pyramid of number, Pyramid of biomass, Pyramid of energy; Food web; Ecological indicators. Biogeochemical cycles: a) Gaseous cycles: Oxygen cycle, Carbon cycle and Nitrogen cycle. b) Sedimentary cycles: Phosphorus cycle, Sulfur cycle.

MODULE 4 (15 Hours)

Population Ecology and Community Ecology: Population characteristics- Population growth and its dynamics; natality, mortality, growth patterns; Age distribution, Malthusian theory; Community structure, succession and climax, Species diversity, ecological dominance, ecotone, niche, guild, edge effect, ecological equivalent, succession and climax

Major Ecosystems: Terrestrial Ecosystem-Forest, grass land, arid, crop land

Wet land-Ponds, lakes, rivers, oceans, estuaries

Major terrestrial Biomes-Tropical Savannah, Tropical rain forest and deserts

References

Ecology and Environment ,2008-2009.P. D. sharma (Rastogi Publications, Meerut)

A text book of Environmental Studies.,2006.D.K.Asthana, Meera Asthana (S.Chand&Co.)

Essential Environmental Studies,2009.S.P.Misra,S.N.Pandey,(Ane Books Pvt.Ltd,Chennai)

Environmental Education – A Conceptual Analysis. P.Kelu,University of Calicut publication

Text Book of Environmental Studies, Erach Bharucha, 2005.Orient Longman Pvt.

Ltd., Ernakulam

Course No. 1.4

Course Code: SDC1AG01

Course Title: Fundamentals of Agronomy

Credits: 4

Total Contact Hrs: 60 Hrs

Objectives:

- To enable the students to acquire knowledge on importance of agriculture and various types of farming.
- To study the fundamentals of agronomy and classification of field crops

MODULE 1

12 Hrs

Importance of agriculture in India and Kerala, Hunger and food security, Agronomy, Sustainable agriculture, Subsistence agriculture, commercial agriculture, Extensive and intensive agriculture,

Peasant farming, Urban agriculture, Agribusiness, Agricultural seasons in India and Kerala, Rainfed and irrigated agriculture.

MODULE 2

12Hrs

Agricultural classification of crops, Agronomic classification of crops, Botanical classification of crops, Major farming systems in Kerala and Cropping Intensity, Methods of sowing/planting - planting geometry and its effect on growth and yield.

MODULE 3

12Hrs

Soil and climatic requirements, varieties, cultural practices, special systems of cultivation, harvesting and processing of major cereals and millets, pulses, tubercrops, rice, maize, finger millet, cowpea, tapioca, sweetpotato, amorphophallus, yams, coleus, arrowroot etc

MODULE 4

12Hrs

Soil productivity and fertility. - Crop nutrition - nutrients -classification - Nutrient sources- organic manures -fertilizers - biofertilizers .Nutrient recycling through manures and fertilizers - organic manures. Fertilizers and fertilizer use- management of fertilizers .Biological nitrogen fixation, Green manure crops and cover crops .Integrated Nutrient Management.

MODULE 5

12Hrs

Irrigation: definition and objectives. Role of water in soil and plants- Irrigated agriculture vs. Rainfed agriculture, dry farming and dryland farming-definition. Water resources and in India and Kerala. Irrigation methods - drip and sprinkle irrigation systems. Water management of different crops like rice, banana, coconut, cowpea, and vegetables.

Text Books:

1. Balasubramaniyan, P and Palaniappan, S.P. 2001. *Principles and Practices of Agronomy* AgroBios(India)Ltd., Jodhpur.
2. Cox, G.W and Atkins, M.D. 1979. *Agricultural Ecology : An Analysis of World Food Production Systems*. W.H. Freeman and Company, San Francisco
3. De, G.C.1989.*Fundamentals of Agronomy*. Oxford & IBH Publishing Co., New Delhi.
4. Grigg, D.B. 1974. *The Agricultural Systems of the World: An Evolutionary Approach*. Cambridge University Press, Cambridge.
5. Harlan, J.R. 1992. *Crops and Man*. American Society of Agronomy & Crop Science Society of America, Madison, WI.
6. Havlin, J. L., Beaton, J. D., Tisdale, S.L., and Nelsohn, W.L. 2006. *Soil Fertility and Fertilizers: An Introduction to Nutrient Management* (7 ed.). Pearson Education, Delhi.
7. ICAR.2006. *Hand book of Agriculture*, ICAR, New Delhi.
8. Janick, J., Schery, R.W., Woods, F.W., and Ruttan, V.W. 1974. *Plant Science: An Introduction to World Crops*. W.H. Freeman and Company, San Francisco.
9. Noor Mohammed.1992. Origin, diffusion and development of agriculture. In: Noor Mohammed (ed.), *New Dimensions in agricultural geography: Vol.1.Historical Dimensions of agriculture*. Concept publishing Co., New Delhi.pp29-75.
10. Reddy.T.Y and Reddy, G.H.S.1995.*Principles of Agronomy*, Kalyani Publishers, Ludhiana.

11. Chatterjee, B.N. and Maiti, S.1985.*Principles and Practices of Rice Growing*. Oxford & IBH Publishing Co., New Delhi.

Course No. 1.5

Course Code: SDC1AG02

Course Title: Fundamentals of Horticulture

Credits: 4

Total Contact Hrs: 60Hrs

Objectives

- To acquaint with importance, division and classification of horticultural crops.
- To understand the basic principles and types of plant propagation.

MODULE 1

12 Hrs

Horticulture - definition, importance, division and classification of horticultural crops. Importance of horticulture in India and Kerala. Orchard planning, layout, planting systems - management practices. Tree forms and functions - Training and pruning in horticultural crops - principles and methods, techniques of training and pruning, fruit thinning.

MODULE 2

12Hrs

Phases of growth and development - vegetative/ reproductive balance; Flowering in plants - bearing habit and its classification- factors associated with flowering and fruit set. Fruit set and development - structure and process concerned with setting. Fruit drop - factors affecting and control measures - unfruitfulness - internal and external factors. Seedlessness in horticultural crops; significance and induction.

MODULE 3

12 Hrs

Plant propagation - definition and basic concepts, sexual and asexual types - advantages and disadvantages. Media, containers, potting, re potting and pre planting treatments. Asexual propagation - propagation by cuttings, types of cuttings, factors affecting rooting of cuttings. Propagation by layering - types of layering.

MODULE 4

12 Hrs

Propagation by grafting - methods of grafting - development of graft unions, separation and after care. Stock-scion relationship - Graft incompatibility - factors affecting incompatibility. Propagation by budding, methods of budding - A comparative study between grafting and budding.

MODULE 5

12 Hrs

Nursery - site selection, layout - components of a nursery - production unit, sales unit, display area, management and maintenance, propagation unit - close planted progeny orchards. Plant propagating structures- greenhouse, glasshouse, hot bed, cold frame, lath house, net house, mist chamber.

Text books:

1. Bose, TK., Mitra, SK. and Sadhu, K. 1986. *Propagation of tropical and subtropical horticultural crops*. NayaProkash, Calcutta.
2. Denixon, RI. 1979. *Principles of Horticulture*. Mac Millan, New York.
3. Edmond, JB., Sen, TD, Andrews, TS and Halfacre, RG. 1977. *Fundamentals of Horticulture*. Tata McGraw Hill, New Delhi.
4. Hartmann, HT. and Kester, DE. 1986. *Plant propagation - Principles and practices*. Prentice-Hall, New Delhi.
5. Leopold, A.C. and Kriedeman, P.E. 1975. *Plant Growth and Development*. Tata McGrawHill Publishing Co. Ltd., New Delhi.
6. Chadha, K. L. 2003. *Handbook of Horticulture*, ICAR, New Delhi. Choudhury, B. 1983. *Vegetables*. National Book Trust, New Delhi.
7. Das, P. C. 1993. *Vegetable crops in India*. Kalyani Publishers
8. Gopalakrishnan, T. R. 2007. *Vegetable Crops*. New India Publishing Agency, New Delhi.
9. Hazra, P. and Som, M. G. 1999. *Technology for vegetable Production and Improvement*. NayaProkash, Calcutta

Course No. 1.6

Course Code: SDC1AG03

Course Title: Fundamentals of Agricultural Engineering

Credits: 4

Total Contact Hrs: 60 Hrs

Objectives

- To familiarize with fundamentals of water management.
- To acquaint with various soil conservation methods.

MODULE 1

12 Hrs

Irrigation: definition and objectives. Role of water in soil and plants- Irrigated agriculture vs. Rainfed agriculture, dry farming and dryland farming-definition.

MODULE 2

12 Hrs

Methods of determining water requirement-effective rainfall. Methods of irrigation and their engineering aspects - surface irrigation, sprinkler, drip - Agronomic techniques to improve water use efficiency- factors affecting water use efficiency.

MODULE 3

12 Hrs

Soil erosion- nature and extent of erosion; types- soil erosion by water- different forms- Soil conservation vs. water conservation - agronomic measures- mechanical measures- Role of grasses and pastures in soil conservations; Wind breaks and shelter belts.

MODULE 4

12 Hrs

Water harvesting techniques - in situ and ex situ water harvesting methods - Farm ponds, percolation ponds or wells, check basin, minor irrigation tanks.

MODULE 5

12 Hrs

Surveying: survey equipment, chain survey, cross staff survey, plotting procedure, calculations of area of regular and irregular fields.

Text books:

1. Dhruvanarayana, V.V. 1993.*Soil and Water Conservation Research in India*. ICAR, New Delhi.
 2. Gurmel Singh, C. Venkataraman, G., Sastry, B. and Joshi, P. 1990.*Manual of Soil and Water Conservation Practices*. Oxford and IBH Publishing Co., New Delhi.
 3. Hansen, V.Eh., Israelsen, O.W., and Stringham, G.E. 1979. *Irrigation Principles and Practices* (4th Ed.). John Wiley and Sons, New York.
 4. Lenka, D. 2001.*Irrigation and Drainage*. Kalyani Publishers, New-Delhi.
 5. Mal, B. C. 2002.*Introduction to Soil and Water Conservation Engineering*, Kalyani Publishers, New-Delhi.
 6. Michael, A.M and Ojha, T.P. 2005.*Principles of Agricultural Engineering-Vol.II*. Jain Brothers, New Delhi.
 7. Michael, A.M. 1988.*Irrigation Theory and Practice*. Vikas Publishing House Pvt. Ltd., New Delhi.
-

Course No. 1.7

Course Code: SDC1AG04

Course Title: Fundamentals of Agronomy and Horticulture – Practicals

Credits: 6

Total Contact Hrs: 90 Hrs

Objectives

- To develop skill in propagation and cultivation aspects of horticultural crops.
- To familiarize with cultivation aspects of cereals and millets, pulses and tuber crops.

Contents

1. Identification of cereals and millets, pulses, and tuber crops.
 2. Different methods of sowing; direct seeding: broadcasting, dibbling and drilling-transplantation.
 3. Seed treatment - Rhizobium inoculation of leguminous crops.
 4. Identification of manures -organic manures: bulky and concentrated manures
Fertilizers: Straight, complex and mixed fertilizers - identification and preparation.
 5. Fertilizer recommendation and calculation for major cereals and pulses.
 6. Familiarization with green manure crops and cover crops.
 7. Familiarization to Different planting systems and layout
 8. Propagation methods - sexual propagation -seed viability tests, dormancy breaking methods.
 9. Propagation structures - mist chamber, green house, hot beds etc.
 10. Propagation by cuttings.
 11. Propagation by layering - types of layering.
 12. Propagation by grafting - methods of grafting
-

SEMESTER II

Course No. 2.3

Course Code: GEC2HR06

Course Title: Human Resource Management

Credits: 4

Total Contact Hrs: 60 Hrs

Objectives

- To acquaint with the principles and practices of human resource management.

Module 1

Introduction to Human Resource Management—Importance--scope and objectives of HRM. Evolution of the concept of HRM- Approaches to HRM- Personal management Vs Human Resource Management-HRM and competitive advantage- Traditional Vs Strategic human resource management.

(15 Hours)

Module 2

Human resource planning, Recruitment and selection—Job analysis---process of job analysis- job discretion- job specification-- methods of job analysis-- Conventional Vs strategic planning—job evaluation—Recruitment--source of recruitment-methods.

(20 Hours)

Module 3

Placement, Induction and Internal mobility of human resource. Training of employees—need for training-objectives- approaches --methods-training environment- areas of training- Training evaluation.

(15 Hours)

Module 4

Performance appraisal and career planning. Need and importance- objectives process- methods and problems of performance appraisal- . Concept of career planning –features- methods –uses career development.

(15 Hours)

Module 5

Compensation management and grievance redressal. Compensation planning objectives- Wage systems- factors influencing wage system-.Grievance redressal procedure-discipline- approachespunishment-essentials of a good discipline system.Labour participation in management.

(15 Hours)

References:

- Human Resource Management- Text and Cases-- VSP Rao
- Human Resource Management – PravinDurai 2. Human Resource Management—Snell, Bohlander
- Personal Management and Human Resources—VenkataRatnam .Srivasthava
- A Hand Book of Personnel Management Practice—Dale Yolder

Course No. 2.4
Course Code: SDC2AG05
Course Title: Plantation Crops, Spices and Fruits
Credits: 4
Total Contact Hrs: 60 Hrs

Objectives

- To acquaint with the cultivation aspects of Plantation crops, spices and fruit crops.

Module1**15 Hrs**

Plantation crops, Introduction - importance - area, production - origin, distribution - botany, varieties - climate, soil, site selection - propagation, production of quality planting materials and hybrids - nursery management - layout, planting, aftercare - irrigation, manuring - stage of harvest, harvesting, yield and uses of :-coconut and Rubber.

Module2**12 Hrs**

Plantation crops, Importance - area, production - origin, distribution - botany, varieties - climate, soil, site selection - propagation, production of quality planting materials and hybrids. Nursery management - layout, planting, aftercare - irrigation, manuring - stage of harvest, harvesting, yield and uses of cashew, tea and coffee.

Module 3**12 Hrs**

Spices, Definition - classification - importance to the state. Origin - distribution - area, production .varieties - climate, soil - propagation, nursery management - site selection, layout, planting - crop management including manuring, irrigation, shade regulation, harvesting, yield of the following crops: Pepper, cardamom, ginger, and nutmeg.

Module 4**15Hrs**

Fruits, Importance and scope of commercial fruit production - Global scenario of fruit production and export - Present status of fruit production in the state and in the country - problems and prospects.Crop management practices - selection and preparation of planting materials, field preparation and planting, manuring, irrigation, weed management, use of bio-regulators, other cultural operations. Cultural practices for quality improvement. Maturity indices, harvesting, grading, packing, storage and ripening techniques. Industrial and export potential- of Crops- Banana, mango,and pineapple.

Module 5**6 Hrs**

Fruits, Management practices of crops gaining importance in the state recently (mangosteen, rambutan, durian).

Text books:

1. Chadha, K.L.2001. Hand Book of Horticulture,ICAR, New Delhi.
 2. Kumar.N, Abdul Khader.J.B.M.Rangaswami.P. and Irulappan., 1993. Introduction to spices
 3. Menon.K.P.V. and Pandalai.K.M. 1960. The coconut Palm - a monograph. Indian Central Coconut Committee, Ernakulam.
 4. Purselove. J.W., Brown, E.G.Green, C.L. and Robbins, S.R.G.1981.SpicesVol-I & II.
 5. Pruthi.J.S. 1993.Major Spices of India, Crop Management - Post Harvest Technology, ICAR, New Delhi.
 6. Pruthi, J.S.2001 Minor Spices and Condiments-Crop Management and Post HarvestTechnology, ICAR, New Delhi, India.
 7. Amar Singh, 1986. Fruit Physiology and Production.Kalyani Publishers, New Delhi.
 8. Bose, T.K, Mitra,S.K. and Sanyal, D. 2002. Fruits: Tropical and Subtropical. Vol. I & II, Nayaprakash publications, Calcutta.
 9. Hayes,W.B. 1957. Fruit Growing in India.Kitabitan, Allahabad.
 10. Kumar, N. 1997 (6th Edition).Introduction to Horticulture.Rajhalakshmi Publications, Nagercoil
 11. Mitra,S.K, Bose,T.K and Rathore, D.S. 1991. Temperate Fruits. Horticulture and Allied Publishers , Calcutta.
 12. Naik,K.C. 1949. South Indian Fruits and Their Culture.Varadachari Co., Madras.
 13. Samson, J.A. 1980. Tropical Fruits.Longman group, London.
-

Course No. 2.5**Course Code: SDC2AG06****Course Title: Fundamentals of Seed Technology****Credits: 4****Total Contact Hrs: 60 Hrs**

Objectives

- To familiarize with the fundamentals of plant breeding.
- To familiarize with the basics of seed technology.

Module1: Morphology and systematics of crop plants**20 Hrs**

General features of important families - morphology of roots, stem, leaves, flowers, fruits and seeds.Introduction to field crops - Classification of field crops. Botany and economic importance of crops like Rice, Ragi, cowpea, Bitter Gourd, Cucumber, Brinjal, Chilli, Tomato, Soyabean,coconut,Groundnut, Gingelly, Tapioca, Cotton, Sweet potato, Rubber, Mango, Cashew, Pepper, Papaya and Banana.

Module 2: Principles of Seed Technology**20 Hrs**

Introduction to Seed Production, Importance of Seed Production,The concept of a seed-definition-structure of a seed-seed development process, Definition, Characters of good quality seed,Factors

affecting seed quality - ecological influences , packing practices, harvest and post harvest handling, Genetic and agronomic principles of seed production, Seed testing procedures for quality assessment- Physical, Purity, germination and viability test, Principles of establishing a seed testing laboratory, Post harvest seed management techniques seed extraction-seed processing- drying-cleaning-upgrading-seed blending, Dormancy of seed, role of growth regulators in restoring seed viability, physical agents for increased seed germination, seed vigour etc. Seed treatment, Importance of seed treatment, types of seed treatment, equipment used for seed treatment, Seed packing and seed storage, factors affecting seed longevity during storage and conditions required for good storage, General principles of seed storage, measures for pest and disease control, temperature control, Seed production of major crops - field crops , plantation crops , fruit plants ,spices, ornamental plants , medicinal plants, Different classes of seeds- Production of nucleus, breeder's seed, foundation and certified seed production, Seed certification, procedure for seed certification, field inspection and field counts etc.,

Module 3: Legislation of Seed Technology

20 Hrs

Seed Legislation - Seed Act and Seed Act enforcement, Central Seed Committee, Central Seed Certification Board, State Seed Certification Agency, Central and State Seed Testing Laboratories; Seed Act 2000 and other issues related to seed quality regulation, Organizations involved in seed production i.e., public, quasi, co operative, private etc. Planning seed production programme- seed farm organization-procurement and pricing policy-economics of seed production of different crops; government policy in seed production and study of export potential of seeds.

Text books:

1. Albert F-Hill and O.P. Sharma, 1996. Economic Botany. Tata McGraw - Hill Publishing Company Ltd., New Delhi
2. Chalam, G.V., J. Venkateswarlu. 1966. Agricultural Botany in India-Vol. 1. Asia publishing house, Bombay, New Delhi
3. Daniel Sundararaj, D and G. Thulasidas, 1993. Botany of field crops. Macmillan India Ltd., New Delhi
4. Allard, R.W. 1960. Principles of Plant Breeding. John Wiley & Sons INC. USA. Toppan Co. Ltd. Japan
5. 4. Choudhari, T.C. 1982. Introduction to Plant Breeding. Oxford A& IBH Publishing Co., New Delhi
6. 5. Elliot. 1958. Plant Breeding & Cytogenetics. Mc Grow Hill. New York
7. Sharma, J.R. 1989. Principles and Practice of Plant Breeding. Tata McGraw - Hill Publishing Company Limited, New Delhi.
8. Singh, B.D. 2001. Fundamentals of Genetics. Kalyani Publishers. New Delhi. Ludhiana
9. Singh, B.D. 2003. Plant Breeding Principles and Methods. Kalyani Publishers. New Delhi/ Ludhiana.
10. Agrawal, R.L. 1995. *Seed Technology*. Oxford, IBH Publishing Co., New Delhi.
11. Bose, T. K. and Som, M. G. 1990. Vegetable crops in India. Naya Prokash, Calcutta.
12. Das, P. C. 1993. Vegetable crops in India. Kalyani Publishers
13. Dahiya, B.S and Rai, K.N., 1997. *Seed Technology*, Kalyani Publishers.

Course No. 2.6
Course Code: SDC2AG07
Course Title: Plantation Crops, Spices and Fruits and Seed Technology- Practicals
Credits: 5
Total Contact Hrs: 60 Hrs

Objectives

- To acquire skill on cultivation aspects of Plantation crops, spices and fruit crops
- To familiarize with the botanical aspects of field crops.
- To develop skill in various aspects of seed production

Plantation Crops

1. Coconut: Nursery techniques, Seedling selection, Production of quality planting materials and hybrids and mother palm selection,
2. Familiarization with varieties, Moisture conservation methods in coconut plantations.
3. Layout and planting, care and management of plantations.
4. Tapping systems in rubber.
5. Training and pruning in tea, coffee.

Spices

1. Morphology, nursery techniques, planting in main field, cultural operations and harvesting of pepper, cardamom, ginger, nutmeg

Fruits (Banana, Pineapple and Mango.)

1. Familiarization with important varieties. Practice in propagation, selection of good planting materials, field preparation and planting, manuring and use of growth regulators. Familiarization with weedicides, and plant protection chemicals. Studies on major pests, diseases and nutritional disorders. Studies on maturity indices and storage.

Seed technology

1. Introduction to field crops and agricultural classification of field crops.
 2. Observing general morphology of roots, stem, leaves, inflorescence, flowers
 3. Family characters and Botany and economic parts of the crop plants
 4. Microscopy
 5. Preparation and use of fixatives and stains for light microscopy
 6. Preparation of micro slides
 7. Identification of seeds of summer vegetables and cool season vegetables
 8. Seed sampling principles and procedures
 9. Physical purity analysis of seeds
 10. Seed Testing: Germination analysis and viability analysis of seeds
 11. Seed dormancy and breaking methods
 12. Techniques of hybrid seed production in tropical vegetables
 13. Seed extraction techniques
 14. Seed treatment against systemic diseases
 15. Seed production in rice, Hybrid seed production in rice, coconut
-

Course No. 2.7
Course Code: SDC2AG08
Course Title: Internship/Project (Cultivation of Crops)
Credits: 5

Objectives

- To develop skill and to get experience in the cultivation practices of various crops

Work planned:

Familiarisation with seedling/sucker selection, land preparation, pit making and planting, Nutrient management, irrigation and other intercultural operations, pest and disease management aspects by allotting each student with different crops.

SEMESTER III

Course No. 3.2
Course Code: GEC3NS08
Course Title: BASIC NUMERICAL SKILLS
Credits: 4
Total Contact Hours: 60

Objectives:

- To enable the students to acquire knowledge of Mathematics and Statistics.
- At the end of this course, the students should have understood set operations, matrix and Mathematics of finance, Statistical tools and their applications.

Module 1

Sets and Set Operation - Venn Diagrams - Elements of Co-ordinate system - Matrices - Fundamental ideas about matrices and their operational rules - Matrix multiplication - Inversion of square matrices of not more than 3rd order - Solving system of simultaneous linear equations.

(10 Hours)

Module 2

Theory of Equations : Meaning - types of equations - Simple linear and Simultaneous equations (only two variables) eliminations and substitution method only - Quadratic equation factorization and formula method ($ax^2 + bx + c = 0$ form only) - Problems on business applications.

(10 Hours)

Module 3

Progressions : Arithmetic Progressions - Finding the 'n'th term of an AP and also sum to 'n' terms of an AP - Insertion of Arithmetic means in given terms of AP and representation of AP - Geometric Progression : Finding 'n'th term of GP - Insertion of GMs in given GP and also

representation of GP - Mathematics of Finance - Simple and compound interest (Simple problems only).

(10 Hours)

Module 4

Meaning and Definition of Statistics - Scope and limitations - Statistical enquiries -Scope of the problem - Methods to be employed - Types of enquiries - Presentation of data by Diagrammatic and Graphical Method - Formation of Frequency Distribution.

(15 Hours)

Module 5

Measures of Central Tendency - Arithmetic Mean - Median - Mode - Geometric and Harmonic Mean - Measures of variation and standard, mean and quartile deviations -Skewness and Kurtosis - Lorenz curve. Analysis of Time Series: Methods of measuring - Trend and Seasonal variations - Index number - Unweighted indices -Consumer price and cost of living indices.

(15 Hours)

(Theory and problems may be in the ratio of 20% and 80% respectively. An over view of the topics is expected and only simple problems shall be given)

References:

- Sundaresan and Jayaseelan - An Introduction to Business Mathematics and Statistical Methods.
 - Dr. A K Arte & R V Prabhakar - A Text Book of Business Mathematics.
 - Sanchethi and Kapoor- Business Mathematics.
 - Gupta S.P- Statistical Methods
 - Navaneethan P- Business Mathematics
 - R.S.N. Pillai, Mrs. Bhagavathi - Statistics
 - P.R. Vittal - Business Mathematics and Statistics.
-

Course No. 3.3

Course Code: GEC3TC09

Course Title: Plant Tissue Culture and Biotechnology

Credits: 4

Total Contact Hrs: 60 Hrs

Objectives:

- To build theoretical foundation in plant tissue culture and biotechnology.

Plant tissue culture

Module-1 (20 hours)

1. Plant tissue culture – Principles and techniques; Cellular totipotency; *invitro* differentiation – de differentiation and re-differentiation.
3. Tissue culture medium – Basic components in tissue culture medium – Solid and liquid medium; Murashige and Skoog medium – composition and preparation.

4. Aseptic techniques in *in vitro* culture – sterilization – different methods –sterilization of instruments and glassware, medium, explants; workingprinciple of laminar air flow and autoclave.
5. Preparation of explants – surface sterilization, inoculation, incubation, subculturing.
6. Micropropagation - Different methods – apical, axillary bud proliferation, direct and indirect organogenesis and somatic embryogenesis.
7. Different phases of micropropagation – multiple shoot induction, shoot elongation, *in vitro* and *in vivo* rooting hardening, transplantation and field evaluation; Advantages and disadvantages of micropropagation. Somaclonal variation.

Module – II (15 hours)

1. Methods and Applications of tissue culture:
 1. Shoot tip and meristem culture
 2. Somatic embryogenesis and synthetic seed production
 3. Embryo culture
 4. Protoplast isolation culture and regeneration – transformation and transgenics
 5. Somatic cell hybridization, cybridization.
 6. *In vitro* secondary metabolite production — cell immobilization, bioreactors
 7. *In vitro* production of haploids – anther and pollen culture
 8. *In vitro* preservation of germplasm

Biotechnology

Module –I (15 hours)

1. Recombinant DNA Technology: Gene cloning strategies – recombinant DNA construction – cloning vectors – plasmids- Ti plasmids, pBR322, bacteriophage based vectors. Restriction endonucleases and ligases- transformation and selection of transformants – using antibiotic resistance markers. Blotting techniques; PCR.
2. Different methods of gene transfer – chemically stimulated DNA uptake by protoplast, electroporation, microinjection, biolistics. Agrobacterium mediate gene transfer- gene library, gene banks.

Module –II (10 hours)

1. Application of Biotechnology in:
 - a. Medicine - Production of human insulin, human growth hormones.
 - b. Forensics - DNA finger printing.
 - c. Agriculture - Genetically modified crops – Bt crops, Golden rice, Flavr Savr tomato, herbicide resistant crops, edible vaccines.
 - d. Environment- Bioremediation- use of genetically engineered bacteria- super bugs.
 - e. Industry- Horticulture and Floriculture Industry, production of vitamins, amino acids and alcohol.
-

Course No. 3.4
Course Code: SDC3AG09
Course Title: Micropropagation of Plants- Practicals
Credits: 5
Total Contact Hrs: 75 Hrs

1. Requirements for Plant Tissue Culture Laboratory.
 2. Media components and preparations.
 3. Preparation and sterilization of media.
 4. Aseptic manipulation and inoculation of various explants.
 5. Callus induction, subculturing and plant regeneration.
 6. Micro propagation of important crops.
 7. Preparation of synthetic seeds.
 8. Demonstration of Anther culture.
 9. Demonstration of embryo culture.
 10. Hardening/ acclimatization of regenerated plants.
-

Course No. 3.5
Course Code: SDC3AG10
Course Title: Integrated Pest Management in Crops
Credits: 4
Total Contact Hrs: 60 Hrs

Objective:

- To develop knowledge on the theoretical basis of integrated pest management.

Module 1

12 Hrs

IPM- introduction, importance, concepts, principles. Tools of IPM- Host plant resistance, definition, mechanisms of resistance, compatibility with other pest management practices - merits and demerits.

Module 2

12 Hrs

IPM Methods- Cultural methods, Mechanical methods, Physical and Legislative methods, Biological methods- definition, methods, advantages, limitations. Natural enemies- parasites, predators and microorganisms used in pest control.

Module 3

12 Hrs

Important groups of micro organisms-bacteria, viruses and fungi used in insect pest control.

Mass multiplication techniques of important biocontrol agents.

Module 4

12 Hrs

Chemical control - importance, hazards and limitations. Classification of insecticides based on chemical nature- insecticides of plant origin (botanical insecticides) and Synthetic insecticides. Preparation of neem oil garlic emulsion and tobacco decoction. Formulations of insecticides and

calculation of quantity of formulations for field application. Synthetic insecticides - organophosphates, carbamates, synthetic pyrethroids. Plant protection equipments - Classification- and working principles- parts of sprayers, dusters and uses.

Module 5

12 Hrs

Distribution, host-range, symptoms of damage and management practices for major pests of the following crops-Rice, Coconut, Banana, Cashew, Pepper, cardamom, Brinjal, Bittergourd and cowpea.

Text books:

1. Mani, M. S. 1968. General Entomology. Oxford and IBH Publishing Company, New Delhi.
 2. Nayar, K. K., Ananthakrishnan T. N. and David.B.V. 1976. General and Applied Entomology, Tata McGraw Hill Publishing Company Limited, New Delhi.
 3. Pedigo, L. P. 1999. Entomology and Pest Management. Third Edition. Prentice Hall, New Jersey, USA.
 4. Richards, O.W. and Davies, R. G. 1977.Imm's General Text Book of Entomology, Vol.1&2, Chapman and Hall Publication, London..
 5. Srivastava, P. D. and Singh, R. P. 1997.An Introduction to Entomology, Concept Publishing Company, New Delhi.
 6. Dhaliwal, G. S. and Ramesh Arora. 1998. Principles of Insect Pest Management .Kalyani Publishers, New Delhi.
-

Course No. 3.6

Course Code: SDC3AG11

Course Title: Protected Cultivation of Horticultural Crops

Credits: 4

Total Contact Hrs: 60 Hrs

Objectives

- To familiarize with protected cultivation structures and cultivation practices

Module1

12 Hrs

Introduction - scope and importance - problems and prospects of protected culture in India - growing structures - green house - polyhouse - net house - basic considerations in establishment and operation of greenhouses - maintenance .

Module 2

12 Hrs

Advantages of growing plants in a greenhouse - functioning and maintenance. Manipulation of environmental factors - environmental control systems in green house. Maintenance of cooling and heating system in green houses.

Module 3

12Hrs

Type of containers used in protected culture. Substrate -Use of substrate and preparation of substrate for protected cultivation, soil decontamination. Water management- nutrient management (fertigation).

Module 4

12 Hrs

Crop regulation - special horticultural practices in protected cultivation for commercially important crops: vegetable crops, flowering plants, seedlings, etc

Module 5

12Hrs

Harvesting methods - postharvest handling - standards - grading - packing and marketing.

Suggested Readings:

1. Foja Singh., 1997. Advances in Floriculture. Media Today Pvt. Ltd., New Delhi-17.
 2. Prasad, S. and U.Kumar. 1998. Commercial floriculture. Agro Botanica. Bikaner - 334 004.
 3. Roy. A. Larson., 1992. Introduction of Floriculture. International Book Distributing Co., Lucknow.
 4. Vishnu Swarup., 1997. Ornamental Horticulture. Macmillan India Ltd., New Delhi-2. Wltez, S., 1972. The world gladiolus, NAGG, USA.
 5. Yadav, L.P. and Bose, T.K., 1986. Biology, conservation and culture of orchids. East-West Press Private Limited, New Delhi.E.
 6. Yadav.I.S. and M.L. Choudhary., 1997. Progressive floriculture. The House of Sarpan, (Media), Bangalore.
-

Course No. 3.7

Course Code: SDC3AG12

**Course Title: Protected Cultivation of Horticulture crops and Pest Management-
Practicals**

Credits: 5

Total Contact Hrs: 75 Hrs

Objectives

- To practice with protected cultivation practices of important crops
- Familiarization with cultural methods of pest control.

Contents

Protected cultivation in general:

1. Study of structures utilized for protected culture.
2. Cost estimation of different growing structures
3. Design and orientation of poly/green houses.
4. Study of various inputs used for protected culture
5. Type of containers used in protected culture.
6. Use of substrate and preparation of substrate for protected cultivation
7. Fertigation system in green houses
8. Maintenance of cooling and heating system in green houses.
9. Special horticultural practices in protected cultivation

Protected cultivation aspects of individual crops:

1. Protected cultivation of cowpea,
2. Protected cultivation of capsicum
3. Protected cultivation of cucumber
4. Protected cultivation of tomato
5. Protected cultivation of orchids and anthurium.
6. Protected cultivation of rose.

Pest management

1. Familiarization with Mechanical methods of pest control.
2. Identification of predators.
3. Identification of microbial agents.
4. Familiarization with different formulations of insecticides.
5. Preparation of neem oil garlic emulsion and tobacco decoction.
6. Familiarization with different insecticides.
7. Calculation of doses/concentrations of insecticides.
8. Preparation of spray fluid for field application.
9. Familiarization with Plant protection equipments.
10. Identification, symptoms of damage, collection and preservation of pests of:
 - a) Rice, Coconut.
 - b) Banana, Cashew.
 - c) Pepper, cardamom.
 - f) Brinjal, Bittergourd and cowpea.

SEMESTER IV

Course No. 4.2

Course Code: GEC4IT11

Course Title: Information Technology Credits: 4

Total Contact Hrs: 60 Hrs

Objectives

- To understand the general principles and techniques of information technology
- To acquaint with the applications of IT in Agriculture

Module I (10 Hours)

Introduction to IT: meaning and nature-importance-applications in business and management office automation – objectives – office automation technologies –office equipments- virtual office-office communication methods: tele, audio and video conferencing and tele-presence system.

Module II (10 Hours)

Microsoft Office – components- Word processing - characteristics of word processing – MS Word for word processing – creating, formatting and printing documents in MS Word – inserting objects

from other MS applications – mail merge- Microsoft PowerPoint – creating presentations in PowerPoint- applying templates – recording narration – presenting animation – inserting hyperlink – inserting slide number, date and time – inserting picture into slide – slide transition – running slide show.

Module III (10 Hours)

Spreadsheet-features-advantages-packages-Ms Excel: creating, formatting and printing worksheets-functions in Excel- mathematical: SUM, PRODUCT, SQRT, ROMAN and ROUND statistical: AVERAGE, MEDIAN, MODE, STDEV, CORREL and FORECAST, Financial: DB, SLN, SYD, PMT, NPER, and IPMT- Database: DMAX, DMIN, DAVERAGE, DCOUNT and DSUM- goal seek-scenario management.

Module IV (10 Hours)

Database system– characteristics of database system- DBMS- components – relational database system - Database administrator – functions of database administrator – database security - Microsoft Access – creation of database in MS Access – designing and running tables and queries in Access, types of queries- , Creating forms – report generation in MS Access – creating report in design view - creating report using Wizard –formatting and printing of report.

Module V (10 Hours)

The Internet – Internet protocol suite – domain name system – Internet and its possibilities for business communication – Internet tools –email, FTP, WWW, bulletin boards, telnet- portals – search engines – website– intranet and extranet- Electronic Data Interchange- objectives and advantages of EDI- EDI formats- business applications of EDI.

Module VI (10 hours)

Practical sessions to demonstrate the use of MS Office applications such as Word, Excel, Access and PowerPoint and getting familiarized with web browsing and email communications.

Books:

1. Management Information Systems, Kenneth C. Laudon and Jane P. Laudon, Pearson Education, New Delhi, 2002.
2. Using Microsoft Office, Ed Bott and Woody Leonhard, Prentice Hall of India, New Delhi 1999.
3. Fundamental of Database Systems, Elmasri and Navathe, Addison Wesley, New Delhi.

Course No. 4.3

Course Code: GEC4SA12

Course Title: Soil and Agricultural Microbiology

Credits: 4

Total Contact Hrs: 60 Hrs

Module 1

4 hrs

Introduction to soil Microbiology – Properties of soil (structure, texture, formation). Types

and significance of soil microbes – Factors affecting microbial population - Soil fertility test.

Module 2

6 hrs

Biogeochemical cycle –Role of microorganisms in Carbon, Phosphorous, Nitrogen and sulfur cycles.

Module 3

10 hrs

Biological Interactions Microbe–Microbe Interactions. Mutualism, Synergism, Commensalism, Competition, Amensalism, Parasitism, Predation. Microbe–Plant Interactions. Roots- Rhizosphere and Mycorrhizae, Aerial Plant surfaces, Microbe–Animal Interactions. Role of Microbes in Ruminants, Nematophagous fungi, Luminescent bacteria as Symbiont

Module 4

12 hrs

Plant pathology (symptoms, disease cycle and control measures) – Bacterial diseases - Angular leaf spot of cotton, bacterial leaf blight of rice, crown galls, bacterial cankers of citrus Fungal disease- Wilt of tomato - Fusarium oxysporum Red rot of sugarcane - Colletotrichum falcatum, Early blight of potato - Alternaria solani Wilt of cotton , Viral diseases- Papaya ring spot, tomato yellow leaf curl, banana bunchy top

Module 5

13 hrs

Applications of microbes in agriculture : Biofertilizers. Symbiotic nitrogen fixation – (Rhizobium, Frankia) –Symbiotic nutrient mobilizers – Endomycorrhizae and Ectomycorrhizae. Non symbiotic microbes – Azotobacte . Associative Symbiosis – Azospirillum. Cyanobacteria (Nostoc. Gloeocapsa), Azolla-Anabaena System Bio pesticides- bacterial, fungal and viral, Advantages over the chemical counter parts.

Suggested Readings.

1. Microbial Ecology. John Wiley & Sons, Inc., New York 2.
2. Introduction to Soil Microbiology by Alexander, M.(1977). John Wiley & Sons, Inc.,
3. Agricultural microbiology, 2nd edition. Rangaswami G., Bagyaraj D. J. Prentice hall of India.
4. Ronald M. Atlas., Richard Bartha. Microbial Ecology. Benjamin Cummings. 1998
5. Robert, L Tate (1995). Soil Microbiology. First edition, John Wiley and Sons, Inc. New York edition. Pearson Education.
6. Rangaswami G and Mahadevan A (2002). Disease of Crop Plants in India. Fourth edition, PHI Learning (P) Ltd., New Delhi.
7. Subba Rao NS (2004). Soil Microbiology. Fourth edition, Oxford and IBH Publishing Co.Pvt. Ltd., New Delhi.
8. Mishra RR (2004). Soil Microbiology. First edition, CBS Publishers and distributors, New

Delhi.

9. Devlin RM. (1975). Plant Physiology. 3rd edition, Willard Grant Press.

10. Stolp H. (1988). Microbial Ecology: Organisms Habitats Activities. Cambridge University Press, Cambridge, England.

11. Agrios GN. (2006). Plant Pathology. 5th edition. Academic press, San Diego,

12. Lucas JA. (1998). Plant Pathology and Plant Pathogens. 3rd edition. Blackwell Science, Oxford.

13. Mehrotra RS. (1994). Plant Pathology. Tata McGraw-Hill Limited.

14. Rangaswami G. (2005). Diseases of Crop Plants in India. 4th edition. Prentice Hall of India Pvt. Ltd., New Delhi.

15. Singh RS. (1998). Plant Diseases Management. 7th edition. Oxford & IBH, New Delhi.

Course No. 4.4

Course Code: SDC4AG13

Course Title: Weed Management and Fodder Crop Production

Credits: 4

Total Contact Hrs: 60 Hrs

- To understand the general characters of weeds and their management
- To acquaint with cultivation of rice, fibre crops, fodder crops, etc.

MODULE 1

15 Hrs

Weeds: Introduction, harmful and beneficial effects, classification, propagation and dissemination. Concepts of weed prevention, control and eradication; Methods of weed control: physical, cultural, chemical and biological methods. Integrated weed management (IWM); Herbicides: advantages and limitation of herbicide usage in India, Herbicide classification, formulations, methods of application. Compatibility of herbicides with other agro chemicals; Weed management in rice, banana, pineapple, coconut, rubber, vegetables. Aquatic and problematic weeds and their control.

MODULE 2

15 Hrs

Origin, geographic distribution, economic importance, soil and climatic requirement, varieties, cultural practices, harvesting and postharvest handling of major Oilseeds, Sugar cane, Fibre crop, Narcotics, Medicinal plants.

MODULE 3

10 Hrs

Crop Production in rice in detail: Methods of sowing, Varieties and their duration, various systems of rice cultivation. Raising of nursery, sowing in the main field, Nutrient and water management. Weed Management in rice. Harvest indices in rice.

MODULE 4

10 Hrs

Mechanised farming in Rice. Introduction to various machines employed in mechanised rice cultivation including field preparation, weeding and harvesting.

MODULE 5

10 Hrs

Fodder crops: their cultivation and management.

Text books:

1. Agarwal, P.C. 1990. Oilseeds in India. Oxford and IBH, New Delhi
2. Balasuramaniyan, P. and Palaniappan, SP. 2003. Principles and Practices of Agronomy. Agrobios (India)
3. Barnes, A.C. 1964. The Sugarcane. Interscience Publishers, New Delhi
4. Chidda Snidng, Prem Singh and Rajbir Singh. 2003. Modern Techniques of Raising Field Crops (2 Ed.). Oxford & IBH, New Delhi.
5. ICAR [Indian Council of Agricultural Research]. 2006. Hand Book of Agriculture. ICAR, New Delhi
6. KAU [Kerala Agricultural University]. 2007. Package of Practices Recommendations - Crops. Directorate of Extension, Kerala Agricultural University, Thrissur
7. Lekshmikantan, M. 1983. Technology in Sugarcane Growing. Oxford & IBH Publishing Co., Pvt. Ltd., New Delhi
8. Prasad, R. (Ed.). 2001. Field Crop Production. ICAR, New Delhi
9. Pursglove, J.W. 1975. Tropical Crops: Monocotyledons. The English Language Book Society and Longman, London
10. Thomas, J., Joy, P.P., Mathew, S., Skaria, B.P., Duethi, P.P. and Joseph, T.S. 2000. Agronomic Practices for Aromatic and Medicinal Plants. Directorate of Arecanut and Spices Development, Kozhikode.
11. Yadav, D.S. 1992. Pulse Crops. Kalyani Publishers., New Delhi.
12. Gurmel Singh, C. Venkataraman, G., Sastry, B. and Joshi, P. 1990. Manual of Soil and Water Conservation Practices. Oxford and IBH Publishing Co., New Delhi.
13. IARI [Indian Agricultural Research Institute]. 1977. Water Requirement and Irrigation
14. Management of Crops in India, IARI Monograph No.4, Water Technology Centre, IARI, New-Delhi.
15. Lenka, D. 2001. Irrigation and Drainage. Kalyani Publishers, New-Delhi.
16. Mal, B. C. 2002. Introduction to Soil and Water Conservation Engineering, Kalyani
17. Michael, A.M. 1988. Irrigation Theory and Practice. Vikas Publishing House Pvt. Ltd., New Delhi.
18. Mishra, R.D. and Ahamed, M. 1993. Manual of Irrigation Agronomy. Oxford and IBH Publishing Company Pvt. Ltd.
19. Prihar, S.S. and Sandhu, B.S. 1987. Irrigation of Field crops - Principles and Practices - ICAR, New-Delhi.
20. Sankara Reddi, G.H. and Yellamanda Reddy, T. 2003. Efficient Use of Irrigation Water. Kalyani Publishing House, New Delhi.
21. Tideman, E.M. 1996. Watershed Management: Guidelines for Indian Conditions. Omega Scientific Publishers, New Delhi.
22. Aldrich, R.J. and Kramer, R.J. 1997. Principles in Weed Management. Panama Publications,

New Delhi.

23. Anderson, P.W. 1983. Weed Science - Principles. West Publishing Con.d New York

24. Ashton, P.M. and Crafts, A.S. 1981. Mode of Action of Herbicides (2 Ed.) Wiley- Inter

Course No. 4.5

Course Code: SDC4AG14

Course Title: Livestock Farming

Credits: 4

Total Contact Hrs: 60 Hrs

Objectives

- To familiarize with fundamentals of livestock farming.
- To acquaint with the management of various farms.

MODULE 1

12 Hrs

Role of Livestock in National economy: Management- Principles of management, Functions of management, Tools of management. General Management Practices in Dairy farming-Grooming, Drying off, Control of bad habits, Castration, Dehorning, Trimming, Shoeing, Identification marks, removing extra teats.

MODULE 2

12 Hrs

Cattle and Buffalo management- Housing of Cattle, Calf raising, Heifer management, Management of pregnant and lactating cow and Buffaloes, Care and management of cross breed cow, Care and management of breeding bull, Sheep and Goat management- Housing of sheep and goat, General management practices.

MODULE 3

12 Hrs

Milk Industry: Dairy Development in India- Operation Flood Programme, Contribution of Military Dairy Farm, NDDB, NDRI, Milk grid to dairy development. Dairy Co-operatives structure and functions, Milk Chemistry and Milk constituents- Definition of Milk, Composition of Milk, Constituent of Milk, Factors affecting Quality and Quantity of milk, Nutritive value of milk, Physico-chemical properties of milk. Clean milk production: Source of contamination.

MODULE 4

12 Hrs

Poultry management: - Housing of Poultry, General Management practices, Pig Farming, Rabbit Farming, Duck Farming- Breeds of duck, General management practices. Quail management.

MODULE 5

12 Hrs

Classification of Animal Diseases: Study of major Diseases- Foot and mouth disease (FMD) Rinderpest, Anthrax, Black quarter (BQ), Haemorrhagic Septicaemia (HS). Study of Parasitic Diseases: Brucellosis, Babesiosis, Theileriosis. Diseases of lactating cow: Mastitis, Dystokia Milk fever, Prolaps, Ketosis. Diseases of Calves: Pneumonia, Calf score, Diarrhoea. Poultry Diseases- Ranikhet, Coccidiosis, Bird flu, Parasites of poultry. First aid measures. Disposal of carcasses.

Text books:

- 1) A Text Book of Animal Husbandry by G.C. Banarjee
 - 2) A Text Book of Animal Science by. Dr. A.U. Bhikane and Dr. S.B. Kawitkar
 - 3) Advances in Dairy Animal Production by V.D. Mudgal, K.K. Singhal and D.D. Sharma
 - 4) Handbook of animal Husbandry, The I.C.A.R. publication
 - 5) Animal Husbandry & Dairy Science by. Jagdish Prasad.
 - 6) Dairy India Yearbook - 2007 by. P.R. Gupta
 - 7) Handbook of Veterinary Physician by V.A. Sapre
 - 8) Farm Animal management and feeding practices in India by Thomas & Shashtri
 - 9) Dairy Microbiology by K.C. Mahanta
-

Course No. 4.6

Course Code: SDC4AG15

Course Title: Weed Management, Crop Production and Livestock Farming - Practicals

Credits: 5

Total Contact Hrs: 75 Hrs

- To familiarize with the general characters of weeds and their management.
- To familiarize with cultivation of rice, fibre crops, fodder crops etc.
- Familiarization with cultural methods of pest control.
- To familiarize with practices in livestock farming.
- To acquaint with the management of important farm animals and birds

Weed management

1. Techniques of weed collection, identification and preparation of herbarium of weeds.
2. Herbicide formulation and identification- Herbicide label information.
3. Study of herbicide application equipments and calibration.
4. Computation of herbicide doses.
5. Field practice of spraying herbicides in the field.
- 6.
7. Recording observations on the effect of herbicides on crops and weeds.
8. Hand weeding and hoeing using conoweeder in rice.
9. Hoeing and after cultivation in cassava plots.
10. Economics of weed control practices.
11. Visit to areas with problem weeds.
12. Familiarization and planting of various fodder crops and their preservation.
12. After cultivation operations of major crops.

Pest management

1. Familiarization with Mechanical methods of pest control.
2. Identification of predators.

3. Identification of microbial agents.
4. Familiarization with different formulations of insecticides.
5. Preparation of neem oil garlic emulsion and tobacco decoction.
6. Familiarization with different insecticides.
7. Calculation of doses/concentrations of insecticides.
8. Preparation of spray fluid for field application.
9. Familiarization with Plant protection equipments.
10. Identification, symptoms of damage, collection and preservation of pests of:
 - a) Rice, Coconut.
 - b) Banana, Cashew.
 - c) Pepper, cardamom.
 - d) Brinjal, Bittergourd and cowpea.

Live stock farming

1. Morphology of cattle, buffalo and poultry
2. Classification of Cattle Breeds
3. Study of Cattle, Breeds
 - a. Milch : Gir, Sahiwal, Red Sindhi,
 - b. Draught: Khillar, Dangi, Red kandhari.
 - c. Dual: Deoni, Hariyana
 - d. Exotic: Jearsy, H.F.
 - e. Cross breed: Holdeo, Jerdeo.
4. Study of Buffalo Breeds: Murrah, Jaffrabadi, Nagpuri and Surti
5. Study of Sheep and Goat breeds: Osmanabadi, Jamnapuri, Saanem

Course No. 4.7
Course Code: SDC4AGI6
Course Title: Internship/Project (Cultivation of Rice)
Credits: 5
Total Contact Hrs: 75 Hrs

Objectives

- To understand the sustainable cultivation aspects of rice under low land condition.
- Rice-crop planning
- Nursery raising: Land preparation, seed treatment, sowing, water management, nutrient management, and plant protection
 - Main field preparation, transplanting, nutrient management, water management, Identification of weeds and weed management
 - Identification of insect pests and diseases and plant protection
 - Harvesting, postharvest handling of produce, storage and marketing of produce. Harvest Index- Preparation of balance sheet including cost: benefit ratio (A minimum 5cents will be allotted to each student).

NOTE: In addition to regular practicals, the students will complete certain time bound operations after the regular class hours.

SEMESTER V

Course No. 5.1

Course Code: GEC5EM13

Course Title: Environmental Microbiology and Biotechnology

Credits: 4

Total Contact Hrs: 60 Hrs

Objectives

- To understand various aspects of environmental microbiology and biotechnology

Module-I

Introduction to Microbiology-History-scope-Types –structure, biology and classification of bacteria, mycoplasma, fungi, algae and virus-identification (10 Hours)

Module-II

Rules, regulations and tools in Microbiology- Basic principles of Autoclave, Hot air oven, laminar air flow. Microscopy-Bright field-phase contrast-dark field-fluorescent-con-focal-electron microscopy (SEM,TEM) Centrifuge-spectrophotometer (10 Hours)

ModuleIII

Sampling Techniques: Preparation of samples, types of media-sterilization techniques-cultivation and preservation of microorganism-methods of estimation and isolation of microorganism in soil, water and milk(10 Hours)

Module-IV

Microbiology of soil-microbial flora of soil-interaction among soil microorganism-role of soil microorganisms-nitrogen, carbon, sulphur cycles-microbiology of aquatic micro organism- Air microbiology-distribution, techniques and role of air microorganisms.(10 Hours)

Module-V

Microbial Genetics-concept of the gene mutations, transformation, conjugation, transduction, plasmids, microbial control of environmental pollution; genetic engineering and recombinant DNA techniques.(brief study only)(10 Hours)

Module-VI

Microbial growth process-major products of Industrial microbiology-alcoholic beverages, amino acids and antibiotics,, Recombinant DNA technique in Biotechnology-Gene cloning-cloning vectors, organic synthesis and degradation, Environmental Applications (10 Hours)

Text Books:

Microbiology-Paul.A.Ketchum.1984.John wiley and Sons,New york.

Microbiology-L.M.Prescott,J.P.Harley,D.A.Klein,1993.2nd Ed.Wm.C.Brown Publishers

Microbiology-M.J.Pelczar,E.C.S.Chan,N.R.Kreig.1996. Mc Graw Hill Books Co.,New york

Microbiology-Fundamentals and Applications. Atlas,R.M.Macmillan Pub. Co.,N ew York

References:

Bacterial Metabolism. Doelle,N.W.1975.2nd Ed.Academic Press

Microbial Genetics-D.Freigelder,1987.Jones Bartkett Publishers,Inc,Boston

Introduction to Environmental Microbiology.Mitchell,R.1974.Prentice Hall Int.

Introduction to Soil Microbiology.M.Alexander.1977Ny. John Wiley and Sons

Aquatic Microbiology –G.Rheinheimer.1991.4th Ed. John Wiley and Sons

Microbial Biotechnology-A.N.Glazer,H.Nikadio.1995.W.H.Freeman & Co.,New York

Bacteriology- Salle

A text book of Microbiology. Ananthanarayanan,R and Jayaram Panicker

Course No. 5.2

Course Code: GEC5FD14

Course Title: Food and Dairy Microbiology

Credits: 4

Total Contact Hrs: 60 Hrs

Objectives

- To understand various aspects of food and dairy microbiology

Module 1 (10 hours)

Food as a substrate for microorganisms. Types of microorganisms in food - Source of contamination - Factors influencing microbial growth in foods (extrinsic and intrinsic) Microbial examination of food- viable colony count, examination of fecal Streptococci.

Module 2 (10 hours)

Physical and chemical properties of milk. Milk as a substrate for microorganisms. Types of microorganisms in Milk- bacteria, fungi and yeast. Sources of microbial contamination of milk. Microbiological analysis of milk. Rapid platform testsorganoleptic, Clot on boiling (COB), turntable acidity alcohol test, DMC, sedimentation test and pH. Standard plate count, MBRT.

Module 3 (10 hours)

Food fermentations: Cheese, bread, yoghurt, idli, fermented pickles and fermented vegetables, Ice cream, - methods and organisms used. SCP, Probiotics and prebiotics.

Module 4 (10 hours)

General principles underlying spoilage, different kinds of foods, cereals and cereal products - sugar and sugar products - vegetable and fruits - meat and meat products - fish and other sea foods - eggs and poultry - dairy and fermentative products (ice cream/milk/bread/wine).

Module 5 (10 hours)

Food Poisoning : food borne infections (a) Bacterial: Staphylococcal, Brucella, Bacillus, Clostridium, Escherichia, Salmonella (b) Fungal : Mycotoxins including aflatoxins, ergotism (c) Viral: Hepatitis, (d) Protozoa - Amoebiasis.

Module 6 (10 hours)

Food preservation : Principles of food preservation - methods of preservation. a. Physical (irradiation, drying, heat processing, pasteurization, chilling and freezing, high pressure and modification of atmosphere) b. Chemical (Sodium benzoate Class I & II). Food Sanitation: Good manufacturing practices - HACCP, Personnel hygiene.

Suggested Readings

1. Food Microbiology by Adams, M R . and Moss, M.O.1995.The Royal Society of Chemistry, Cambridge.
2. Food Microbiology by Frazier, W.C. and Westhoff, D.C.1988.TATA McGraw HillPublishing company ltd., New Delhi.
3. Modern Food Microbiology by Jay, J.M.1987.CBS Publishers and distributors, New Delhi.
4. Basic Food Microbiology by Banwart, G.J.1989.Chapman & Hall New York.
5. A Modern Introduction to Food Microbiology by Board, R.C.1983.Blackwell Scientific Publications, Oxford.
6. Dairy Microbiology by Robinson, R.K.1990. Elsevier Applied Science, London.
7. Food Poisoning and Food Hygiene, Hobbs, B.C. and Roberts, D.1993. Edward Arnold.
8. MICROBIOLOGICAL EXAMINATION METHODS OF FOOD AND WATER by SILVA
9. Lund BM, Baird Parker AC, and Gould GW. (2000). *The Microbiological Safety and Quality of Foods*. Vol. 1-2, ASPEN Publication, Gaithersberg, MD.
10. Gould GW. (1995). *New Methods of Food Preservation*. Blackie Academic and Professional, London.

Course No. 5.3
Course Code: SDC5AG17
Course Title: Commercial Vegetable Production
Total Credits: 4
Total Contact Hrs: 60 Hrs

Objectives

- To understand various principles and practices of commercial vegetable production.

Module 1

12 Hrs

Introduction - Importance and scope of vegetable crops of India with special emphasis to Kerala. Nutritional importance- nutrient value of vegetables, ANV. Classification of vegetables – types of classification and their bases - Botanical, cultural, thermo classification, classification based on parts used.

Module 2

12 Hrs

Factors affecting vegetable production- soil, temperature, light, water, nutrients. Basic principles of vegetable production. Nursery, sowing and transplanting, Care and management.

Module 3

12 Hrs

Types of vegetable farming - Kitchen garden; Market garden; Truck garden; vegetable forcing; Vegetable garden for seed production; Hydroponics, aeroponics, Riverbed system, Terrace Garden etc. Kitchen garden- site selection, principles of layout, cropping schedule. Growth regulators -role of growth regulators in vegetable production and methods of application.

Module 4

12 Hrs

Production technology of warm season vegetable- Importance, origin, taxonomy, varieties, cultivation, problems and prospects for Solanaceous crops- tomato, brinjal and chilli-Cucurbits- bitter gourd, snake gourd, cucumber, melons, pumpkins, watermelon and ivy gourd. Leguminous crops- vegetable cow pea and winged bean. Other vegetables-okra, amaranthus.

Module 5

12 Hrs

Production Technology of cool season vegetables- Importance, origin, taxonomy, Varieties, cultivation, problems and prospects of potato, cole crops - cabbage & cauliflower. Root crops- carrot, radish, beetroot. Bulb crops- onion, garlic and Leafy vegetables

Course No. 5.4
Course Code: SDC5AG18
Course Title: Agricultural Enterprises
Credits: 4
Total Contact Hrs: 60 Hrs

Objectives

- To understand various commercial enterprises in agricultural sector through observation, field visits and presentation.

MODULE 1

12Hrs

Bee keeping -history and development. Honey bees- kinds of bees, biology-Hiving and domestication. Seasonal management of bees.Bee pasturage. Bee products- extraction, uses, composition and preservation. Diseases and enemies of honey bees and their control. Bee poisoning. Scope of apiculture in Kerala. Recent advances in apiculture research.

MODULE 2

10 Hrs

Sericulture - history and development. Types of silkworms in India - morphology, biology, rearing of silkworms.Host plants and their cultivation.Diseases and enemies of silkworm and their control. Use of biotechnology in sericulture.Scope of sericulture in Kerala. Recent advances in sericulture research.

MODULE 3

23 Hrs

Mushroom cultivation, Importance of mushroom cultivation - definition of mushroom - its importance - present scenario of mushroom cultivation - general morphological features, taxonomy and identification of different mushrooms-poisonous, hallucinogenic and medicinal Mushrooms. Pure culture of mushrooms and their nutritional requirements. Definition of spawn, substrate for spawn, types of spawn, methods of spawn production, characteristic of a good spawn, storage of spawn. Cultivation of Agaricus species - composting - its formulation, casing, preparation of casing mixture, sterilization, cultivation of pleurotus, Volvariella, Lentinus, Calocybe and Auricularia. Different types of substrates, substrate preparation and sterilization, Spawning, methods of spawning, spawn run phase, cropping. Identification and management of different pests and diseases of mushrooms. Methods of harvesting mushrooms, post harvest treatments and preservation of mushrooms. Packing and processing - Different methods of processing, canning and dehydration. Nutritive value of mushrooms and preparation of different recipes.

MODULE 4

15 Hrs

Commercial floriculture, Status and prospects of commercial cultivation of flowers. Cultivation aspects of traditional and cut flowers - jasmine, crossandra, marigold, tuberose, gladiolous, heliconia etc. Protected cultivation of rose, gerbera, chrysanthemum etc. - general concepts and practices. Commercial cultivation of **orchid's** and anthurium. Status and prospects of Kerala. Classification and varieties, planting material production, methods of planting, media components and management, shade regulation, irrigation, nutrition, plant protection, stage and method of harvest, postharvest handling and marketing. Economics of cultivation.

Text books:

1. David, B. V. and Kumarawami, T. 1978. *Elements of Economic Entomology* Popular Book Depot, Madras.
2. Ganga, G. and Sulochanachetty. 1999. *An Introduction to Sericulture* Second edition. IBM and Oxford Publishing Company, New Delhi.
3. Groul, R.A. 1963. *The Hive and the Honeybee*. Dadani and Sons. Inc. Illinois.
4. Krishnaswami, S., Narasimhanna, Suryanarayana and Kumararaj. 1991. *FAO Manuals on Mulberry Cultivation, silkworm rearing and silk reeling*. IBM and Oxford Publishing Company, New Delhi.
5. Mishra, R. C. 1998. *Perspectives in Indian Apiculture*. Agro botanica, Bikaner, Rajasthan
6. Sardar Singh. 1962. *Bee Keeping in India*. ICAR, New Delhi.
7. Chang, S. T. Miles, P. G. and Hays, W. A. 1978. *The Biology and Cultivation of Edible Mushrooms*. Academic Press, London.
8. Lulu Das. 2002. *Mushroom Recipes*. (Released in the VIII Biennial meeting of AICMIP).
9. Nair, M. C. 1995. *Beneficial Fungi and Their Utilization*. Scientific publishers, New Pali Road, Jodhpur.
10. Randhawa, G.S. and Mukhopadhyay, A. 1986. *Floriculture in India*. Allied publishers New Delhi.
11. Rogers, J. 1974. *Flower arranging*. Hamlyn, London.

Course No. 5.5

Course Code: SDC5AG19

Course Title: Fundamentals of Organic Farming

Total Credits: 4

Total Contact Hrs: 60 Hrs

Objectives

- To familiarize with the concept of sustainability and sustainable development.
- To acquaint with the fundamentals of organic farming.
- To have the knowledge about the organic certification procedures.

MODULE 1**12 Hrs**

The concept of sustainability and sustainable development-emerging issues- Sustainable agriculture- concept themes- differences between conventional, sustainable, and alternate agriculture- Various alternate agricultural systems- Conventional, sustainable, and alternate agriculture- Alternate agricultural systems- biodynamic farming, natural farming, organic farming, permaculture, homa farming, and other forms/limitations- Modernization of agriculture and its relation to sustainability.

MODULE 2**12Hrs**

Factors affecting ecological balance and ameliorative measures- Indian agriculture in terms of availability of natural resources and their carrying capacity- Strategies for realizing sustainable agriculture- low vs. high external input agriculture -Natural resource management as a part of sustainable resource management -crop production practices- animal production practices-Basic ecological principles of LEISA - promising LEISA techniques and practices –Good Agricultural Practices(GAP)- GAP certification -Improved manure handling - crop residue management - strategic use of chemical fertilizers and pesticides, traps, repellants and biological control, water conservation measures for sustainability- water harvesting - ITK and farmer centered techniques and practices.

MODULE 3**12 Hrs**

Organic agriculture-history-concepts- philosophy- objectives, opportunities and priorities-Criticisms- Organic farming and food security-Principles of organic farming. Tools and practices of organic farming: Planned crop rotation, Green manures and cover crops, Manuring and composting, multiple cropping.Intercropping in relation to maintenance of soil productivity.

MODULE 4**12 Hrs**

Biological pest control: Biological agents -Mass multiplication and familiarization with field application, Different traps and pheromones for pest control. Biocontrol of weeds, diseases and insect pests, Sanitation, Tillage and cultivation, Mulching, Supplemental fertilization, Biorational pesticides, Foliar fertilization.

MODULE 5**12 Hrs**

Socio-economic impacts; Marketing and export potential - Current status of organic farming - Initiatives in India and Kerala- National Programme for Organic Production (NPOP) - Operational structure of NPOP-Accreditation agencies- Certification Agencies - National Standards for Organic Products (NSOP)-inspection and certification procedures.

Text books:

1. Ananthkrishnan, T.N. (ed.) 1992. Emerging Trends in Biological Control of Phytophagous insects.Oxford & IBH, New Delhi.
2. Chhonkar, P.K. and Dwivedi, B.S. 2004. Organic farming and its implications on India's food security.Fertil. News 49(11): 15-18,21-28,31&38.
3. Gaur, A.C. 1982. A Manual of Rural Composting. FAO/UNDP Regional Project Document, FAO, Rome.

4. Howard, A. 1940. An Agricultural Testament. Oxford University, London. Lampin, N. 1990. Organic Farming. Farming Press Books, Ipswich, U.K.
 5. Palaniappan, S.P and Anandurai, K. 1999. Organic Farming- Theory and Practice, Scientific Pub., Jodhpur.
 6. Reddy, M.V. (ed.) 1995. Soil organism and Litter decomposition in the Tropics. Oxford & IBH, New Delhi.
 7. Singh, S.P. (ed.) 1994. Technology for Production of Natural Enemies, Project Directorate of Biological Control, Bangalore.
 8. Trewavas, A. 2004. A critical assessment of organic farming and food assertions with
 9. Trivedi, R.N. 1993. A Text Book of Environmental Sciences, Anmol Pub., New Delhi.
 10. Veeresh, G.K., Shivashankar, K. and Singlachar, M.A. 1997. Organic Farming and Sustainable Agriculture, Association for Promotion of Organic Farming, Bangalore.
 11. Woome, PL. and Swift, M.J. 1994. The Biological Management of Tropical Soil Fertility, S.B.F. & Wiley.
-

Course No. 5.6

Course Code: SDC5AG20

Course Title: Government Policies and Programmes Related to Agriculture

Credits: 5

Total Contact Hrs: 60 Hrs

Objectives

- To acquaint with various Government Policies related to Agriculture in Kerala and India.
- To familiarise with five year plans and Panchayathiraj system in India.

MODULE 1 Introduction to agricultural policies 10 Hrs

Introduction to agricultural policies of Kerala and of India - need and importance - National Agricultural Policy in brief.

MODULE 2 Agricultural policies regarding land and labour 20 Hrs

Agricultural policies regarding land - need and scope for land reforms - Abolition of intermediaries - Tenancy reforms - Ceiling on land holdings - appraisal of land reforms. - Size pattern of operational holdings, problem of sub-division and fragmentation of holdings.

Agricultural policies regarding labour - present position of agricultural labour - minimum wages - abolition of bonded labour - Recommendations of the National Commission on Rural Labour - NREGP.

MODULE 3 Agricultural policies regarding seeds and fertilizers 20 Hrs

Agricultural policies regarding seeds - National Seeds Policy - varietal development and plant variety protection - seed production - quality assurance - seed distribution and marketing - infrastructure facilities - transgenic plant varieties - import of seeds and planting material - export of seeds - promotion of domestic seed industry Agricultural policies regarding fertilizers

- Fertilizer pricing policy - payment of subsidy. Agricultural policies regarding plant protection chemicals - pesticide production and consumption in India - protection of consumers from adverse impacts of pesticides. Agricultural policies regarding irrigation, machinery, technology etc.

MODULE 4 Agricultural policies regarding credit

15 Hrs

Agricultural policies regarding credit - Co-operatives and rural credit - Commercial banks and rural credit - Regional Rural Banks - Lead Bank Scheme - NABARD. Agricultural policies of Kerala and of India- regarding agricultural products and their marketing, export and prices - food security.

MODULE 5 Five Year plans and Panchayathiraj

15 Hrs

Concept of planned growth- Five Year Plans-Government policies and programs in agriculture and rural development. IADP - IAAP- IWDP- Watershed development Programmes- IRDP- NREGP- SGSY - Kudumbasree- etc. Peoples' Plan- Decentralised planning- current Plans - Agricultural development programmes and schemes of the dept. of Agriculture- liaison with Local Self Government. Panchayati raj system and institutions- gramasabha- Preparation of plan projects in agriculture.

Text books:

1. Government of India. Five year Plan Documents.
 2. Government of India.Economic Survey. Published by Planning Commission (various issues)
 3. Government of India.Economic Review. Published by State Planning Board (various issues)
-

Course No. 5.7

Course Code: SDC5AG21

Course Title: Commercial Vegetable Production, Agricultural Enterprises and Organic Farming -Practicals

Credits: 5

Total Contact Hrs: 75 Hrs

Objectives

- To develop awareness on bee keeping, sericulture and lac culture through observation, field visit and reporting.
- To develop skill in cultivation of edible mushrooms and to develop skill in dry flower production and bouquet making.
- To familiarize with the production and utilization of biofertilizers and biocontrol agents.

Commercial vegetable production

1. Main field preparation and planting of transplanted tropical vegetable crops.
2. Main field preparation and planting of direct sown vegetable crops.
3. Preparation of nursery bed, sowing and aftercare of seeds of vegetable crops.
4. Preparation of growth regulator solutions and application.

5. Maturity indices and harvesting of vegetables for vegetable purpose and seed purpose.
6. Identification and familiarization of cool season vegetables.
7. Main field preparation and planting of cool season vegetables.
8. Visit to the farmer's fields in the vegetable growing areas to study the field problems faced by the farmer.

Commercial Enterprises

1. Different types of bees and bee equipments.
2. Handling of bee colonies.
3. Extraction and processing of honey.
4. Visit to apiaries.
5. Identification of silkworms
6. Laboratory rearing of mulberry silkworms and visit to rearing units.
7. Identification of lac insects and their natural enemies.
8. Identification of common edible and poisonous mushrooms.
9. Preparation of substrates for mushroom cultivation.
10. Oyster mushroom cultivation.
11. Paddy straw mushroom cultivation.
12. Button mushroom cultivation.
13. Visit to a commercial mushroom production unit.
14. Methods of harvesting mushrooms.
15. Mushroom recipes – preparation.
16. Production techniques of dry flowers.
17. Value addition in cut flowers and loose flowers, hands on training in preparation of garlands, bouquet, flower arrangements etc.

Organic farming

1. Preparation of enriched farm yard manure.
2. Coir pith composting.
3. Preparation of Vermicompost.
4. Study and field application of biofertilizers.
5. Raising green manure crops and cover crops.
6. Plant protection through bio-agents and traps.
7. Plant protection using pheromones.
8. Visit to urban waste recycling unit.
9. Study of profitable utilization of agricultural wastes.
10. Visit to poultry and dairy units to study resource allocation, utilization and economics.
11. Visit to an organic farm to study various components and utilization.
12. Raising of crops and ornamental nursery raising organically through nutrient, diseases and pest management.

SEMESTER VI

Course No. 6.1

Course Code: SDC6AG22

Course Title: Major Internship/Main Project/Dissertation

Credits: 30

Details of Project Work

Industrial training will be conducted at the industrial premises engaged in agriculture and allied activities. A group of students (5-6 number) will be allotted to each industry. The interest of the students will be one of the major criteria in selecting the category of industry. A project report of the industrial training shall be submitted at the end of sixth semester and a viva-voce will be conducted by a panel of three subject experts.

B. Voc. Agriculture
Semester I
Fundamentals of Agronomy
Course code: SDC1AG01

One mark questions

1. The term Agriculture is derived from two Latin words viz: and
2. The word cereal is derived from
3. Cereals are an excellent source of fat soluble vitamin E, which is an essential antioxidant (True/False)
4. Cereal grain contains 60 to 70% of starch and is an excellent energy rich foods (True/False)
5. Scientific name of Sorghum
6. Scientific name of Blackgram
7. Groundnut contains 50% oil content (T/F)
8. Rice is a *rabi* crop (T/F)
9. Wheat is a rabi crop (T/F)
10. Scientific name of Wheat
11. Agronomy is derived from two Greek words viz: and
12. Define Agronomy
13. Give two examples for fibre crops
14. Give two examples for sugar crops
15. Give two examples for oil seeds
16. Give two examples for pulses
17. pH in Alkaline soils is
18. Give an example for green manure
19. Give an example for green leaf manure
20. Urea is a straight fertilizer (T/F)
21. Manganese is a macro nutrient (T/F)
22. Give an example for complex fertilizer
23. MAP is a (Straight fertilizer/Complex fertilizer/Mixed fertilizer/all of these)
24. Give an example for bulky organic manure
25. Give an example for concentrated organic manure
26. Khaira disease of paddy is caused by the deficiency of
27. Define irrigation

28. Cultivation of crops in areas where rainfall is less than 750 mm per annum is known as
29. Cultivation of crops in areas receiving rainfall above 750 mm per annum is known as
30. Cultivation of crops in regions receiving more than 1,150 mm per annum is known as
31. Give an example for nitrogen fixing bacteria
32. Cowdung is a bulky organic manure (T/F)
33. Expansion of FYM
34. A crop planted to replace a main crop that has failed due to biotic, climatic, or management hazards and utilize the remaining period of the season
35. The practice of allowing germination and early growth in a well-prepared seedbed, the nursery and uprooting and planting the seedlings in the main field at the appropriate time is called
36. The refuse of stables and barnyards consisting of livestock excreta with or without litter applied to land to make it more productive is called
37. Raising a quick growing crop, often a legume, and ploughing it in situ is referred to as
38. The blue green algae associated with Azolla is
39. Expand VAM
40. Marginal scorching is a deficiency symptom of
41. The scientific name of Rice is
42.refers to growing of a number of crops one after the other in a fixed rotation to maintain the fertility of the soil.
43. Where lands are of sloping nature,.....type of cultivation is practiced specially in hilly areas.
44. Inserting a seed through a hole at a desired depth and covering the hole is known as
45. An example for a Kharif crop is.....
46. is considered as father of tillage
47. Blue revolution refers to production

48.deals with the production of fruits, vegetables, flowers, ornamental plants, spices and condiments
49. Sunflower is a crop
50. gives black soil its colour
51.is a measure of intensity of heat energy
52. The tillage operation that is done after the harvest of crop to bring the land under cultivation is known as.....
53.is an example for a nitrogen fertilizer
54. is an example for a tuber crop
55. are industrially manufactured chemicals containing plant nutrients
56.deals with the production of various crops which includes food crops, fodder crops, fibre crops, sugar, oilseeds, etc
57.deals with agricultural practice of breeding and raising livestock in order to provide food for humans and to provide power (draught) and manure for crops.
58. deals with production of large scale cultivation of perennial trees for supplying wood, timber, rubber, etc. and also raw materials for industries.
59. deals with practice of breeding and rearing fishes including marine and inland fishes, shrimps, prawns etc. in order to provide food, feed and manure.
60.deals with application and utilization of agricultural produces in a better manner in order to provide nutritional security, including value addition and food preparation.
61. Central Tobacco Research Institute is situated at
62. Central Rice Research Institute is situated at
63. Indian Institute of Pulses Research is situated at
64. Indian Institute of Sugarcane Research is situated at
65. Central Institute of Cotton Research is situated at

66. Indian Institute of Horticultural Research is situated at
67. Indian Institute of Vegetable Research is situated at
68. Central Potato Research Institute is situated at
69. Central Tuber Crops Research Institute is situated at
70. Central Plantation Crops Research Institute is situated at
71. Central Agricultural Research Institute is situated at
72. Indian Institute of Spices Research is situated at
73. Indian Institute of Soil Sciences is situated at
74. Central Soil Salinity Research Institute is situated at
75. Central Institute on Post harvest Engineering and Technology is situated at
76. Central Institute for Research on Buffaloes is situated at
77. National Research Centre on Plant Biotechnology is situated at
78. National Research Centre for Citrus is situated at
79. National Research Centre for Grapes is situated at
80. National Research Centre for Banana is situated at
81. National Research Centre on Meat is situated at
82. Expand IRRI
83. Expand CGIAR
84. is the father of Green Revolution in India
85. Crop plants that complete life cycle within a season or year are called
86. Plants that have life span of two consecutive seasons or years are called
87. Plants that live for three or more years are called
88. is an example for a cereal crop
89. The scientific name of sorghum is
90. The scientific name of Finger millet is
91. The scientific name of Red gram is
92. The scientific name of Black gram is.....
93. The scientific name of Green gram is
94. The scientific name of Cow pea is
95. The scientific name of Bengal gram is
96. The scientific name of Horse gram is

97. The scientific name of Groundnut is
98. The scientific name of sesame is
99. The scientific name of castor is
100. The scientific name of sunflower is
101. The scientific name of Safflower is
102. is the economic portion in groundnut
103.is the most extensive soil found in India
104. Dark-grey colour of black soil is due to.....
105. soil is always acidic in nature
106. Broadcasting is otherwise called as.....
107. The arrangement of the plants in different rows and columns in an area to efficiently utilize the natural resources is called.....
108.is an example for a macronutrient
109.is an example for a micronutrient
110. occurs in chlorophyll and is also an activator of enzymes
111. is involved in processes which ensure carbon assimilation and the transportation of photosynthates throughout the plant
112. is required for plant growth, cell division and enlargement
113. Dislocation of soil from one side of a ridge and to be placed nearer the cropped side is called.....
114. Removing of older leaves from sugarcane is termed as

Two mark Questions

1. Differentiate Extensive and Intensive agriculture
2. Differentiate Subsistence and Commercial agriculture
3. Agricultural seasons in Kerala
4. Differentiate Dry farming and Dryland farming
5. Differentiate Green manures and green leaf manures
6. Differentiate Straight fertilizers and Complex fertilizers
7. Differentiate bulky organic manures and concentrated organic manures with examples
8. Define peasant farming, Urban agriculture
9. Define Sustainable agriculture
10. Explain dry farming, dryland farming, rainfed agriculture

11. Match the following

Groundnut	<i>Vigna mungo</i>
Wheat	<i>Arachis hypogaea</i>
Cowpea	<i>Triticum aestivum</i>
Blackgram	<i>Vigna unguiculata</i>

12. Define the agricultural seasons in India

13. Explain agribusiness

14. Explain the methods of planting

15. Soil fertility vs Soil productivity

16. Arnon & Stout's criteria for essentiality

17. Micro nutrients vs Macro nutrients

18. Differentiate Square planting system and hexagonal planting system

19. Classification of crops based on ontogeny

20. Classification of crops based on seasons

21. Match the following

Bajra	<i>Glycine max</i>
Soybean	<i>Vigna radiata</i>
Tapioca	<i>Pennisetum glaucum</i>
Greengram	<i>Manihot esculenta</i>

22. Define Annual crops with examples

23. Define Biennial Crops with examples

24. Define Perennial crops with examples

25. Match the following

Redgram	<i>Vigna radiata</i>
Blackgram	<i>Vigna unguiculata</i>
Cowpea	<i>Vigna mungo</i>
Greengram	<i>Cajanus cajan</i>

1. Role of Agronomists
2. Define soil
3. Classification of soils, based on taxonomy
4. What are the objectives of tillage
5. What is primary tillage?
6. What is secondary tillage?

7. What do you mean by off-season tillage?
8. Clean tillage
9. Blind tillage
10. Dry tillage
11. What is puddling?
12. Minimum tillage
13. Zero tillage
14. Seed rate
15. Dibbling
16. Dry matter partitioning
17. Explain the different crop geometries available for crop production
18. Role of manures and fertilizers in crop production
19. Write a note on Macro and Micronutrients
20. What do you mean by activated sludge?
21. Differentiate between green manures and green leaf manures
22. What is farm yard manure?
23. What is compost manure?
24. What are oil cakes?
25. What are bone meals?
26. What are fish manures?
27. Nitrate fertilizers
28. Ammonium fertilizers
29. Nitrate and ammonium fertilizers
30. Organic nitrogenous fertilizers
31. Phosphatic fertilizers
32. Potassic fertilizers
33. Micronutrient fertilizers
34. Straight fertilizers
35. Mixed fertilizers
36. What are the advantages of mixed fertilizers?
37. Thinning and gap filling
38. Weeding and hoeing
39. Earthing up

40. Harrowing
41. Rogueing
42. Topping
43. Propping
44. Detrashing
45. De-suckering
46. Vesicular Arbuscular Mycorrhizae
47. Band placement
48. Point placement
49. Fertigation
50. Root dipping
51. Root feeding
52. Surface irrigation methods
53. Advantages of intercropping
54. Sustainable agriculture
55. Integrated farming system
56. Differentiate between dry farming and dry land farming
57. Cropping intensity

Four mark questions

1. Major farming systems in Kerala
2. Discuss the cultivation practices in rice (with reference to soil, climate, varieties, cultural practices, harvest)
3. Discuss the cultivation practices in Wheat (with reference to soil, climate, varieties, cultural practices, harvest)
4. Discuss the cultivation practices in Cowpea (with reference to soil, climate, varieties, cultural practices, harvest)
5. Discuss the cultivation practices in tapioca (with reference to soil, climate, varieties, cultural practices, harvest)
6. Discuss the cultivation practices in amorphophallus (with reference to soil, climate, varieties, cultural practices, harvest)
7. Discuss the cultivation practices in finger millet (with reference to soil, climate, varieties, cultural practices, harvest)
8. Explain biological nitrogen fixation

9. Elucidate the nitrogen cycle
10. Define irrigation and its objectives
11. Explain Drip irrigation and its parts
12. Explain Sprinkler irrigation and its parts
13. Importance and scope of agriculture in India
14. Hunger and food security
15. Integrated Nutrient Management
16. Branches of agriculture
17. Explain the types of tillage
18. Factors affecting seed germination
19. Factors affecting plant population
20. Crop geometry
21. Role of nutrients in plant growth
22. What are bulky organic manures?
23. Write a note on concentrated organic manures
24. Nitrogenous fertilizers
25. Write a note on inorganic fertilizers
26. Straight vs Mixed Fertilizers
27. Agronomic measures to improve the Fertilizer use efficiency (FUE).
28. Write a note on Inter-cultivation
29. Biofertilizers
30. Integrated nutrient management (INM)
31. Importance of water to plants
32. Methods of irrigation
33. Write a note on dry farming
34. Differentiate between rainfed and irrigated farming

15 marks questions

1. Agronomic classification of crops
2. Importance and scope of agriculture in India and Kerala
3. Explain the role and deficiency symptoms of macro nutrients in plants
4. Explain the role and deficiency symptoms of micro nutrients in plants
5. Explain drip and sprinkler irrigation

- 1. Scope and importance of agriculture in India**
2. Classification of crops
3. Factors affecting crop production
4. Classification of Organic manures, inorganic fertilizers and biofertilizers
5. Time and method of fertilizer application
6. Irrigation methods

7. Major soils of India

8. Major farming systems in Kerala and India

9. Cultivation practices of rice

10. Cultivation practices of tapioca
11. Cultivation practices of maize
12. Cultivation practices of finger millet
13. Cultivation practices of sweet potato
14. Describe your own Integrated farming system model

B. Voc-AGRICULTURE

Semester- 1

Question bank on
SDC1AG02-Fundamentals of horticulture

One mark

1. Science and technique of production, processing and merchandising of fruits, vegetables, flowers, spices, plantations, medicinal and aromatic plants is.....,
2. India ranksin fruits and vegetable production in the world
3. India ranks.....in production of banana
4. Branch of horticulture which deals with scientific study of fruit crop is.....
5.is branch of horticulture, which deals with the principle and practices of handling, packaging and processing of harvested crops to increase their storage life and availability.
6. Based on lifespan most of the fruits arein nature
7. Based on lifespan most of the vegetable crops arein nature.
8.is an example for herbaceous and succulent plant.
9. Lifespan ofplant is an year or a season.
10. Lifespan ofplant is more than two years.
11. Growth curve isin shape.
12. Log phase in growth curve is also calledphase
13. Example for biennial plant is.....
14.is an example for asexual /vegetative method of propagation
15. Seed is used formethod of propagation in plants.
16.is an example for transplanted vegetable Crop.
17.is an example for temporary vegetable.
18.is an example for tropical vegetable
19. Kharif season is from.....to.....
20. In India Rabi season starts fromto
21. Rabi season is also called.....season.
22. Water melon is a.....season crop.
23. Based on lifespan Onion is acrop.
24. Edible part of cauliflower is called
25. Deficiency ofcause fruit drop.
26.is a crop that belongs to cucurbit.
27. Cabbage grows well inseason
28.plant require longer photo period.

29. The branch of horticulture that deals with the scientific study of vegetable crop is known as.....
30. Carrot and spinach is a source of.....
31. Example for plantation crop is.....
32. Mango is rich in vitamin.....
33.plant are neural to length of day and night
34.is a place where seedling, saplings or any other planting materials are raised, propagated,multiplied and sold out.
35. In sexual method of propagation plants are raised from
36. Is a process by which flowering is promoted by a cold treatment given to plants.
37. Insystem of planting plant to plant and row to row distance is same.
38. Insystem of planting plants are right angle to each other.
39. Insystem of planting trees are planted in the corners of equilateral triangles,6 trees thus form a hexagon with another tree at its centre.
40. Area where intensive cultivation of fruit crops is done is called.....
41. Physical technique the control the shape, size and direction of plant growth are known as.....
42. In.....system of training main stem is allowed to grow to a certain height and leaders is cur to encourage lateral scaffold from near the ground giving a vase shaped plant.
43. Insystem of training the central axis of plant is allowed to grow unhindered permitting branches all around.
44. Central leader system of training is also removal of plant parts like bud, shoots, root ect to strike a balance between vegetative and production is called.....
45. A plant with stamens and carpel in different flowers on the same plant is.....
46. Example for monoecious plant is.....
47. Plant which bear male and female flower on different plants are known as.....
48. Example for dioecious plant is.....
49. When stigmatic viability period does not match with the pollen viability it is called.....
50. When stamen ripe before the stigma become receptive, the flower is called
51. Example for protandrous plant is.....
52. When stigma become receptive before stamen produce viable pollen is.....

53.method of propagation is commonly practiced for root induction.
54. In grafting rooted plant is called.....
55. In grafting stem cutting from donor plant is called.....
56.is method of propagation in which cut stems of two different plants are joined together to grow as a single plant.
57. Fruit develop from aggregate or cluster of multiple separate pistil that are born on single flower is called.....
58. When entire inflorescence develop in single fruit it is called.....
59. When pollen is transferred from the anther of a flower to stigma of same flower ,the type of pollination is.....
60. When pollen of one flower transferred to the stigma of another flower it is called.....
61.is the formation of fruit with out fertilization.
62. Example for parthenocarpic fruit is.....
63. Fusion of male and female gametes to form zygote in plants is called.....
64.is formed by fusion of one of the male nuclei with the polar nuclei
65.provide nutrition in form of starch and protein to developing embryo in seeds.
66. Fusion of one of the male nuclei along with egg cell leads to formation of ...
67. Zygote undergo cell division to give rise to
68. Seed develop frominside fruit.
69. Production of microspore and megaspore in plants is known as.....
70. Microspore is produced in.....of flower.
71. Megaspore is produced in.....
72. Inability of two different plants when grafted together to produce a successful union is termed as.....
73. Seedless fruit is obtained by.....
74. Triploid fruits are.....fruits.
75. Grafting technique in which two separate plants are made to unite by tightly processing the cut side surface of the stem is.....
76. Grafting technique used to repair damaged bark on a trunk by attaching scions is called
77. Major diseases of nursery stage is.....

78. Temperature for hot water treatment of seeds to break dormancy is.....
79. Nursery should be in.....and.....shape to minimise the length of boundary for fencing.
80.covered green house are expensive but they have long shelf-life.
81.Is used to sense and control temperature in a green house.
82.is a transparent thermo plastic used as green house covering material
83.is a propagating structure which uses heat from decomposing organic matter to raise the temperature of soil in an enclosed space to extend growing season.
84.is a propagating structure which is a bottomless box with removable top used to protect small plants from wind and temperature
85.propagation structure provide out door shade and protect container grown plants from high summer temperature and high light irradiation.
86.propagation unit maintain humidity by continuous film of water.
87. T budding is also calledbudding
88. In.....method of budding rectangular shaped patch of bark is removed and replaced with bud patch of same size from a bud stick
89. The method of budding which involve removal of complete ring of bark from root stock without leaving a strip is also known as.....
90. Air layering is Also known as.....

Two mark

1. Define horticulture. List out the branches.
2. Define pomology, olerology and floriculture.
3. Importance of horticulture
4. Define temperate and tropical fruits with example.
5. Define climacteric fruit with example.
6. What is deciduous and evergreen tree?
7. Define annual, biennial and perineal plants.
8. What is xerophyte?
9. Define halophyte with example.
10. Define nursery

11. Define orchard
12. Define contour and terrace farming with example
13. What is quincunx system of planting?
14. Define square system of planting with help of diagram.
15. What is mulching?
16. What is intercropping?
17. What is manuring?
18. Define training. What are its advantages?
19. Define pruning and its types.
20. What is open centre system of training?
21. What is leader system of training?
22. What is modified leader system of training?
23. What is topworking?
24. Define growth.
25. What are the characteristics of growth?
26. What is meristem tissue?
27. Draw labelled diagram of growth curve.
28. What is lag, log and exponential phase in growth curve?
29. What is juvenility?
30. What are the process involved in maturity?
31. What is abscission? Define process involved.
32. What is photoperiodism? List out its types.
33. What is long day plant? Write an example.
34. What is day neutral plant?
35. Define vernalisation.
36. Define florigen.
37. Define hermaphroditic plant.
38. Define two types of buds based on its position on plant.
39. What is alternate bearing?
40. Define irregular bearing.
41. Difference between pure bud and mixed bud.

42. Define heterostyly.
43. Define dichogamy. List out its types.
44. List out different plant growth stages.
45. What is false fruit?
46. What is some fruit?
47. Define aggregate fruit with example.
48. Define pollination. What are the types of pollination.
49. Define fertilization in plants.
50. What is sporogenesis in plants?
51. What is microsporogenesis?
52. What is megasporogenesis?
53. Define double fertilization.
54. Define fruit and seed.
55. Process of ripening of fruit.
56. Define non climacteric fruit with example.
57. What is fruit drop? List out types of fruit drop.
58. What is thinning? List out its advantages.
59. Define unfruitfulness.
60. Define parthenocarpy with the help of example.
61. List out methods to induce seedlessness.
62. Define propagation and its types.
63. What are the methods of asexual propagation?
64. Advantages and disadvantages of sexual reproduction.
65. List out some potting media used in nursery.
66. What is potting and repotting?
67. Cutting and its types
68. Grafting and its types.
69. Budding and its types.
70. Layering and its types.
71. Whip and tongue grafting.
72. Define bridge grafting with the help of diagram.

73. Define air layering and mount layering.
74. Define t budding, inverted t budding and I budding
75. Define chip budding.
76. What is graft incompatibility? List out its types.
77. What is stock scion relationship?
78. Process involved in graft union development.
79. Define nursery. What are the advantages?
80. List out the important qualities of good sites for constructing a nursery.
81. List out important components of nursery
82. What is green house?
83. List out some of the covering material used for construction of green house.
84. What is hot frames and principle behind it?
85. What is cold frames?
86. What is lath house?
87. What is most chamber?
88. Describe mist propagation unit.
89. What is notch grafting?
90. Write some points on care and management of nursery.

4 marks

1. Importance and scope of horticulture in India and kerala
2. Describe the classification of horticultural plants.
3. Advantages and disadvantages of sexual and asexual method of propagation.
4. Cutting and it's methods.
5. Describe types of grafting
6. Describe types of layering.
7. Describe types of budding.
8. Describe important planting system with the help of diagram.
9. Describe principles of orchard establishment and management.
10. What is training? What are methods of training.
11. Describe types of pruning.

12. What is growth. Describe the characteristics of growth.
13. Describe growth curve with the help of graph.
14. Stages of growth and process involved.
15. What is Photoperiodism? Describe its classification based on duration required.
16. What is bearing habits? Describe classification of bearing habits in fruit plants.
17. Describe the factors associated with flowering and fruitset.
18. Describe types of fruits.
19. Describe process involved in fruit and seed development.
20. What is double fertilization? Explain the process with the help of diagram.
21. Difference between climacteric and non climacteric fruits.
22. What is fruit drop? Describe types of fruit drop.
23. What are the causes of fruit drop?
24. Unfruitfulness. Factors affecting fruitfulness.
25. How can we control unfruitfulness?
26. What is seedlessness? What is its importance and methods to induce seedlessness?
27. What are the different types of media and containers used in plant nursery for raising seedlings?
28. Describe potting, repotting and preplanting in a nursery.
29. Write brief note on development of graft union.
30. Describe after care of grafted plants
31. Briefly describe stock scion relationship
32. Describe graft incompatibility and its types.
33. Difference between budding and grafting.
34. Briefly describe care and management of nursery.
35. Plant protection measures adopted in nursery.
36. Write brief note on green house.
37. Hot frames and cold frames. Functions and advantages
38. Write note on potting of seedlings in nursery
39. Describe lath house and mist house.
40. Draw detailed labelled layout of nursery.

15 marks

1. Write elaborate note on orchard management.
2. Describe methods of training and pruning. Write note on advantages of training and pruning.
3. Write detailed note on fruiting and bearing habits. Describe its classification.
4. Describe factors associated with flowering and fruit set.
5. Describe all the steps involved in fruit set and seed.
6. Phases of fruit development and process involved in it.
7. Describe cutting and layering with labelled diagram.
8. Describe budding and grafting with labelled diagram.
9. Care and management of nursery.
10. Describe nursery layout with detailed diagram.
11. Explain components of nursery.
12. Describe different types of propagation structure with help of diagram.
13. Describe the branches of horticulture. Write brief note on importance, scope and need of horticulture.
14. Write detailed note on classification of horticulture crops with help of example.
15. What is unfruitfulness. What are the internal and external factors affecting fruitfulness in plants.
16. Describe types of growth media and containers used for seedling raising. Write note on steps involved in potting and repotting.
17. Describe methods to test seed viability.
18. What is dormancy. Describe methods to break seed dormancy.

B. Voc. Agriculture
Semester I
Fundamentals of Agricultural Engineering
Course code: SDC1AG03

One mark questions

1. The length of Gunter's chain is
2. The number of links present in a Gunter's chain is
3. The length of each link in a Gunter's chain is
4. The length of Engineer's chain is
5. The number of links in an Engineer's chain is
6. The length of each link in an Engineer's chain is
7. The process of locating intermediate points on a straight line between two end points in a straight line is called
8. Define Ranging
9. The process of measuring the distance with a chain or tape is known as
10. Define Chaining
11. The process of measuring the lateral distance of the object from the survey line to the left or right according to their positions is
12. Define offsetting
13. Gunter's chain is a metric chain (T/F)
14. Engineer's chain is a non – metric chain (T/F)
15. Revenue chain is a metric chain (T/F)
16. is a prominent point on the chain line and can either be at the beginning or the end or along the boundary
17. Define 'Main stations' in surveying
18. The stations located on the main survey lines are known as
19. Subsidiary stations
20. Subsidiary stations taken on the main survey lines to locate the details of the object is
21. Tie stations
22. Name an instrument used for setting out right angles to a chain line

23. Slow process of erosion, compensated by formation of soil by natural weathering process is called.....
24. First stage in the erosion process is.....
25. Indiscriminate cutting down of trees causes.....
26. The equation used to determine Kinetic Energy is
27. The equation to find the area of an irregular field using trapezoidal rule is
28.erosion may not be evident significantly, but loose a thin layer of fertile soil every year.
29. There are number of latitudes on earth
30. A tillage operation that will leave a substantial part of the residual vegetative materials of the previous crop on or near the surface as a protective cover is known as.....
31. Insurveying the curvature of land is taken in to account
32.cannot be smoothed by tillage.
33. Growing crops in alternate strips laid out at right angles to the direction of prevailing wind is termed as
34. Cultivation along the land slope may cause.....
35. Areas where loose top soil overlies a tight soil are more susceptible toerosion.
36.erosion is the advanced stage of rill erosion.
37.established an empirical model for predicting erosion on a cultivated field.
38.measures are adopted for lands with slope less than 2%
39. Expand ICRISAT
40. Expand USLE
41. Instage of gully erosion, vegetation begins to grow in the channel.
42. Over grazing of vegetative cover causes.....
43. The acceleration due to gravity is..... at the poles
44. There are number of longitudes on earth
45. Broad Bed and Furrow (BBF) method was introduced by
46. measures are adopted for lands with slope more than 2%

47.erosion is removal of soil by water from small but well defined channels or streamlets when there is concentration of overland flow
48.is the art of making measurements that will determine the relative position of points on the surface of the earth in order that the shape and extent of any portion of the earth surface may be ascertained and delineated on a map or plan
49.can be smoothed by tillage.
50.cultivation reduces the velocity of overland flow and retards soil erosion.
51. Intillage, the seed bed is prepared by cultivating the soil in a narrow strip
52. is covering of land surface with closely spaced ridges at right angles so that a series of rectangular basins are formed.
53.is an implement used for forming tied ridges.
54.consist of construction of series of platforms along contours cut into hill slope in a step like formation.
55.tree can be used as shelter belts
56. Insurveying the curvature of land is taken in to account
57. Gunter's chain is feet long
58. The equation to find the area of an irregular field using trapezoidal rule is
59. The constant vertical distance between two consecutive contour lines is called
60. is the ratio between any given length on the drawing and the corresponding length on the ground
61. In surveying, the curvature of the earth is not taken in to account as the survey extent only to small areas.

Two mark questions

1. Types of chains in surveying
2. What is geologic erosion
3. How are sediments transported in a stream?
4. Explain broad bed and furrow
5. How can wind erosion be controlled?

6. What are the types of accelerated erosion?
7. Write the difference between Stream Bank erosion and gully erosion
8. What is saltation?
9. What is pedestal erosion?
10. From where will you begin construction of contour bund or any other soil conservation structure? Upstream to downstream or downstream to upstream? Justify your answer.
11. How can wind erosion be controlled?
12. Differentiate between a contour bund and a graded bund
13. What do you mean by Bench terracing?
14. What is a farm pond?
15. What are the special types of erosion?
16. What are the Disadvantages of wind breaks?
17. What are the types of strip cropping?
18. What do you mean by Contour trenching?
19. What is pinnacle erosion?
20. What are the factors influencing soil erosion?
21. What are the different tillage practices adopted to reduce soil erosion?
22. What is stream bank erosion?
23. How are sediments transported by wind?
24. What is piping erosion?
25. What is contour cultivation?
26. What do you mean by surface creep?
27. What are the types of contour trenching?
28. What do you mean by stone terracing?
29. What are the benefits of percolation ponds?
30. Define soil
31. What is soil Erosion
32. What is geologic Erosion
33. What is accelerated Erosion
34. What is splash erosion
35. What is sheet erosion

36. What is rill erosion
37. What is gully erosion
38. Mention the Conservation Measures adopted against Soil Erosion
39. Define contour
40. What is strip cropping?
41. What is Contour strip cropping
42. What is Field strip cropping
43. What is Buffer strip cropping
44. What is Wind strip cropping
45. What is a contour bund?
46. Define graded bunds
47. What is tied ridging?
48. What is basin listing?
49. What are the common *in-situ* moisture conservation practices?
50. What are the Benefits of Broad Bed and Furrow
51. What are wind breaks?
52. What are shelter belts?
53. Define erosivity
54. Define erodibility
55. Define detachability
56. Define transportability
57. What is a land slide?
58. What's an avalanche?
59. What do u mean by shifting cultivation?
60. What do u mean by jhum cultivation?
61. Define surveying. What are the fundamental principles of surveying?
62. Differentiate plane surveying and geodetic surveying
63. Define chain surveying and its principle
64. Discuss Ranging, Chaining, Offsetting, Triangulation
65. Differentiate Gunter's chain and Engineer's chain

66. Differentiate main stations and subsidiary stations with appropriate pictorial representation

67. Differentiate dry farming and dry-land farming

Four mark questions

1. Drip Irrigation
2. Classification of survey
3. Water harvesting techniques
4. Surface irrigation
5. Differentiate between a contour bund and a graded bund
6. Stages of gully erosion
7. Types of contour trenching
8. Explain the types of soil erosion
9. Methods of irrigation
10. What are the soil conservation measures for hill slopes?
11. Techniques to improve water use efficiency (WUE)
12. What are the stages of gully erosion?
13. Factors affecting water use efficiency
14. Explain the types of soil erosion
15. What are the stages of gully erosion
16. Explain the biological measures of erosion control
17. What are the soil conservation measures for hill slopes
18. Explain the role of Agricultural Engineering in crop production
19. Write about Agriculture in the 21st century
20. What are the engineering measures for erosion control?
21. What are the types of strip cropping?
22. Classification of survey
23. Write about measurement of distances

15 mark questions

1. Explain drip irrigation
2. Explain gully control structures
3. Explain the types of soil erosion and their control measures
4. Soil conservation measures for agricultural lands
5. Explain watershed management

6. Write about in-situ moisture conservation practices
7. Soil conservation measures for hill slopes
8. Calculations of area of regular and irregular fields

B. Voc-AGRICULTURE

Semester- 2

Question bank on

SDC2AG05- plantation crops, spices and fruits

1 mark

1. West coast tall is a variety of.....
2. Lakshaganga hybrid of coconut is obtained by cross between.....and.....
3. When Andaman Ordinary is crossed with Gangabondam.....hybrid is obtained in coconut.
4. Coconut hybrid.....is developed by cross between COD and WCT.
5. Kerasangara hybrid of coconut is obtained by the cross between.....and.....
6. West Coast Tall x Malayan Yellow Dwarf givehybrid

7.is an example of cross pollinated crop.
8. Which variety is suitable for cultivation both under rainfed and irrigated condition.
9. Is a coconut hybrid suitable for root wilt affected area.
10.is a coconut hybrid suitable for drought prone area.
11.is a coconut hybrid suitable for drought prone area
12. Example for tender coconut is.....
13. Name one dual purpose variety of coconut.
14. Spacing adopted for coconut in triangular system of planting is.....m
15. Spacing adopted for coconut in triangular system of planting is..... m
16. Removal of male part in plants is called
17. For tender coconut.....month old nuts are harvested.
18. Moisture content of copra for final use is.....
19. Average yield of coconut/palm/year is.....nuts.
20. Important pest of coconut is.....
21. Geometrical cutting of coconut fronds is due to
22. Economic life of rubber is.....
23. Most commercially cultivated rubber plant species is.....
24.is the largest rubber producing state in India.
25. Family of rubber is.....
26.is the largest rubber producing state of the world
27. Treatment of natural rubber with sulphur to make it hard is called.....
28.is an example of deciduous tree.
29. Rubber fruit is called.....
30. Ideal PH for growing rubber is.....
31. Rubber Research Institute of India is located at.....
32. Three types of budding in rubber are..... , And
33. Abnormal leaf fall is a major diseases in.....
34. Pink disease is a major diseases in.....
35. In rubber, while tapping make cut.....degrees downward from left to right.
36. While tapping, cut.....mm into the bark to take latex.
37. Intensive tapping prior to felling of the old trees is called.....
38. Latex contain.....percent of rubber
39. Example for anticoagulant used in rubber is.....

40. For coagulation.....is used in rubber
41. Native of cashew is.....
42.is a variety of cashew
43. Scientific name of cashew is.....
44. Directorate of cashew research is in.....
45. Family of cashew is.....
46. Swollen pedicel of cashew is called.....
47. Epicotyl grafting is practiced in.....
48.is the most preferable intercrop of cashew.
49. Tea mosquito bug is major pest of.....
50. Largest area under tea cultivation in world isin India
51.is an example of evergreen shrub.
52. Blister blight is a disease of..... crop.
53.is the scientific name of banana.
54.fruit is called apple of paradise/tree of wisdom
55. Origin of banana is.....
56.is the largest producer of banana in India.
57.is the example for naturally occurring parthenogenetic fruit.
58. Is the underground modified stem of banana
59.is lateral shoot developed from rhizome usually emerge close to the parent plant.
60.sucker of banana is characterised by broader leaves which do not produce a healthy banana lump with slender pseudostem.
61. Cutting pseudostem of sucker at ground level followed by application of kerosene is called.....
62. Providing support to the banana plant when it is at bunching state is called.....
63. Removal of male buds after the last set of fruit to increase bunch weight is.....
64. Spraying of.....@ 100 ppm after 7 month of planting increases fruit size and yield in banana
65.is the process of cutting the pseudostem after harvesting of bunches
66. Pseudostem weevil is a pest of.....
67. Panama wilt is a diseaseof.....
68. Banana bunchy top is diseases of.....
69. Banana bunchy top is caused by.....
70. Banana bunchy top is transmitted by.....
71. Ratna is a mango hybrid obtained by cross between.....and.....
72. Seedless variety of mango is.....

73. Polyembryony is found infruit crop.
74.is a major propagation methods of mango.
75. Scientific name of pineapple is.....
76. Fruit called golden queen is.....
77. Pineapple contain protein digestive enzyme called.....
78.is propagating material of pineapple
79. Multiple crown is found in.....due to soil and environmental reasons.
80. Endogenous brown spot/internal browning at base of fruit in pineapple is.....
81. Fruit from coffee tree is called.....
82. India produce.....percent of world coffee.
83.and.....are the 2 main varieties of coffee grown in India.
84.is the largest producer of coffee in India
85.variety of coffee is susceptible to major diseases.
86. Scientific name of pepper is.....
87. Which spice is called king of spices
88. Queen of spices is.....
89.is the highest producer of pepper in world.
90. Fruit type of pepper.....
91. Flower when pollinated by other flower of same spike, it is said to be.....
92. Maturation of female phase preceding the male phase by few days or weeks are called.....
93. Optimum temperature for pepper growth is.....
94.is the most popular variety of pepper among all other cultivars in Kerala.
95. Sreekara and shubhakara is a variety of
96. Pepper is propagated vegetatively by.....
97. To ensure root formation and development in pepper the cuttings are dipped in 1000 ppm solution of.....
98.is a method of propagation in pepper in which rooted cutting is grown on a vertical column.
99. Polly beetle is an important pest of.....crop.
100. Quick wilt in pepper is caused by
101. Scientific name of nutmeg is.....
102. IISR rajetha and mahima is a variety of.....
103. Modified stem of ginger is.....
104. IISR Vishwashree is a variety of.....

105.is a plant parasite found in nutmeg
106. Crimsoncoloured aril of nutmeg is.....
107. Scientific name of cardamom is.....
108. Cardamom belongs to family.....
109. Katte disease is caused by.....
110. Katte disease is transmitted by.....
111.variety is resistant to rhizome rot in cardamom
112.is a katte disease resistant variety of cardamom.
113. Scientific name of mangosteen is.....
114. Scientific name of rambutan is.....

2 marks

1. Write note on site selection in coconut.
2. List out varieties and hybrids of coconut.
3. Steps involved in selection of mother plant in coconut for propagation.
4. Write notes on spacing and layout of coconut planting.
5. Oil extraction in coconut.
6. List out diseases in coconut
7. Write down some points on importance of pepper.
8. Climate and soil in rubber cultivation.
9. List out Varieties in pepper.
10. Define green budding
11. Define brown budding
12. Define young budding.
13. Spacing in rubber planting.
14. Pruning in rubber.
15. Intercropping in rubber.

16. Mulching, shading and white washing in rubber.
17. Weed management in rubber.
18. List out important pests in rubber.
19. List out important diseases of rubber.
20. Write note on tapping implements.
21. Area, distribution and production of cashew.
22. List out the varieties of cashew.
23. Epicotyl grafting in cashew.
24. Air layering in cashew
25. Training and pruning in cashew.
26. High density planting in cashew.
27. Top working in cashew.
28. Pest and diseases in cashew.
29. Methods of planting in cashew.
30. Origin, area and distribution of banana.
31. Inflorescence of banana.
32. Types of suckers in banana.
33. List out important varieties of banana.
34. Write note on hardening in tissue culture.
35. High density planting in banana.
36. Desuckering and earthing up in banana.
37. Propping and denavelling in banana.
38. Trashing and bunch covering in banana.
39. Varieties and hybrids of mango.
40. Manuring in mango.
41. Bioregulators in mango cultivation.
42. Thinning and pruning in mango.

43. Major pests of mango.
44. Sunscald in pineapple
45. Define fasciation and multiple crown in pineapple.
46. Define black heart in pineapple.
47. Difference between arabica and robusta coffee
48. Manuring in coffee.
49. Pest and diseases in coffee.
50. Health benefits of pepper.
51. Floral biology of pepper.
52. Varieties of pepper.
53. Write note on kattedisease in cardamom
54. Column method of propagation in pepper.
55. Bush pepper
56. Serpentine method of layering in pepper.
57. Climate and soil for ginger cultivation.
58. Single bud sprout transplanting in ginger.
59. Seed propagation in nutmeg.
60. Vegetative propagation in nutmeg.
61. Botany of cardamom.
62. Production of quality planting material in cardamom.
63. Forking and mulching in cardamom.
64. Bee keeping in cardamom.
65. Pest and diseases in cardamom.
66. Climate and soil requirement of mangosteen.
67. Propagation methods in rambutan.
68. Training and pruning in rambutan.

4 marks

1. Write note on Hybrid production in coconut.
2. Describe harvesting in coconut.
3. Write briefly on vulcanization in rubber.
4. Write note on botany of rubber with help of labelled diagram.
5. Nutritional disorders in rubber
6. Write detailed procedure on tapping in rubber.
7. Write note on botany of cashew crop with help of labelled diagram.
8. Propagation methods in cashew.
9. Write short note on pruning of tea.
10. Botany of banana.
11. Steps involved in tissue culture banana production.
12. After cultivation practices in banana.
13. Other cultivation practices of banana
14. Write briefly on Propagation methods in mango
15. After cultivation practices of mango.
16. Use of bioregulators in mango.
17. Cultural practices of quality improvement in mango.
18. Describe flowering and ripening in mango.
19. Describe post harvest technologies in mango.
20. Write brief note on pest and diseases in coffee.
21. Botany of pepper.
22. Production of quality planting material in pepper.
23. Propagation methods in pepper.
24. Botany of nutmeg.
25. After cultivation practices in mango.
26. Pest, diseases and control measures in cardamom.

27. Write note on katte disease, symptom, causal organism, vector and management.
28. Harvesting and post harvest operations in cardamom.
29. Mangosteen fruit cultivation aspects.
30. Propagation and after cultivation practises in rambutan.
31. Global scenario of fruit production and export of banana
32. Cultural practises for quality improvement in banana.
33. Cultural practices for quality improvement in mango.
34. Industrial and export potential of pineapple.
35. List out pest and diseases of major spices in Kerala. Suggest some control measures.
36. Write down the characteristics of tall and Dwarf varieties of coconut.
37. Write note on pest and diseases of banana with control measures.

15 marks

1. Write elaborate note on propagation ,production of quality plant materials, nursery management, planting and aftercare of coconut.
2. Describe cultivation aspects of banana.
3. Write detailed note on propagation methods in rubber.
4. Write down detailed note on tissue culture in banana with the help of flow chart.
5. Describe grafting methods and planting systems in mango and cashew.
6. Write elaborate note on role of plant growth regulators in mango and ripening techniques in mango.
7. Write note on propagation,planting, intercultural operations, harvesting, yield, storage and ripening techniques in pineapple.
8. Write elaborate note on area, production, distribution and varieties and cultivation aspects of ofcoffee.
9. Describe pests and diseases of major plantation crops and it's management.
10. production if quality planting material and methods of propagation in pepper.
11. Describe Cultivation aspects of nutmeg.
12. Write elaborately on mangosteen,. Rambutan and durian cultivation in Kerala.
13. Cultivation aspects of pepper, cardamom.

14. Cultivation aspects of mango.

15. Cultivation aspects of pineapple.

.....

B. Voc. Agriculture
Semester II
Fundamentals of Seed Technology
Course code: SDC2AG06

One mark questions

1. Define seed
2. The liveness of a seed is known as
3. Define germinability
4. True to type nature of the seed is
5. Seed health
6. Genetical purity of Breeder seeds
7. Genetical purity of Foundation seeds
8. Genetical purity of Certified seeds
9. Physical purity for certification in maize
10. Physical purity for certification in Bhindi
11. Physical purity for certification in Groundnut
12. Objectionable weeds of paddy
13. Objectionable weeds of berseem
14. Optimum moisture for long term storage
15. Optimum moisture for short term storage
16. Systemized crop production is known as
17. Seed multiplication ratio
18. The quantity of quality seed that have replaced the actual seed requirement of the location that are normally produced by the farmer using their own seed
19. Three generation model of seed multiplication

20. Four generation model of seed multiplication
21. Five generation model of seed multiplication
22. Breeder seed
23. Foundation seed
24. Registered seed
25. Certified seed
26. Agency involved in Nucleus seed production
27. Tag colour of Breeder seed
28. Tag colour of Foundation seed
29. Tag colour of Certified seed
30. Tag colour of Truthful labelled seed
31. Seed multiplication ratio for paddy varieties
32. Seed multiplication ratio for paddy hybrids
33. Seed multiplication ratio for maize varieties
34. Seed multiplication ratio for maize hybrids
35. Tools used for hybrid seed production in Rice
36. Tool used for hybrid seed production in maize
37. Removal of staminal column, the male portion of the bisexual flower is referred to as
.....
38. The pollen from the male parent is dusted on the female parent which is referred to as
.....
39. Name the modified system of emasculation and dusting technique, where the male
and female lines are raised separately in blocks in hybrid seed production
40. Block system technique is practised in sunflower (T/F)
41. Block system technique is practised in cotton (T/F)
42. Detasseling technique is practised in
43. Emasculation and dusting technique is practised in tomato (T/F)
44. Prescribed distance which separates seed crop from the crop of lower standards
belonging to same variety or another variety is
45. Define isolation distance
46. Isolation distance requirement for paddy foundation seed
47. Isolation distance requirement for paddy certified seed
48. Isolation distance requirement for maize foundation seed
49. Isolation distance requirement for maize certified seed

50. Define roguing
51. Define off-types
52. The identification and removal of 'off-type' plants from seed crops termed as.....
53. A portion of the tassel is remaining in the plant while detasseling is termed as
54. Carrying out detasseling work when the tassel is within the leaves is termed as
55. The tassel is remaining in lower or unseen or unaccounted in within the whole of leaves is termed as
56. Define shedding tassel
57. Days for physiological maturation in paddy is
58. Days for physiological maturation in maize is
59. Days for physiological maturation in blackgram is
60. Physiological maturity symptom in paddy is
61. Physiological maturity symptom in maize is
62. Physiological maturity symptom in pulses is
63. Physiological maturity symptom in tomato is
64. Physiological maturity symptom in brinjal is
65. Period from physiological maturity to harvest is known as
66. Period from harvest to packaging is referred to as
67. Period from packaging to distribution is known as
68. Period during distributing and marketing is known as
69. Period from purchase to planting of seed is known as
70. Tetrazolium test is done to determine

Two mark questions

1. Differentiate seed and grain
2. Seeds as per Seed Act (1966)
3. Physical quality in seeds
4. Genetic purity in seeds
5. Physiological quality in seeds
6. Characters of a good quality seed

7. Significance of quality seed
8. Seed production
9. Difference between seed production and crop production
10. Paddy
 - a. Multiplication ratio
 - b. Seed renewal period
 - c. Seed multiplication stages
11. Enlist the factors affecting good quality seed production
12. Define
 - a. Breeder seed
 - b. Foundation seed
13. Define
 - a. Breeder seed
 - b. Registered seed
14. Define
 - a. Registered seed
 - b. Certified seed
15. Differentiate certified seed and truthful labelled seed
16. Hybrid
17. Heterosis
18. Enlist the principles involved in hybrid seed production
19. Pistillateness
20. Self-incompatibility
21. Enlist any four gametocides to induce male sterility artificially

22. Detasseling
23. Emasculation and dusting
24. Block system in hybrid seed production
25. Differentiate Synthetic and composite varieties
26. Define
 - a. Off types
 - b. Roguing
27. Differentiate improper tasseling and immature tasseling
28. Differentiate improper tasseling and incomplete tasseling
29. Differentiate incomplete tasseling and shedding tasseling
30. Differentiate single cross hybrid and double cross hybrid
31. Physiological maturation
32. Match the following with regard to the days for physiological maturation
 - a. Paddy i. 45 days
 - b. Maize ii. 27 – 30 days
 - c. Red gram iii. 30 days
 - d. Blackgram iv. 30 – 38 days
33. Write the physiological maturity symptoms in the following crops
 - a. Paddy
 - b. Maize
 - c. Pulses
 - d. Tomato
34. Harvestable maturation
35. Enlist the principles of seed storage

36. Match the following

- | | |
|--|---------------------------|
| a. Period from physiological maturity to harvest | i. On-farm segment |
| b. Period from harvest to packaging | ii. Distribution |
| c. Period from packaging to distribution | iii. Bulk seed segment |
| d. Period during distributing and marketing | iv. Packaged seed segment |
| e. Period from purchase to planting of seed | v. Post-maturation |

37. Storage conditions for seed storage

38. Storage of commercial seeds and carryover seeds

39. Write a brief note on seed packing in relation to seed storage

40. Write a brief note on classification of packing materials in relation to seed storage

Four marks questions

1. Measurement of hybrid vigour
2. Cytoplasmic genetic male sterility
3. Write briefly on lines involved in CGMS
4. Briefly describe
 - a. Detasseling
 - b. Emasculation and dusting
 - c. Block system in hybrid seed production
5. Briefly describe the agronomic principles of seed production
6. Briefly describe the genetic principles of seed production
7. Write a brief note on types of hybrids in maize
8. Write a short note on
 - a. Single cross hybrid
 - b. Double cross
 - c. Three way cross
 - d. Double cross hybrid
 - e. Double top crosses

9. Write short notes on
 - a. Improper tasseling
 - b. Immature tasseling
 - c. Incomplete tasseling
 - d. Shedding tasseling
10. Hybrid seed production in tomato
11. Write short notes on physiological maturity and harvestable maturity
12. Describe the segments of the storage period for seeds
13. Types of storage for seeds
14. Write short notes on
 - a. Seed packaging in relation to seed storage
 - b. Classification of packing materials
15. Explain briefly the various genetic contaminants in seed production
16. Briefly explain
 - a. Duration of plant breeder's right
 - b. Exemptions
17. Write a brief note on
 - a. Seed dormancy
 - b. Breaking the seed dormancy
18. Briefly explain types of seed treatments
19. Briefly explain the role of growth regulators in restoring seed viability
20. Write short on the following with regard to seed certification
 - a. Field inspection
 - b. Field counts

15 marks questions

1. Briefly describe the genetic and agronomic principles of seed production
2. Hybrid seed production in rice
3. Hybrid seed production in maize
4. Write a brief essay on seed production in groundnut
5. Write a brief essay on storage godowns and their maintenance
6. Write a brief essay on Seed village concept
7. Write a brief essay on Seed certification
8. Seed production in coconut

B.Voc Agriculture
3rd Semester Degree Examination
Course code : SDC3AG10
Course title: Integrated Pest Management in Crops.

One marks

1.is an organism that cause damage to the plant and result in the commercial lose to a plant or animal.
2. Expert assessment reveals that around% of yield lose in major crops is due to insect pest.
3. Insect belongs to phylum.....
4. Insect belongs to class.....
5.is the branch of zoology that deals with the study of insect.
6. The biological interaction in which organisms' prey on others for the food is called.....
7. External skeleton which support and protect the animal body is.....
8. Part of the body of insect between head and body is called.....
9. The paired appendages used for sensing in Arthropoda are.....
10. Chemical which is used for controlling pest and weeds are called.....
11.is a sustainable approach to manage pest by combining biological, cultural, physical and chemical tools.
12.are those characters that enable a plant to avoid, tolerate or recover from attacks of insects under condition that would cause greater injury to other plants of same species.
13. Host plant character responsible for non-preference of the insect for shelter, oviposition feeding etc. is called.....
14. Trichomes(hair) in cotton which is non preferred by white fly istype of host plant resistance mechanism.
15. Adverse effect of the host plant on biology of insect due to biochemical and biophysical factors present in it is called.....
16. DIMBOA against European corn borer is an example of.....
17.content in cotton have an adverse effect on biology of *Helicoverpaarmygera*.
18. Presence of sinigrin in plant control.....(pest name)
19. Ability of a plant to grow despite pest attack is called.....
20.is a cultural method of IPM.
21. Growing a single crop year after year in the same field gives the pest population sufficient time to become establish the damage level. This type of cultivation is called.....
22. Planting of susceptible crop around major crops as trap is called.....

23. Castor crop is raised around chillie/tomato to control fruit borer/sucking moth,here castor crop is called.....crop.
24. Intercropping and mixed cropping are examples of.....method of IPM.
25. Alternate wetting and drying of rice field eliminate (pest name)
26. Sanitation is involved inmethod of pest control.
27. Clipping tip of the rice seedling before planting eliminates egg masses of.....
28. Group of organism having same genotype is called.....
29. Reduction or suppression of insects population by means of manual operation or a mechanical device is called.....
30. Handpicking of egg masses or nymph and adult are practiced in.....method of ipm.
31. Adult of.....beetle can be hooked out from coconut by means of iron hook.
32. Passing a rope across rice crop is done so as to dislodge.....over standing water.
33.light trap produce primary UV, blue and green radiation with little red radiation against flying insects
34. In.....trap, synthetic sex pheromones are placed in traps to attract male insect.
35. Yellow sticky traps attract.....
36.oil is usually used in yellow sticky trap to trap insects.
37.trap help to trap insect moving on the soil surface, such as ground beetle.
38.trap is used by keeping them under grain surface to trap stored product insects.
39.is a method of controlling pest by using other organisms.
40.is an example for natural enemy of pest.
41.is an example of insect predator.
42.are the species whose immature stage develops on or within a single insect host, ultimately killing the host.
43.is an example of parasitoid in IPM
44. *Trichogrammasp* is a.....
45. To control grub of rhinoceros beetle, the site is treated with.....(biocontrol agent)
46. To control adult of rhinoceros beetle, the site is treated with.....(biocontrol agent)
47. Various microorganisms which causes disease in insects are called.....
48.is an example for entomopathogenic bacteria.
49. *Bt* in *Bt* cotton indicates.....
50. Those fungi that parasitize and kills insects are called.....
51.is also called white lacto fungus

52.is also called white muscardine fungus.
53.are virus that attack insect and other arthropods.
54. The virus particle of NPV are occluded in the protein body called.....
55. Adults ofis controlled by OBV
56. Entomopathogenic protozoa enters the insect body and kills the insect by causing
57.is an example for Entomopathogenic protozoa
58. *Vairimorphaneatrics* is a.....
59. Entomopathogenic nematodes belongs toandfamily.
60. Entomopathogenic nematodes have mutualist partnership with
61.is the legal restriction of movement of plant materials between countries.
62.is the quarantine stations of sea port.
63.is the quarantine stations of air port.
64.is the certificate issued by exporting country or state stating that particular material is free from pest ,diseases or weeds.
65.is applied to insect body for moisture loss in physical method of IPM
66.andradiation is used to make insect sterile.
67. Host insect used for mass multiplication of *trichogramma*is.....
68. Host insect used for mass multiplication of entomopathogenic nematode is.....is.....
69. Yellow stem borer is a major pest of.....
70. Dead heart and white ear head is a disease of.....
71. scientific name of rice leaf folder is.....
72. Hopper burn symptom of rice is associated with which pest.
73. Scientific name of rhinoceros beetle is.....
74. V shaped cut of leaf in coconut is a symptom caused by.....
75. Red palm weevil is a pest of.....crop
76.pest of coconut makes elongated galleries of silk and feacalfrass onundersides of leaflets and is sheltered within.
77. Polly beetle is a major pest of.....crop
78.is a pest of cardamom.
79. Tea mosquito bug is a serious pest of.....

2 marks

80. Define Integrated Pest Management.
81. What is plant protection?
82. Define pest. Draw flow chart representing classification of pest.
83. What is entomology?
84. Principles of IPM.
85. Draw labelled diagram of insect body and it's parts.
86. Aim and importance of IPM.
87. Tools of IPM.
88. Define Host Plant Resistance.
89. What is antixenosis?
90. Define tolerance.
91. List out methods of IPM.
92. Define cultural method of pest control.
93. Define biological method of pest control.
94. Define physical method of pest control.
95. Define mechanical method of pest control.
96. Define legal method of pest control
97. What is crop rotation?
98. Advantages and disadvantages of cultural method of pest control.
99. What is trap cropping?
100. What is mixed cropping?
101. Define light trap.
102. What is black light trap?
103. What is mercury vapour lamp light trap?
104. Define pheromone trap.
105. Define yellow sticky trap.
106. What is insect predator?
107. What is parasitoid?
108. Define entomopathogens.

109. Write about *Trichogramma sp.*
110. Biological control of rhinoceros beetle.
111. Write about *Bacillus thuriangensis*.
112. Define Entomopathogenic fungi.
113. Write about *Beauveria bassiana*.
114. Write about *Metarrhizium anisopliae*.
115. Define plant quarantine.
116. Quarantine acts of India..
117. Quarantine stations in India.
118. What is phytosanitary certificate ?
119. Define soil solarization.
120. List out major pest of rice.
121. List out major pest of coconut.
122. List out major pest of banana.
123. List out major pest of pepper.
124. List out major pest of cardamom.
125. List out major pest of brinjal.
126. Limitations of chemical control of pest.
127. Draw flowchart of classification of insecticide.
128. Define wettable powder.
129. What is emulsifiable concentrates?
130. Write about azadirachtin.

4 marks

1. Write note on general characteristics of insects.
2. Describe compatibility of Host Plant Resistance in IPM.
3. Write briefly on advantages and disadvantages of Host Plant Resistance as a component of IPM.
4. Describe legal method of control of pest in IPM.
5. Cultural method in IPM.
6. Describe mechanical method of control of pest.
7. Describe physical method of control of pest.
8. Types of light trap and its mechanism.

9. Example for biological control of major crops.
10. Write elaborate note on Entomopathogenic bacteria.
11. Write note on NPV, GV and OGV.
12. Describe entomopathogenic protozoa with the help of example.
13. Describe symptom of damage caused by major pest of brinjal.
14. Describe symptom of damage caused by major pest of pepper.
15. Describe management practices of major pest of cashew.
16. Describe management practices of major pest of cardamom
17. Working principle of sprayer.
18. Write note on Botanical insecticide.
19. Formulations of insecticide for field application.
20. Host plant Resistance.
21. Write note on synthetic insecticide.
22. Plant protection equipment.
23. Preparation of tobacco decoction.
24. Preparation of neem oil garlic emulsion.
25. Mass multiplication of green muscardine fungus.
26. Mass multiplication of *Metarrhiziumanisopliae*.
27. Chemical control-importance, hazards and limitations

15 marks

1. Write detailed note on host plant resistance, its mechanism and compatibility with other pest management practices. List out merits and demerits.
2. Write elaborate note on Integrated Pest Management.
3. Write detailed note on biological control of pest with the help of example.
4. Write elaborate note on entomopathogens.
5. Mass multiplication technique of *Trichogramma*, *Metarrhizium anisopliae*
6. Mass multiplication technique of entomopathogenic nematode and OBV
7. Write detailed note on distribution, host range, symptom of damage and management practices of major pest of rice.
8. Pest, symptom of damage, management of pest in coconut and pepper.
9. Write elaborate note on insecticides, its classification, organic insecticides and botanical insecticides.

10. Write elaborately about biocontrol agents.

B. Voc. Agriculture

Semester III

Protected cultivation of Horticultural crops

Course code: SDC3AG11

One mark questions

1. Define Greenhouse structure
2. Define greenhouse effect
3. Name the design used when a greenhouse is placed against the side of an existing building
4. Name the greenhouse of standard type and full-size structure where the two roof slopes are of equal pitch and width
5. Name the type of greenhouse which is constructed on hilly terrain
6. Name the design which uses two or more A-frame greenhouses connected to one another along the length of the eave
7. Name the design which is similar to ridge and furrow type greenhouses except that, there is provision for natural ventilation
8. Name the type of greenhouse, where the pipe arches or trusses are supported by pipe purling running along the length of the greenhouse
9. Green house types based on utility are and
10. Name two greenhouses that are categorized based on their shape
11. Name two greenhouse types based on construction
12. Name the greenhouses with span less than 6 m where only wooden framed structures are used
13. Name the type of greenhouse where pipes are used for construction of greenhouses, when the clear span is around 12m
14. Name the type of greenhouse where the span is greater than or equal to 15m and truss frames are used
15. Name the type of greenhouse where the covering material is glass
16. Name the type of greenhouse where the covering material is flexible plastic films
17. Name two flexible films used in the construction of plastic film greenhouses
18. Name two construction materials used in rigid panel greenhouses
19. Define greenhouse range
20. Define head house
21. Active summer cooling is achieved by evaporative cooling process (T/F)
22. Fan and pad system is an active summer cooling systems (T/F)
23. Fog cooling system is an active summer cooling system (T/F)
24. Pad in the fan and pad cooling system is made up of
25. Convection tube cooling is an active winter cooling system (T/F)
26. Horizontal air flow cooling is an active winter cooling system (T/F)
27. Name two active winter cooling systems
28. Name two active summer cooling systems
29. Name any two types of benches in greenhouse
30. Name any two types of raised benches
31. Name any two materials for benches
32. Give any two examples for portable benches

33. Give two examples for containers used in greenhouses
34. Give any two examples for plantable alternative containers
35. Give any two examples for compostable alternative containers
36. Give any two sources of alternative containers
37. Name the watering system which consists of a plastic pipe around the perimeter of a bench with nozzles that spray water over the substrate surface below the foliage
38. Name the watering system which can be used for crop production in benches or beds
39. Name the watering system used for the production of seedlings grown in plug trays
40. Plug trays
41. Durability of poly ethylene as a covering material for greenhouse
42. Durability of poly ethylene UV resistant as a covering material for greenhouse
43. Durability of fiber glass as a covering material for greenhouse
44. Durability of double strength glass as a covering material for greenhouse
45. Name the greenhouse structure which maintain humidity by continuous film of water
46. Instrument used in greenhouses to control relative humidity is
47. Instrument used in greenhouses to control temperature is
48. Define gravel culture
49. Define hot frame
50. Durability of polycarbonate as a covering material for greenhouse
51. Cold frames
52. Name any two fertilizer application methods
53. Name any two forms of inorganic fertilizers used in greenhouses
54. Sphagnum is also known as peat moss (T/F)
55. Gable
56. Greenhouse length
57. Greenhouse width
58. Ridge in a greenhouse
59. Low - tech greenhouse
60. Medium – tech greenhouse
61. Hi-tech greenhouse

Two marks questions

1. Enlist the types of greenhouse based on shape
2. Enlist the types of greenhouse based on utility
3. Enlist the problems of open field vegetable cultivation
4. Lean-to type greenhouse
5. Even span type greenhouse
6. Uneven span type greenhouse
7. Ridge and furrow type greenhouse
8. Saw tooth type greenhouse
9. Quonset greenhouse
10. Greenhouses for active heating
11. Greenhouses for active cooling

12. Greenhouse - Wooden framed structures
13. Greenhouse – Pipe framed structures
14. Greenhouse – Truss framed structures
15. Glass greenhouses
16. Plastic film greenhouses
17. Rigid panel greenhouses
18. Shading nets
19. Define
 - a. Greenhouse range
 - b. Head house
20. Enlist the four types of connected greenhouses
21. Draw a rough diagram of
 - a. Gutter connect even span
 - b. Gutter connect barrel vault
22. Enlist the four types of free standing greenhouses
23. Draw a rough diagram of
 - a. Even span
 - b. Quonset
 - c. Uneven span
 - d. Gothic arch
24. Rules of watering in greenhouses
25. Hand watering in greenhouses
26. Perimeter watering in greenhouses
27. Overhead sprinklers in greenhouses
28. Boom watering in greenhouses
29. Drip irrigation in greenhouses
30. Advantages of containers in greenhouse production
31. Fumigation in greenhouses
32. Media decontamination in greenhouses
33. Write short notes on

- a. Temperature control in greenhouses
- b. Relative humidity control in greenhouses
- 34. Write short notes with respect to greenhouses
 - a. Light intensity control
 - b. Quality of light
- 35. Briefly explain pre-cooling after harvest
- 36. Briefly explain sorting and grading
- 37. Briefly explain packaging
- 38. Briefly explain storage of greenhouse produce
- 39. Greenhouse utilization in off-season
- 40. Advantages of using computers as control systems in greenhouses
- 41. Fog cooling system

Four marks questions

- 1. Discuss the advantages of using the green house for growing crops under controlled environment
- 2. Write a brief note on
 - a. Green house structure
 - b. Greenhouse Effect
- 3. Classification of Greenhouse based on shape
- 4. Classification of greenhouse based on utility
- 5. Discuss the problems of open field vegetable cultivation
- 6. Write short notes on
 - a. Lean - to type greenhouse
 - b. Even span type greenhouse
- 7. Write short notes on
 - a. Even span type green house
 - b. Uneven span type green house
- 8. Write short notes on
 - a. Ridge and furrow type greenhouse
 - b. Saw tooth type green house
- 9. Write short notes

- a. Lean-to type greenhouse
- b. Quonset greenhouse
10. Classification of greenhouse based on utility
11. Classification of greenhouse based on construction
12. Classification of greenhouse based on covering materials
13. Write short notes on
 - a. Wooden framed structures
 - b. Truss framed structures
14. Write short notes on
 - a. Glass greenhouses
 - b. Shading nets
15. Write short notes on
 - a. Plastic film greenhouses
 - b. Rigid panel greenhouses
16. Discuss the structural parts of a greenhouse
17. Write short notes on
 - a. Planning of green house facility
 - b. Site selection and Orientation
18. Write short notes with regard to greenhouses
 - a. Rules of watering
 - b. Hand watering
19. Write short notes with regard to greenhouses
 - a. Perimeter watering
 - b. Boom watering
20. Write short notes with regard to greenhouses
 - a. Overhead sprinklers
 - b. Drip irrigation
21. Briefly explain the types of containers in greenhouses
22. Briefly explain types of alternative containers
23. Briefly explain benches in greenhouses
24. Briefly explain materials for benches in greenhouses
25. Fertigation in greenhouses
26. Media preparation and fumigation
27. Write short notes with respect to greenhouses
 - a. Temperature control

- b. Relative humidity control
 - c. Light intensity control
 - d. Quality of light
28. Briefly describe the fan and pad system in greenhouse
29. Briefly describe the heating systems in greenhouses
30. Briefly describe the post – harvest handling practices in cut flowers
31. Write short notes with regard to greenhouse produce
- a. Pre – cooling
 - b. Sorting and grading
 - c. Packaging
 - d. Storage
32. Greenhouse ventilation
33. Active winter cooling systems
34. Active summer cooling systems
35. Briefly explain special horticultural practices in greenhouse production

15 marks questions

1. Write a brief essay on the classification of green house
2. Write short notes on
 - a. Green house structure
 - b. Greenhouse effect
 - c. Advantages of using the greenhouse for growing crops
 - d. Classification of greenhouse based on shape
 - e. Classification of greenhouse based on utility
3. Explain with rough diagrams
 - a. Lean-to type greenhouse
 - b. Even span type greenhouse
 - c. Uneven span type greenhouse
 - d. Ridge and furrow type greenhouse
 - e. Saw tooth type greenhouse
 - f. Quonset greenhouse

4. Write short notes on
 - a. Planning of green house facility
 - b. Site selection and Orientation
 - c. Structural design
 - d. Covering materials
5. Write a brief essay on
 - a. Design criteria for construction of greenhouses
 - b. Construction of glass greenhouses
 - c. Construction of pipe framed greenhouses, material requirement
 - d. Procedure of erection of greenhouses
6. Write short notes on
 - a. Rules of watering in greenhouses
 - b. Hand watering in greenhouses
 - c. Perimeter watering in greenhouses
 - d. Overhead sprinklers
 - e. Boom watering
 - f. Drip irrigation
7. Write an essay on irrigation systems used in greenhouses
8. Write short notes on
 - a. Benches in greenhouses
 - b. Materials for benches
 - c. Containers and its advantages
 - d. Types of containers
 - e. Alternative containers