VELS UNIVERSITY



VELS INSTITUTE OF SCIENCE, TECHNOLOGY & ADVANCED STUDIES (VISTAS)

(Deemed to be University Estd. u/s 3 of the UGC Act, 1956)

NAAC ACCREDITED

PALLAVARAM - CHENNAI - INDIA

SCHOOL OF AGRICULTURE

Academic Regulations and Syllabus

BACHELOR OF SCIENCE (HONOURS) IN AGRICULTURE

OUTCOME BASED EDUCATION

2022

SCHOOL OF AGRICULTURE

Curriculum, Syllabus &Regulation, 2022

VISION

Nowadays, challenges of global warming, food security, nutritional security, sustainable development, degradation of natural resources, and low profitability for small and marginal farmers demand attention toward the global economy. Therefore, the research vision of the School of Agriculture, VISTAS has been targeted towards:

- Generating technologies to provide food, and nutrition security by using crop improvement and genetic engineering for high productivity and quality traits; conservation and development of bio-diversity.
- Conservation and optimal utilization of natural resources with a focus on soil health, input use efficiency, production technique to mitigate climate change, cropping and farming system development under resource constraints focusing on water resource management, integrated pest, and disease management, crop modeling, use of remote sensing and Geographical Information System (GIS).
- Postharvest process and value addition of crops, fruit, and vegetables to minimize losses and enhance commercialization of products through appropriate packaging, handling, and storage techniques.
- Enhancing profitability of small land holders through appropriate techniques, farming systems, processes, services, and commercialization of agriculture by involving entrepreneurs, minimizing of market chain, and emphasis on patent, IPR management, International trade, and exports.
- Developed ICT-based extension and communication networks for farmers and extension personnel and knowledge-based agricultural development.

MISSION

To contribute to the improvement of livelihoods of the rural and urban communities in Tamil Nadu by enhancing food and nutritional security and improving livelihoods to achieve sustainable increases in agricultural production, productivity, and income, while ensuring the efficient and judicious use of natural resources.

VELS INSTITUTE OF SCIENCE, TECHNOLOGY AND ADVANCED STUDIES

SCHOOL OF AGRICULTURE

Academic Regulations and Syllabus of B.Sc. (Hons.) Agriculture

(Applicable to the students admitted from 2022)

TITLE

1.1. These academic Regulations shall be called "Vels Institute of science, Technology And Advanced Studies (VISTAS), School of Agriculture, B.Sc. (Hons.) Agriculture Academic Regulations - 2022" for obtaining Bachelor Degree in the School of Agriculture.

1.2. The regulations provided herein shall apply to the students admitted from the academic year from 2022-23 onwards.

DEFINITIONS

2.1. Academic Year means a period consisting of two consecutive semesters including the inter-semester break as announced by the University/ Deans of respective colleges. The first year of study shall be the first and second semesters following a student's admission. The second year of study shall be the third and fourth semesters; the third year, the fifth and sixth semesters and the fourth year, the seventh and eighth semesters.

2.2. Coordinator means a teacher of the faculty who has been nominated by the Dean concerned to look after academic matters of a particular year of the degree programme. He/she will attend to registration, preparation of time tables, and distribution of courses, regulation of credit load and maintenance of individual student's records of the concerned batch of every year.

2.3. An academic counselor means a teacher of the faculty who has been nominated by the Dean for counseling a group of students in academic matters.

2.4. A curriculum is a group of courses and other specified requirements for the fulfillment of the degree program.

2.5. Curricula and Syllabi are a list of approved courses for the Degree Programme. Where each course is identified with a three-letter code, a course number, an outline of the syllabus, and credit is assigned.

2.6. The course is a teaching unit of a discipline to be covered within a semester as detailed in the Curricula and Syllabi issued by the School of Agriculture, VISTAS.

2.7. The credit Load of a student during a semester is the total number of credits of all the courses a student registers during that particular time in the semester.

2.8. A credit, in theory, means one hour of classroom lecture, and a credit in practical means two and a half hours of laboratory or workshop or fieldwork per week. For example, a 1+1 course (2 credits)

means 1hour of theory and 2½ hours of practical per week. As per the guidelines of UGC/ICAR, 30 students per batch will be allotted for practical classes.

2.9. Grade Point means the total marks in percentage obtained in a course divided by 10 and rounded to two decimal places.

2.10. Credit Point means the grade point multiplied by the credit load of the course.

2.11. Overall Grade Point Average (OGPA) means the total credit points of the courses completed by the student divided by the total credits of the courses. The OGPA is to be worked out and then rounded to two decimals.

2.12. Duration of Semester means each semester of 105 working days inclusive of the mid-semester and practical examinations but excluding the study holidays and final theory examinations.

2.13. The transcript card is the consolidated report of the academic performance of a student issued by the Vels Institute of Science, Technology and Advanced Studies (VISTAS) on completion of the curriculum.

2.14. Class Grade Chart means a grade chart prepared by the Controller of Examinations indicating marks obtained by the students belonging to a particular class for each course.

2.15. Statement of Marks means a report of grades, credit points, and OGPA obtained by a student in a particular semester.

2.16. Re-examination/Re-appearance is an examination written for the failed courses by a student without undergoing regular class/course.

ADMISSION

3.1. Admission of the student to B.Sc. (Hons.) Agriculture program in the School of Agriculture shall be based on merit and follow the policy and guidelines of ICAR and Vels Institute of Science, Technology and Advanced Studies (VISTAS). The minimum admission requirement shall be decided by the VISTAS and issued from time to time. The decision of the VISTAS is final in deciding the procedure of admission and finalization of the number of seats.

3.2. Tuition fees and other fees: The various fees payable by the students will be decided by the VISTAS from time to time.

In case of new admission, the fees for the semester are payable in advance failing which they will not be admitted.

In other cases, the fees are payable within seven working days from the commencement of the semester.

In the case of default, a fine as per the VISTAS rules will be collected.

The students who fail to pay the tuition fees within seven working days from the commencement of the semester will not be allowed to attend the classes and their names will be struck off from the rolls. However, if the defaulting students pay the fees along with the fines in addition to a prescribed readmission fee, they will be permitted to attend the classes. The period for which his/her name is removed from the rolls will be treated as an absence to calculate the minimum attendance (80%) requirements.

Students who are away on a study tour, camp activities or other extracurricular activities organized by the Institute or the faculty at the commencement of the semester may, however, pay their semester tuition fees and other fees within the third working day after they return from such programs, without a fine.

Scholarship: A student who has been granted scholarships by the Welfare Departments or by the Government of India or by the State Government will, however, be exempted from the levy of fines, provided the fees are paid on the next day after the scholarship amount is disbursed to him/her. The concession referred to above will apply to those who have been granted scholarships and not to those who have only applied and are expecting sanctions.

The candidate should obtain a Hall Ticket from the Controller of Examinations through the Dean after clearing all arrears including the hostel dues before the commencement of each semester's final examination.

SYSTEM OF EDUCATION

4.1. Maximum Duration Permissible: The system of education followed for all the undergraduate programs is the Semester System with a duration of four academic years (8 Semesters). The maximum duration permissible for a student shall be `n' plus four academic years (16 semesters), where ‘n’ denotes the normal duration of the degree program (8 semesters). The hostel facilities will be provided only for the actual duration of an academic program.

4.2. Credit Requirements: The minimum credit requirement for each Degree Programme is 180

4.3. Medium of Instruction: The medium of Instruction in the School of Agriculture shall be English.

4.4. Maximum Credit Load: A student can register for a maximum of 25 credits during a semester. An additional 1 or 2 credits shall be permitted at the discretion of the respective Deans of the colleges.

4.5. Course Teacher: The Dean concerned, in consultation with the respective Head of the Department, will nominate the course teacher for each course at the beginning of the semester. The course teacher shall be responsible to the Head of the Department in all matters connected with the conduct of the course. The Head of the Department will monitor the progress of the course(s) of the respective Department.

4.6. Academic Counselor: The Dean of the college will allot a group of not less than five students to the nominated Academic Counselor. The Academic Counselor will counsel the group of students in curricular and extra-curricular activities for the entire period of the degree program byconducting periodical meetings.

4.7. Class Time Table: At the beginning of each semester, the Dean of the college will prepare the class time table with the help of the Coordinator of the respective year.

4.8. Working Days and Time Schedule: Except Sundays and other listed holidays, all other days of the week including Saturdays are working days for the students. Normal Working Hours: 7.30 a.m. to 5.00 p.m. Depending upon the need, the respective Dean will decide about the timings. The schedule may vary in each teaching campus to suit the local needs.

4.9. Commencement and Closure of Semesters: The date of commencement and closure of semesters as well as inter-semester break shall be announced by the Dean of the School of Agriculture after the approval of the Deans's committee. The schedule of the final theory examinations shall be announced by the Controller of Examinations in consultation with the Dean ofthe School of Agriculture. The University through the Deans' Committee should approve any deviation after dates are announced.

4.10. Inter-semester Break: A break of about 15 (fifteen) days shall normally be allowed between any two consecutive semesters. A longer inter-semester break during summer may be allowed every year, subject to a maximum of 30 days during May - June.

4.11. Academic Calendar: A common academic calendar shall be prepared by the Faculty Dean (Agriculture) every year by including the date of registration, date of mid-semester examinations, final theory examinations, inter-semester break, and summer holidays for all the undergraduate programs. The Dean of the School of Agriculture shall schedule the academic activities within the specified period without deviation.

4.12. Condensation of Semesters: The Dean concerned has the responsibility to adhere to the common Academic Calendar. However, under an extraordinary situation upon the recommendation of the Dean's Committee and with the permission of the VISTAS, condensation of the semester may be made up to a maximum of 10 days to cope withthe examination schedule. The loss of classes in such cases should be compensated by a special timetable.

REGISTRATION OF COURSES

5.1. A course shall be offered only once in an academic year during the semester as listed in the course curricula and syllabi.

5.2. All eligible candidates shall register for the requisite courses at the beginning of each semester IN

PERSON under the guidance of the Co-ordinator. IN ABSENTIA registration will not be permitted under any circumstance.

5.3. Registration without fine: The courses prescribed for a semester can be registered on the date scheduled in the academic calendar. Registration is also permitted on the second day (which is the first working day of the semester) without a fine.

5.4. Registration with fine: Late registration shall be permitted by the Deans concerned for up to seven working days inclusive of the date of registration on payment of a late registration fee.

5.5. Procedure to get permission for late registration: The student concerned shall apply with proper reason to the Dean concerned through the Academic Counselor and Coordinator to get the permission of the Dean for the late registration of the courses. Beyond the prescribed time limit, no student shall be permitted to register for the courses for a particular semester.

5.6. For calculating 105 working days for a semester, the second day of registration will be counted as the first working day of the semester. For example,

Model

Date of Registration	:	02.12.2022 (Monday)	1st Day
Last date for Registration without fine	:	03.12.2022 (Tuesday)	
	:	04.12.2022 (Wednesday)	
	:	05.12.2022 (Thursday)	
	:	06.12.2022 (Friday)	
	:	07.12.2022 (Saturday)	
	:	08.12.2022 (Sunday)	
Last date for Registration with fine	:	09.12.2022 (Monday)	7th Day

ATTENDANCE REQUIREMENTS

6.1. A minimum of 80 percent attendance separately in theory and practical of the concerned course is a must, failing which the student shall not be permitted to appear for both final theory and practical examination in the course concerned and grade 'E' (incomplete) will be awarded. The student must re-register the course when offered again, with the permission of the Dean.

6.2. For the first year of first semester students, for calculating 80 percent attendance the number of working days will be calculated only from the date of joining of the student.

6.3. Students failing to attend the classes/ examinations on the unofficial ground will be treated as 'absent'. Hundred percent attendance is compulsory individually in each of the courses like RAWE, VSP, AITP, ADO/ADA/NGO placement and All India study tour, and similar other programs.

6.4. The PED, NCC/NSS courses shall be registered during the first semester and evaluated at the end of the fourth semester.

6.5. Students deputed for sports, cultural meets, etc., with the prior permission of the Dean of the colleges shall be given attendance for the period of absence. However, students under this category must have attended a minimum of 50% of classes in the total theory and practical classes conducted.

6.6. **Calculation of Attendance**

THEORY CLASS: The number of classes conducted for a course from the first working day as per the time table to the last theory class of that semester is to be construed as the total number of theory classes conducted by the course teacher. The mid-semester examinations are normally conducted during class hours. Attendance for the mid-semester examination will be counted as a theory class. Final theory examinations will be conducted after 105 working days.

PRACTICAL CLASS: The final practical examination will be conducted in the last practical class as per the time table which will not be considered as attendance for the practical class of a particular course. The student belonging to a batch will attend classes and earn attendance in the particular batch only as per the time table. No student shall be permitted to attend along with another batch to gain attendance either in theory or in practical.

EXAMINATIONS

7.1. The evaluation of a student's performance shall be made separately for each course registered by the student.

7.2. **Distribution of Marks**: Each course shall carry a maximum of 100 marks for grading. The distribution of marks shall be as follows.

S.No.	COURSES WITH BOTH THEORY AND PRACTICAL	MARKS
1.	Mid –Semester Examination	30
2.	Practical Examination	20
	Practical Marks Split up	
	Written	10
	Assignment / Specimen Collection	05
	Record / Viva - Voce	05
3.	Final Theory Examination	50
	Total	100
	COURSES WITH ONLY THEORY	
1.	Mid –Semester Examination	40
2.	Assignment	10
2.	Final Theory Examination	50
	Total	100
	COURSES WITH ONLY PRACTICAL	
1.	Mid –Semester Examination	40
2.	Assignment	10
2.	Final Practical Examination	50
	Total	100

7.2. **Evaluation of course work**: The results of the course shall be indicated by grade points ranging from 0 to 10.0. The minimum grade point to be secured for the successful completion of a course

will be 6.00. Securing a grade point less than 6.00 in a course will be treated as 'Re Appearance (RA)' and the grade point will be 0 for calculating the GPA/OGPA. In the case of course with theory and practical, a minimum of 50% mark separately in theory and practical with an aggregate of 60 percent is essential. An OGPA of 6.50 shall be the minimum requirement for the award of a Degree. The following symbols shall be used in the grade sheets.

E	Incomplete (Lack of Attendance)
AB	Absent
RR	Re-registration
RA	Re-appearance
IE	Improvement Examination
EE	Incomplete for reasons other than attendance

7.3. **Evaluation pattern for courses with only practical:**

The evaluation of courses with only practical's is grouped and mark distribution is tabulated. The pattern of questions is to be decided by the course teacher and external examiner. Wherever specimen collections are required a portion of marks shall be allotted either from written test marks or record marks. In the event of a difference of opinion between internal and external examiners, the Deans concerned shall decide the pattern of examination.

7.3.1**. PED101 PHYSICAL EDUCATION (0+1)**

The students will be evaluated for 100 marks. The course teacher will evaluate the performance and behavior of students in the classes and marks will be awarded at the end of the first semester as detailed below.

Particulars	**Max marks**
Attendance & routine activities	60
Behavior	10
Participation in tournaments / Camps	20
Viva-voce	10
Total	**100**

7.3.2.**PED 102 YOGA FOR HUMAN EXCELLENCE (0+1)**

Each student has to undergo 60 hours of face-to-face course work in a year.

Particulars	**Max marks**
Written Examination	40
Yoga Practical Examination	30
Viva –voce	10

Record	20
Total	**100**

7.3.3. **NSS/NCC (0+1)**

The duration of NCC /NSS training is for four semesters (I, II, III and IV).NCC/NSS courses shall be registered during the first semester and evaluated at the end of the fourth semester.

NSS

Each student enrolled in NSS should also attend at least one special camp not exceeding 10 days duration. 80% attendance is mandatory for attending special camp. Marks will be awarded as follows

Particulars		**Max marks**
NSS Regular Programme		
Semester I Semester II Semester III Semester IV	15 15 15 15	60
NSS Special Camp		
Attendance in daily activities during a special camp Special camp activity report *Viva - voce* on the 10th day of the special camp	30 05 05	40
Total		**100**

At the end of the fourth semester, the course teacher shall send the marks awarded to the Controller of Examinations through the Dean, School of Agriculture.

NCC

Each student enrolled in NCC should attend 10 parades per semester, thus 40 parades in four semesters.

S.No.	**Particulars**	**Sem I**	**Sem II**	**Sem III**	**Sem IV**	**Total**
1.	Regular activities and Behaviour	10	10	10	10	40
2.	Participation in camps and special assignments	5	5	5	5	20
3.	Written test and viva	10	10	10	10	40
	Total	**25**	**25**	**25**	**25**	**100**

7.3.4. **Graded and Non grades courses are as followed below;**

S.No.	COURSES WITH BOTH THEORY AND PRACTICAL (1+1), (2+1), (3+1)	MARKS
1.	Mid –Semester Examination	30
2.	Practical Examination	20
	Practical Marks Split up Written Assignment / Specimen Collection Record / Viva - Voce	 10 05 05
3.	Final Theory Examination	50
	Total	**100**
	COURSES WITH ONLY THEORY (1+0), (2+0)	
1.	Mid –Semester Examination	40
2.	Assignment	10
2.	Final Theory Examination	50
	Total	**100**
	COURSES WITH ONLY PRACTICAL (0+1), (0+2)	
1.	Mid –Semester Examination	40
2.	Assignment	10
2.	Final Practical Examination	50
	Total	**100**

7.3.5. **Rural Agricultural Work Experience (RAWE)**

Course on Rural Agricultural Work Experience (RAWE) will be offered in the VII Semester for eight weeks. The village attachment will be organized by the Department of Agricultural Extension. For each batch of students, there will be a designated RAWE Co-ordinator from the Department of Agricultural Extension, who will continuously guide, supervise and monitor the work of students during their placements in rural areas. The designated Teachers from the courses related to the subject matter areas will also visit and guide the students on technological aspects and solve the problems, which are beyond the competence of students as well as, evaluate the performance of the students on the concerned subject. They will also support the students during the extension educational activities.

The orientation program will be organized by different departments during the first week of the semester followed by Village attachment. The students would be required to record their observations in the field on daily basis and will prepare their project report based on these observations. For Agro-Industrial attachment, the students will be attached to Agro-based industries which are organized by Department of Agricultural Economics. The final examination will be conducted separately for each attachment at the end of the semester. The marks will be awarded as detailed below.

Components	VSP (60days)	ADA (10days)	NGO (10days)	Industry (10 days)	Total (90days)
Participation and oral presentation	30 marks	10 marks	10 marks	10 marks	60 marks
Record	10 marks	5 marks	5 marks	5 marks	25 marks
Overall exhibition	-	-	-	-	15 marks
Total	**40 marks**	**15 marks**	**15 marks**	**15 marks**	**100 marks**

7.3.6. **Educational Tours- AGR207(0+1) &AEX405(0+1)**

Educational tour courses AGR207 Study tour-I and AEX405 All India Tour (0+1) are compulsory. Those who miss the study tours for any valid reason must re-register and undertake the tour along with juniors to complete the degree program. The tourswill be taken during the fourth and seventh semesters, respectively. The duration of AGR207 shall not exceed 7 to 10 days and that of AEX405 shall not exceed 15 to 20 days. The study tour shall be conducted within 105 working days. The tours will be arranged by the respective departments of the study in consultation with the Dean, School of Agriculture. The final examination will be conducted separately at the end of the semester by the University. The Marks for the tours are to be awarded as follows

Particulars	Max marks
Attendance	10
Behavior	15
Tour diary	15
Tour record	15
Written examination	30
Viva -voce	15
Total	**100**

7.3.7.**Project Work**

Particulars	Evaluation	Marks
Research area identification and collection of literature	7th semester	20
Work done	8th semester	30

Report	8th semester	20
Presentation	8th semester	20
Viva voce	8th semester	10
Total		**100**

7.3.8.**Experiential learning**

These courses will be offered in the VIII semester. A student can choose any two experiential learning programs ofhis/her choice. The maximum number of students allowed to register in a department will be decided by the Dean depending on enrolment. If more number of students opt for the same department the particular subject mark is considered for selecting a student.Periodical evaluation of the above course will be done by the course teacher during different stages of work. The final evaluation of the above course will be done by the teacher in charge and another staff member appointed as examiner by the Head of the Department. The final examination will be conducted by the University before the commencement of regular final semester examinations.

Particulars	**Max marks**
Project Planning and Writing	10
Presentation	10
Regularity	10
Monthly Assessment	10
Output Delivery	10
Entrepreneurship skills	10
Technical Skill Development/ Business networking	20
Report Writing Skills	10
Final Presentation	10
Total	**100**

7.4. **Mid Semester Examination:** Writing the mid-semester examination is a prerequisite for writing the final theory and practical examinations. Students failing to write mid-semester examinations will not be permitted to attend the classes further in the course concerned and the student will be awarded 'E' grade. The mid-semester examination mark list should reach the office of the Controller of Examinations within fifteen days from the date of conduct of the mid-semester examination

7.5. **Missing Examination:** A student who fails to attend a mid-semester examination due to unavoidable circumstances shall be permitted with prior approval of the Dean to take up missing examination of the particular course, subject to payment of the fee for each missing mid-semester examination. Students deputed for official programs of the University are exempted from paying the fee for missing tests. Such missing examinations should be completed outside the regular class hours within 10 working days of the respective examinations. Attendance will not be given for

taking up missing examinations. The missing examinations are allowed only for mid-semester examinations and not for final theory and practical examinations.

7.6. **Theory Examination:** An examination schedule approved by the Dean and the Controller of Examinations for the mid-semester and final examinations, respectively, shall be final.

Duration for mid-semester and final theory examinations

Mid-semester : 1 hour

Final theory (Handwritten)

1+1, 2+1, 1+2 and 2+2 Credits	: 2½ hours (50 marks)
1+0, 2+0 and 3+0 Credits	: 3 hours (50 marks)
0+1 and 0+2 credits	: 3 hours (50 marks)

Exam pattern

Mid Semester examination – Hand written mode

Final Theory Examination – Hand written mode

7.7. **Practical Examination:** The Dean of Colleges will announce the schedule of final practical examinations. The Controller of Examinations, based on the proposal sent by the Deans concerned, will nominate the external examiner and the course teacher shall be the internal examiner. In the event of an external/ internal examiner nominated for practical examination could not conduct the examination, then the Dean concerned shall nominate an alternative examiner to conduct practical examination in anticipation of approval by the Controller of Examinations. Submission of bonafide practical records certified by the Course Teacher is a pre-requisite for appearing in the practical examinations failing which 'F' grade will be awarded. The duration of the practical examination shall be two and a half hours. The practical marks should be communicated to the Controller of Examinations within 10 days of the last working day. If a student fails to write practical examination, `F' grade will be awarded if he/she has 80% attendance. The student has to appear for the reappearance examination.

7.8. **Question Paper Setting and Evaluation**

The mid-semester question papers will be set and answer papers evaluated by the course teacher concerned and the mid-semester exam is on hand written.

The semester final theory question paper for all the courses will be set by the Controller of Examinations after obtaining question papers from external examiners outside the University. The evaluations of final theory papers are by internally.

The practical examination will be conducted and evaluated by the external examiner with the help of the internal examiner.

The Controller of Examinations will arrange for the evaluation of the semester final theory papers with external examiners.

7.9. **Postponement of Final Examination:** Whenever the Government declares holidays on the dates of final examinations, the examination that falls on the particular date will be postponed to the date after the last examination as per the original examination schedule.

7.10. **Improvement and Re-examination:** Improvement and re-examination are permitted only for the final theory and practical examinations. The students are permitted to write the improvement and re-examinations as and when conducted with the permission of the Dean of College. Improvement and re-examination fee of Rs. 500/ paper or as per VISTAS norms. A student is permitted to write either theory or practical examination alone or both in the reappearance examination for the failed subjects. A student is permitted to write a reappearance examination for the failed subjects only

three times during n+4 years duration excluding the regular final examination (Mid-term assignment and continuous evaluation record marks will be retained as such and the student must produce the evaluated record). In the event of a student failing to secure a pass in the three re-examinations permitted he/she has to re-register the course along with juniors. The registration for the improvement/re-examination shall be done on the date specified by the Controller of Examinations. Each registration is considered an attempt even if the student is absent from the examination. The latest theory / practical examination marks will be retained for the subsequent reappearance examinations for which the student has not opted.

The student having an OGPA of less than 6.50 is eligible to improve the grade point only once in courses with a grade point less than 8.00. A student who has an OGPA of 6.50 and above is not eligible to improve his/her grade points in any course. In case a student fails to secure a higher grade point in the subsequent attempts, the higher grade point secured by the student either in regular or improvement examinations will be accounted. Improvement and re-examination will not apply to the industry and institutional educational tours, RAWE, agro-industrial tie-up programs, crop production, NSS, NCC, and physical education courses. The camp requirement in NSS and NCC may be allowed along with juniors if the student has secured more than 80% attendance in the regular courses.

7.11. Mess due clearance certificate has to be produced by every student before taking the final examinations.

7.12. The minimum grade point to be secured for a pass in a course is 6.00.

7.13. A student has to maintain a minimum OGPA of 6.50 out of 10.00 at the end of the final year (VIII semester) to become eligible for the award of a degree.

7.14. Reappearance examination for the undergraduate failed subjects shall be conducted once in six months, during the semester breaks for 100 marks.

7.15. **Rules of evaluated answer papers**

The evaluated answer papers of the mid-semester shall be shown to the students after the examination. Discrepancies if any, in awarding marks, the student can approach the teacher concerned immediately, for rectification. The answer papers should be retained with the course teacher for six months and then disposed off.

Evaluated final theory answer papers may be retained for up to six months by the Controller of Examinations after the conduct of the examination and then disposed off. The same applies to improvement/re-examination also.

In the event of a candidate who has failed to secure the minimum required mark to pass in the subject shall be permitted to write the re-appearance either final theory or practical or both examinations.

A student who desires to forego the chance of improvement/re-examination is also permitted to reregister the failed courses as and when the course(s) are offered with the permission of the Dean concerned on payment of the re-registration fee as specified by the VISTAS.

7.16. **Revaluation/Re-totaling**

A student can submit a request for revaluation/ re-totaling in the prescribed format to the Controller of Examinations through the Dean concerned not later than ten working days after the issue of class grade charts to the student. Appeals received thereafter will be summarily rejected. The fee for revaluation or re-totaling per subject is to be paid in the form of a demand draft drawn in favor of the Controller of Examinations.

Revaluation is not permissible normally for practical examinations. However, the Dean of the college, if satisfied, may constitute a committee consisting of at least three faculty members to moderate the marks of practical examinations. The report of the committee in such cases should be submitted within two days. The decision of the Dean of the college shall be final.

7.17. **Late for Examinations**

The students who are late by 30 minutes shall not be allowed to enter the examination hall. Similarly, no student will be allowed to leave the examination hall within 30 minutes of the commencement of the examination.

DISCONTINUANCE AND READMISSION

8.1. A student who discontinues the first semester (I year) without getting permission from the Dean concerned will not be re-admitted. However, the student who discontinues the first semester (I year) for genuine reasons with the prior permission of the Dean (within 30 days) will be re-admitted in the first semester of the next year along with the junior batch (I year) of students with the approval of the Academic Council.

8.2. Students admitted to any of the courses discontinuing their studies with permission of the concerned Dean before completing the course may be re-admitted to the course, if they should have completed at least one semester before such discontinuance.

8.3. A student discontinuing studies temporarily on valid and genuine grounds with the prior permission of the Dean of the College will be awarded Grade 'E' for all the registered courses. The student has to rejoin with the permission of the Dean at the beginning of the same semester along with the junior batch of students on payment of a re-registration fee and semester fee.

8.4. When a student discontinues his/her studies in a semester (other than the first semester) on his/her own accord after getting the written permission of the Dean concerned or by the order of the University, he/she shall be re-admitted to the same semester where he/she discontinued, along with the junior batch of students.

8.5. In case of revision of curricula and syllabi the student has to complete all the course works in the original syllabus in which he/she has joined, by registering equivalent / special semester courses (or) the student has to forgo all the courses registered so far in the original curricula and syllabi and register all the courses from the first semester in the new syllabus along with juniors.

8.6. A student shall not be allowed to discontinue consecutively, beyond a period of two semesters. If the discontinuance period exceeds two semesters the name of the student will be removed from the enroll.

8.7. A student who discontinues a course in the undergraduate degree program is not eligible for admission again to any other undergraduate degree program of the University. An undertaking to this effect shall be obtained from the student by the Dean concerned at the time of discontinuation.

MALPRACTICES IN EXAMINATIONS AND MISCONDUCT OF STUDENTS

9.1. The Deans of the Colleges shall be responsible for dealing with all cases of unfair means by students in writing records, assignments, and examinations.

9.2. The invigilator or the course teacher concerned shall report each case of unfair means with full details of the evidence and written explanation of the student concerned to the Dean immediately.

9.3. The Dean shall take appropriate action on receipt of the report and the penalty may be as indicated below:

Students found using unfair means during the mid-semester examination may be debarred from the College for the remaining period of the semester and deemed to have failed in all the courses during the semester.

Students found using unfair means during the final theory / practical examination may be deemed to have failed in all the courses in that semester and also debarred from the College for the next semester.

For using unfair means of a serious nature (which will be decided by the committee nominated by the Dean concerned) warranting higher penalties than those indicated in clauses (a) and (b) the student may be debarred from the University for two semesters or more or permanently with the approval of the Vice-Chancellor. In such cases, the students concerned shall not be allowed to sit for the remaining examinations in the concerned course or other courses.

9.4. Details of each case together with all material evidence and recommendations of the Dean shall be communicated forthwith to the Registrar of the University. The Dean shall issue necessary orders and report each case falling under clauses (a), (b) and (c) the above to the Registrar immediately.

9.5. **Ragging Rules:** Students found involved in ragging or in any other misconduct, or if a complaint is received from the affected student(s) to that effect, will be immediately expelled from the current semester and the Dean shall further constitute a committee to probe and conduct enquiry into the matter and based on the report of the committee, the Dean shall pass the final orders on merit of case within three working days.

9.6. **Unlawful Activities:** In case of students found involved in any unlawful activities either within or outside the Hostel/College Campus, besides expulsion both from the Hostel and College, at the discretion of the Dean, the matter will be reported to the Police of the jurisdiction to be dealt with, in accordance with the appropriate law in force.

AWARD OF THE DEGREE

The degree namely B.Sc., (Hons.) Agriculture shall be awarded during convocation under the seal of the Vels Institute of Science, Technology and Advances Studies (VISTAS) to the students who have successfully completed the entire graduation requirement as detailed below.

The candidates should have undergone successfully the prescribed course of Study in the University. They shall further be required to have completed and passed 180 course credits and shall have earned an overall grade point average (OGPA) of 6.50 out of 10 for all courses completed in B.Sc. (Hons.) Agriculture degree programme. In addition to the above, students shall in the judgment of the Faculty, possess good conduct and character.

The University shall issue Provisional Certificate (PC) to the candidates after having passed all provisional examinations.

If the students fails to complete degree with in 8 years he/she has to be re-admission the course. The maximum duration for the course is 8years.

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B.Sc. (Hons.) AGRICULTURE

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

Graduates of the Agriculture program will,

PEO1: PREPARATION

To educate the students about the basics of agriculture and guide them to utilize the knowledge in tackling the problems in a scientific mode with a cost-effective approach.

PEO2: CORE COMPETENCE

To inculcate the reasoning power through understanding the fundamentals of agriculture and evaluate the practical problems in crop production, processing, storage, and marketing and make an appropriate decision based on technical and scientific knowledge acquired during education in solving any problem in practical agriculture. To understand the scientific aspects of agriculture and apply various technologies in research activities of crop improvement and adopting, and evolving new technologies.

PEO3: PROFESSIONALISM

To acquire knowledge and establish oneself as a successful and dynamic professional in the field of agriculture both locally and globally. To pursue higher study learning participation in post-graduation, and research programs and to utilize the knowledge for advancement in teaching, research, and innovation of Agriculture.

PEO4: SKILL

To provide various types of training and field demonstration to inculcate skills like proficiency in languages, technical communication, analytical capacity, and planning for research on various branches of agriculture both in the laboratory and field. To streamline the thinking ability to be a team leader, with a good interpersonal relationship and as a technical advisor.

PEO5: ETHICS

To apply ethical and social aspects of modern agriculture innovations by using various tools like genetic engineering, data collection and processing, and its application for higher agriculture production to make farming a commercial venture.

PROGRAMME OUTCOMES (PO) & PROGRAMME SPECIFIC OUTCOMES (PSO)

PROGRAMME OUTCOMES (PO)		
PO-1	**Domain Knowledge**	Impart knowledge of basic sciences, applied sciences, fundamentals in agriculture, and related fields.
PO-2	**Problem analysis**	To identify, review, analyze and formulate the problem in agricultural practices and post-harvest techniques.
PO-3	**Problem solutions**	Understand the impact of professional agricultural solutions in societal and environmental contexts, and demonstrate the knowledge and need for sustainable development. To demonstrate the capacity to think critically and select viable solutions to solve problems.
PO-4	**Conduct surveys and investigations**	Understand how all aspects of agriculture are linked by scientists, marketers, and producers to understand the production output and to make an economically viable decision. To understand how employer characteristics and decision-making at various levels enhance the success of an agricultural enterprise. To understand components of agri-business and economics of the market.
PO-5	**Usage of Modern Tools**	Knowledge of Weather codes and Symbols, Reading and Recording of weather and climatic data. To get trained to maintain climatological records, soil data, soil nutrition, and modern biotechnology usage in agriculture. Communication methods and to develop such products through the financial support of banks etc.,
PO-6	**Societal role**	To demonstrate research-based knowledge of the legal and ethical environment impacting agricultural organizations and exhibit an understanding and appreciation of the ethical implications of decisions.
PO-7	**Environment and Sustainability**	Demonstrate knowledge toan understanding of basic agriculture and horticulture production with the breadth and depth of the profession of agriculture and horticulture. Basic biology: taxonomy, anatomy, morphology, and physiology. The characteristics of the environment and their influence on plant growth and development. Current applications of agricultural and horticultural principles and practices for propagation, pest

		management, production, maintenance, and business practices. Comprehensive knowledge of agricultural and horticultural production.
PO-8	**Ethics**	To develop critical, self-critical opinions and approaches aiming at solving the most important practical problems in the field of agriculture by applying gained competencies and following high standards of academic integrity (ethics and morals) both in the profession and in society as a whole.
PO-9	**Individual and Team Work**	To demonstrate an understanding and appreciation for the importance, and impact of globalization and diversity in modern agriculture organizations. Understanding of globalization and NGO working. To develop competence to work in Government, public and private sectors as an individual and as a team for sustainable agriculture.
PO-10	**Communication**	To demonstrate the ability to analyze data and draw appropriate statistical conclusions. To demonstrate the ability to communicate effectively both orally and in writing.
PO-11	**Project Management and Finance**	Able to demonstrate critical thinking and prepare projects to solve the problem and apply them to a variety of farm animal and or plant production systems.
PO-12	**Life-long learning**	This program will also help students to enhance their employability for jobs in different sectors including self-employment as an agri-entrepreneur.
PROGRAMME of SPECIFIC OUTCOMES (PSO)		
PSO-1	Applying the knowledge of crop cultivation, crop improvement, soil and crop management for sustainable organic agricultural production and development.	
PSO-2	Analyzing and identifying complex agricultural problems and formulating ethical solutions using the principles of agricultural science, engineering, and business management.	
PSO-3	Developing innovative processes, products, and technologies to meet the challenges in Agriculture farming practices and through the transfer of technology using various extension tools.	

VISTAS - SCHOOL OF AGRICULTURE
Curriculum and Syllabus of B.Sc. (Hons.) Agriculture
(Applicable to the students admitted from 2022)

SEMESTER WISE COURSE & CREDIT DISTRIBUTION

I SEMESTER					
Sl. No	**Course No**	**List of Courses**	**Contact Periods**	**Credit hours**	**Course type**
1.	HOR 101	Fundamentals of Horticulture	56	2(1+1)	T/P
2.	BIC 101	Fundamentals of Plant Biochemistry and Biotechnology	72	3(2+1)	T/P
3.	SAC101	Fundamentals of Soil Science	72	3(2+1)	T/P
4.	AGF 101	Introduction to Forestry	56	2(1+1)	T/P
5.	BIO101	Introductory Biology*	56	2(1+1)*	T/P
6.	AGR 101	Fundamentals of Agronomy	88	4(3+1)	T/P
7.	MAT 101	Elementary Mathematics*	32	2(2+0)*	T
8.	AGR102	Agricultural Heritage*	16	1(1+0)*	T
9	AEX 101	Rural Sociology & Educational Psychology	56	2(2+0)	T
10.	TAM101/ ENG101	இலக்கியங்களில் வேளாண்மையும் அறிவியல் தமிழ்ப் பயனாக்கமும்/ Development Education	40	1(0+1)	P
11.	AHE 101	Human Values &Ethics (non gradial)	16	1(1+0)**	T
12.	NSS/ NCC/ PED 101	NSS/NCC/Physical Education & Yoga Practices**	80	2(0+2)**	P
TOTAL			**624**	**17+05*+03****	
II SEMESTER					
Sl. No	**Course No**	**List of Courses**	**Contact Periods**	**Credit hours**	**Course type**
1.	PBG 101	Fundamentals of Genetics	72	3(2+1)	T/P
2.	AGM 101	Agricultural Microbiology	56	2(1+1)	T/P
3.	AEG 101	Introductory Soil and Water Conservation Engineering	56	2(1+1)	T/P
4.	CRP 101	Fundamentals of Crop Physiology	56	2(1+1)	T/P
5.	AEC 101	Fundamentals of Agricultural Economics	32	2(2+0)	T
6	PAT 101	Fundamentals of Plant Pathology	88	4(3+1)	T/P
7.	AEN 101	Fundamentals of Entomology	88	4(3+1)	T/P
8.	AEX 102	Fundamentals of Agricultural Extension Education	72	3(2+1)	T/P
9.	ENG 102	Comprehension & Communication Skills in English	56	2(1+1)	T/P
10.	HOR 102	Production Technology for Vegetables and Spices	56	2(1+1)	T/P
11.	NSS/ NCC/ PED 101	NSS/NCC/ Yoga Practices**	80	2(0+2)**	P
TOTAL			**576**	**26(17+9)+**	

				2**	
III SEMESTER					
Sl. No	**Course No**	**List of Courses**	**Contact Periods**	**Credit hours**	**Course type**
1.	AGR 203	Crop Production Technology – I (Kharif Crops)	56	2(1+1)	T/P
2.	PBG 202	Fundamentals of Plant Breeding	72	3(2+1)	T/P
3.	AEC 202	Agricultural Finance and Cooperation	72	3(2+1)	T/P
4.	AGI 201	Agri-Informatics	56	2(1+1)	T/P
5.	AEG 202	Farm Machinery and Power	56	2(1+1)	T/P
6.	HOR203	Production Technology for Ornamental Crops, MAP and Landscaping	56	2(1+1)	T/P
7.	ENS 201	Environmental Studies and Disaster Management	72	3(2+1)	T/P
8.	MAT 202	Statistical Methods	56	2(1+1)	T/P
9.	AMP 201	Livestock and Poultry Management	88	4(3+1)	T/P
10.	NSS/ NCC	NSS/NCC**	80	2(0+2)**	p
TOTAL			**528**	**23(14+9)+ 2****	
IV SEMESTER					
Sl. No	**Course No**	**List of Courses**	**Contact Periods**	**Credit hours**	**Course type**
1.	AGR204	Crop Production Technology – I (Rabi Crops)	56	2(1+1)	T/P
2.	AEX 103	Communication Skills and Personality Development	56	2(1+1)	T/P
3.	AEG203	Renewable Energy and Green Technology	56	2(1+1)	T/P
4.	SAC202	Problematic Soils and their Management	32	2(2+0)	T
5.	HOR204	Production Technology for Fruit and Plantation Crops	56	2(1+1)	T/P
6.	SST203	Principles of Seed Technology	96	3(1+2)	T/P
7.	AGR205	Farming System & Sustainable Agriculture	16	1(1+1)	T/P
8.	AEC203	Agricultural Marketing Trade & Prices	72	3(2+1)	T/P
9.	AGR206	Introductory Agro-meteorology & Climate Change	56	2(1+1)	T/P
10.	OPT201	Elective Course	72	3 (2+1)	T/P
11.	AGR207	Short Tour**	20	1(0+1)**	P
12.	NSS/ NCC	NSS/NCC**	80	2(0+2)**	P
TOTAL			**588**	**22(11+8) + 3****	
V SEMESTER					
Sl. No	**Course No**	**List of Courses**	**Contact Periods**	**Credit hours**	**Course type**
1.	PAT302	Principles of Integrated Pest and Disease Management	72	3(2+1)	T/P

2.	SAC303	Manures, Fertilizers and Soil Fertility Management	72	3(2+1)	T/P
3.	AEN302	Pest of Crops and Stored Grains and their Management	72	3(2+1)	T/P
4.	PAT303	Diseases of Field and Horticultural Cropd and their Management - I	72	3(2+1)	T/P
5.	PBG304	Crop Improvement – I (Kharif Crops)	56	2(1+1)	T/P
6.	AEX304	Entrepreneurship Development and Business Communication	56	2(1+1)	T/P
7.	AGR308	Geo informatics and Nano-technology and Precision Farming	56	2(1+1)	T/P
8.	AGR309	Practical Crop Production – I (Kharif Crops)	80	2(0+2)	P
9.	APR301	Intellectual Property Rights	16	1(1+0)	T
10.	OPT 311-314	Elective Course	72	3 (2+1)	T/P
TOTAL			**624**	**21(12+09) + 3**	

VI SEMESTER

Sl. No	Course No	List of Courses	Contact Periods	Credit hours	Course type
1.	AGR310	Rainfed Agriculture & Watershed Management	56	2(1+1)	T/P
2.	AEG304	Protected Cultivation and Secondary Agriculture	56	2(1+1)	T/P
3.	PAT304	Disease of Field and Horticultural Crops and Their Management – II	72	3(2+1)	T/P
4.	HOR305	Post- harvest, Management and Value Addition of Fruits and Vegetables	56	2(1+1)	T/P
5.	AEN303	Management of Beneficial Insects	56	2(1+1)	T/P
6.	PBG305	Crop Improvement – II (Rabi Crops)	56	2(1+1)	T/P
7.	AGR311	Practical Crop Production – II (Rabi Crops)	80	2(0+2)	P
8.	AGR312	Principles of Organic Farming	56	2(1+1)	T/P
9.	AEC304	Farm Management, Production & Resource Economics	56	2(1+1)	T/P
10.	AFS301	Principles of Food Science and Nutrition	32	2(2+0)	T
11.	OPT 321-324	Elective Course	72	3 (2+1)	T/P
TOTAL			**648**	**21(11+10) +3**	

VII SEMESTER

Sl. No	Course No	Activities	No. of weeks	Contact periods	Credit hours	Course type
1.	AEX405	General orientation & On campus training by different faculties	1	320	20(0+20)	P
		Village attachment	8			
		Unit attachment in Univ./College. KVK/research	5			

		Station				
		Plant Clinic	2			
		Agro- Industrial Attachment	3			
2.	AGR414	Project Report Preparation, Presentation and Evaluation	1	40	1(0+1)	P
3.	AEX404	All India Tour*		40	1(0+1)*	P
TOTAL			**20**	**400**	**22(0+22)**	
VIII SEMESTER						
Sl. No	**Course Code**	**List of Courses**		**Contact Periods**	**Credit hours**	**Course type**
1.	AEL401	Module I - Experiential Learning Programme/		160	10(0+10)	P
2.	AHT401	Module II - Hands on training (HOT)		160	10(0+10)	P
TOTAL				**230**	**20(0+20)**	

Agro – Industrial Attachment: The students would be attached with the Agro-industries for a period of 3 weeks to get an experience of the industrial environment and working.

1. Educational tour will be conducted in break between IV & V Semester or VI & VII Semester.
2. Project work registered in VII semester onwards and it will be evaluated in VIII semester and the result declared along with VIII semester marks.

RAWE Component – I (Village Attachment Training Programme)

S.No:	Activity	Duration
1.	Orientation and Survey of Village	1 week
2.	Agronomical Intervention	1 week
3.	Plant Protection Interventions	1 week
4.	Soil Improvement Interventions(Soil sampling and testing)	1 week
5.	Fruit and Vegetable Production Interventions	1 week
6.	Food Processing and Storage interventions	1 week
7.	Animal Production interventions	1 week
8.	Extension and Transfer of Technology activities	1 week

RAWE Component – II

Agro Industrial Attachment

1. Students shall be placed in Agro and Cottage industries and Commodities Boards for 03 weeks.
2. Industries include Seed/ Sapling production, Pesticides-insecticides, Post harvest-processing-value addition, Agri-finance institutions, etc.

Activities and Tasks during Agro-Industrial Attachment Programme

1. Acquaintance with industry and staff y Study of structure, functioning, objective and mandates of the industry

2. Study of various processing units and hands-on trainings under supervision of industry staff
3. Ethics of industry
4. Employment generated by the industry
5. Contribution of the industry promoting environment
6. Learning business network including outlets of the industry
7. Skill development in all crucial tasks of the industry
8. Documentation of the activities and task performed by the students
9. Performance evaluation, appraisal and ranking of students

List of Elective Courses: A students can select three elective courses out of the following and offer during **IV**, V** and VI** semesters.**

Sl. No	Course Code	Title of the Elective courses	Credits
1.	OPT 201	Agribusiness Management	3(2+1)
2.	OPT 202	Agrochemicals	3(2+1)
3.	OPT 203	Commercial Plant Breeding	3(1+2)
4.	OPT 204	Landscaping	3(2+1)
5.	OPT 311	Food Safety and Standards	3(2+1)
6.	OPT 312	Biopesticides & Biofertilizers	3(2+1)
7.	OPT 313	Protected Cultivation	3(2+1)
8.	OPT 314	Micro propogation Technologies	3(1+2)
9.	OPT 321	Hi-tech. Horticulture	3(2+1)
10.	OPT 322	Weed Management	3(2+1)
11.	OPT 323	System simulation and Agro- advisory	3(2+1)
12.	OPT 324	Agricultural Journalism	3(2+1)

List of Experiential Learning Courses for Semester VIII**

Sl. No	Course Code	Title of the Module	Credits
1.	AEL 401	Production Technology for Bioagents and Biofertilizers	10(0+10)
2.	AEL 402	Seed Production and Technology	10(0+10)
3.	AEL 403	Mushroom Cultivation Technology	10(0+10)
4.	AEL 404	Soil, Plant, Water and seed Testing	10(0+10)
5.	AEL 405	Commercial Beekeeping	10(0+10)
6.	AEL 406	Poultry Production Technology	10(0+10)
7.	AHT 401	Commercial Horticulture	10(0+10)
8.	AHT 402	Floriculture and Landscaping	10(0+10)
9.	AHT 403	Food Processing	10(0+10)
10.	AHT 404	Agriculture Waste Mangement	10(0+10)
11.	AHT 405	Organic Production Technology	10(0+10)
12.	AHT 406	Commercial Sericulture	10(0+10)
Note: In addition to above ELP modules other important modules may be given to the students by SAUs.			

Total No. of Contact Hours : 4218 **Total No. of Credits : 184 - 191**

ABSTRACT OF DEPARTMENT –WISE CREDIT

S.No:	Group	Credits	
1.	Agronomy	21(10+11)	**10+12**
2.	Genetics and Plant Breeding	13(7+6)	**7+6**
3.	Soil Science and Agricultural Chemistry	8(6+2)	**6+2**
4.	Agricultural Entomology	9(6+3)	**6+3**
5.	Agricultural Economics	10(6+4)	**6+4**
6.	Agricultural Engineering	8(4+4)	**4+4**
7.	Plant Pathology	13(9+4)	**9+4**
8.	Horticulture	10(5+5)	**5+5**
9.	Food Science	2(2+0)	**2+0**
10.	Agricultural Extension	9(6+3)	**6+3**
11.	Biochemistry/Physiology/Microbiology/Environmental Sciences	12(7+5)	**7+5**
12.	Statistics, Computer Application and I.P.R	5(3+2)	**3+2**
13.	Animal Production	4(3+1)	**3+1**
14.	Language	3(1+2)	**1+2**
15.	Remedial Courses	04(Bio/Math): 01 (AH)	**4+1**
16.	NSS/NCC/Physical Education & Yoga Practices	6(0+6)	**0+6**
17.	Human Values & Ethics	1(1+0)	**1+0**
18.	Educational Tour	2(0+2)	**0+2**
Total		142+9 elective	142+9
RAWE and ELP+ Project		20+20+1	41
Grand Total		150+20+20+1=**192**	**192**

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DISCILINE-WISE COURSES

S.No:	Discipline/Course title	Credit Hours
	Agronomy	
1.	**Fundamentals of Agronomy**	4(3+1)
2.	**Introductory Agro-meteorology & Climate Change**	2(1+1)
3.	**Crop Production Technology – I (*Kharif* crops)**	2(1+1)
4.	**Crop Production Technology – II (*Rabi* crops)**	2(1+1)
5.	**Farming System & Sustainable Agriculture**	1(1+1)
6.	**Practical Crop Production - I *(Kharif* crops*)***	2(0+2)
7.	**Practical Crop Production - II *(Rabi* crops*)***	2(0+2)
8.	**Principles of Organic Farming**	2(1+1)
9.	**Geoinformatics and Nanotechnology and Precision Farming**	2(1+1)
10	**Rainfed Agriculture & Watershed Management**	2(1+1)
		10+12
	Genetics & Plant Breeding	
1	**Fundamentals of Genetics**	3(2+1)
2.	**Principles of Seed Technology**	3(1+2)
3.	**Fundamentals of Plant Breeding**	3(2+1)
4	**Crop Improvement-I (*Kharif* crops)**	2(1+1)
5.	**Crop Improvement-II (*Rabi* crops)**	2(1+1)
		7+6
	Soil Science & Agricultural Chemistry	
1.	**Fundamentals of Soil Science**	3(2+1)
2.	**Manures, Fertilizers and Soil Fertility Management**	3(2+1)
3.	**Problematic soils and their Management**	2(2+0)
		6+2
	Entomology	
1.	**Fundamentals of Entomology**	4(3+1)
2.	**Pests of Crops and Stored Grain and their Management**	3(2+1)
3.	**Management of Beneficial Insects**	2(1+1)
		6+3
	Agricultural Economics	
1.	**Fundamentals of Agricultural Economics**	2(1+1)
2.	**Agricultural Finance and Co-Operation**	3(2+1)
3.	**Agricultural Marketing Trade & Prices**	3(2+1)
4.	**Farm Management, Production & Resource Economics**	2(1+1)
		6+4
	Agricultural Engineering	
1.	**Soil and Water Conservation Engineering**	2(1+1)
2.	**Farm Machinery and Power**	2(1+1)
3.	**Renewable Energy and Green Technology**	2(1+1)
4.	**Protected Cultivation and Secondary Agriculture**	2(1+1)
		4+4
	Plant Pathology	

1.	**Fundamentals of Plant Pathology**	4(3+1)
2.	**Diseases of Field and Horticultural Crops and their Management-I**	3(2+1)
3.	**Diseases of Field and Horticultural Crops and their Management-II**	3(2+1)
4.	**Principles of Integrated Pest and Disease Management**	3(2+1)
		9+4
Horticulture		
1.	**Fundamentals of Horticulture**	2(1+1)
2.	**Production Technology for Fruit and Plantation Crops**	2(1+1)
3.	**Production Technology for Vegetables and Spices**	2(1+1)
4.	**Production Technology for Ornamental Crops, MAP and Landscaping**	2(1+1)
5.	**Post-harvest Management and Value Addition of Fruits and Vegetables**	2(1+1)
		5+5
Food Science & Technology		
1.	**Principles of Food Science & Nutrition**	2(2+0)
		2+0
Agricultural Extension and Communication		
1.	**Fundamentals of Agricultural Extension Education**	3(2+1)
2.	**Rural Sociology & Educational Psychology**	2(2+0)
3.	**Entrepreneurship Development and Business Communication**	2(1+1)
4.	**Communication Skills and Personality Development**	2(1+1)
		6+3
Biochemistry / Physiology / Microbiology/ Environmental Sciences		
1.	**Fundamentals of Plant Biochemistry and Biotechnology**	3(2+1)
2.	**Fundamentals of Crop Physiology**	2(1+1)
3.	**Agricultural Microbiology**	2(1+1)
4.	**Environmental Studies & Disaster Management**	3(2+1)
5.	**Introduction to Forestry**	2(1+1)
		7+5
Statistics, Computer Application and I.P.R.		
1.	**Statistical Methods**	2(1+1)
2.	**Agri- Informatics**	2(1+1)
3.	**Intellectual Property Rights**	1(1+0)
		3+2
Animal Production		
1.	**Livestock and poultry Management**	4(3+1)
		3+1
Language		
1.	**Comprehension & Communication Skills in English (Gradial course)**	2(1+1)
2.	**இலக்கியங்களில் வேளாண்மையும் அறிவியல் தமிழ்ப் பயனாக்கமும்/ Development Education**	1(0+1)
		1+2
Remedial Courses		
1.	**Agricultural Heritage**	1(1+0)
2.	**Introductory Biology**	2(1+1)
3.	**Elementary Mathematics**	2(2+0)
		4+1

Non-Gradial Courses		
1.	**NSS/NCC/Physical Education & Yoga Practices**	6(0+6)
2.	**Human Values & Ethics**	1(1+0)
3.	**Educational Tour**	2(0+2)
		1+8

NEW COURSES

Sl. No	Course Title	Credit Hours
1.	Geoinformatics, Nanotechnology and Precision Farming	2(1+1)
2.	Rainfed Agriculture and Watershed Management	2(1+1)
3.	Problematic Soils and their Management	2(2+0)
4.	Renewable Energy and Green Technology	2(1+1)
5.	Management of Beneficial Insects	2(1+1)
6.	Fundamentals of Horticulture	2(1+1)
7.	Introduction to Forestry	2(1+1)
8.	Agri-Informatics	2(1+1)
9.	Intellectual Property Rights	1(1+0)
10.	Principles of Food Science & Technology	2(2+0)
11.	Communication Skills and Personality Development	2(1+1)
12.	Principles of Integrated Pest & Diseases Management	3(2+1)
13.	Agricultural Heritage	1(1+0)*
14.	Introductory Biology	2(1+1)*
15.	Elementary Mathematics	2(2+0)*
16.	Human Values & Ethics(NG)	1(1+0)**

***Remedial courses** ****Non-gradial courses**

SYLLABUS FOR B.Sc (Hons.) Agriculture

I YEAR I SEMESTER				
1.	22CHOR11	Fundamentals of Horticulture	2(1+1)	Employability
2.	22CBTC12	Fundamentals of Plant Biochemistry and Biotechnology	3(2+1)	Employability
3.	22CSAC13	Fundamentals of Soil Science	3(2+1)	Employability
4.	22CAGF14	Introduction to Forestry	2(1+1)	Skill Development
5.	22CBIO15	Introductory Biology*	2(1+1)*	Employability
6.	22CAGR16	amentals of Agronomy	4(3+1)	Employability
7.	22CMAT17	Elementary Mathematics*	2(2+0)*	Employability
8.	22CAHR18	Agricultural Heritage*	1(1+0)*	Employability
9	22CAEX19	Rural Sociology & Educational Psychology	2(2+0)	Skill Development
10.	22PTAM11	□□□□□□□□□□□□□□□ □□□□□□□□□□□□□ □□□□□□□□□ □□□□□□□□ □□□□□□□□□□□□□/ Development Education	1(0+1)	Skill Development
11.	22CAHE01	Human Values &Ethics (non gradial)	1(1+0)**	Skill Development
12.	22PPED12	NSS/NCC/Physical Education & Yoga Practices**	2(0+2)**	Skill Development
	TOTAL		**17+05*+03****	

I - SEMESTER

22CHOR11 - FUNDAMENTALS OF HORTICULTURE

COURSE OBJECTIVES

1. To inculcate the basic concepts, technical knowledge of horticultural operations
2. To impart knowledge in various branches and classification of horticulture

THEORY:

UNIT I - BASICS OF HORTICULTURE

Definitions - scope and importance of horticulture – division -classification of horticultural crops – fruits, vegetables, spices and plantation crops, floriculture, landscaping, ornamental gardening, medicinal and aromatic crops – soil and climate for horticultural crops

UNIT II - PLANT PROPAGATION AND PROPAGATION STRUCTURES

Plant propagation – importance, advantages and disadvantages – sexual propagation - seed dormancy– seed treatments– seed germination - asexual propagation -use of specialized plant parts in propagation - scope and importance of micro propagation in horticultural crops - propagation structures and their role

UNIT III - ORCHARD ESTABLISHMENT

Principles of orchard establishment - methods of planting systems including HDP and UHDP in horticultural crops – crop regulatory practices for horticultural crops –methods of training and pruning - juvenility – flower bud differentiation.

UNIT IV - POLLINATION AND FRUIT SET

Flowering behaviour – pollination – fertilization - fruit set - fruit drop - parthenocarpy - unfruitfulness and its causes

UNIT V - PLANT GROWTH REGULATORS AND NUTRIENTS MANAGEMENT

Plant bio-regulators in horticulture – methods of irrigation and fertilizer application in horticultural crops

PRACTICAL

Identification of garden tools. Identification of horticultural crops. Preparation of potting mixture. Preparation of seed bed/ nursery bed. Practice of sexual and asexual methods of propagation including micro-propagation. Layout and planting of orchard. Training and pruning of fruit trees. Fertilizer application in different crops. Visits to commercial nurseries/orchard.

COURSE OUTCOMES (COs)

1. To know the definition of horticulture, branches and classification of horticulture

2. To acquire knowledge on various propagation techniques

3. To get practical knowledge on nursery and orchard layout

4. To learn the different types of planting systems, training, pruning and special horticultural practices

5. Demonstrate fertilizer and irrigation scheduling and special horticultural operations like training, pruning etc.,

REFERENCES

1. Adams, C.R. and M. P. Early. 2004. Principles of horticulture. Butterworth – Heinemam, Oxford University Press.
2. Kumar, N.1997. Introduction to Horticulture, Rajalakshmi Publications, Nagercoil.
3. George Acquaah, 2002. Horticulture – principles and practices. Prentice Hall of India Pvt. Ltd., New Delhi.
4. Hartman, H.T. and Kester, D.E. 1986. Plant propagation – Principles and Practices – Prentice Hall of India Ltd., New Delhi.

E - RESOURCES

1. http://aggie-horticulture,tamu.edu/propagation/propagation.html
2. http://www/britannica.com/
3. http://www.horticulture.com.au/export/hmac.asp
4. http://www.horticultureworld.net/hort-india.htm

22CBTC12 - FUNDAMENTALS OF PLANT BIOCHEMISTRY AND BIOTECHNOLOGY 3(2+1)

COURSE OBJECTIVES

1. To introduce the basic knowledge of plant biotechnology and plant biochemistry
2. To introduce the history of plant tissue culture, preparation of solution, various biochemical test.
3. To introduce the recent advances in plant biotechnology.
4. To familiar them tissue culture laboratory, basic techniques of biotechnology.

THEORY:

UNIT I IMPORTANCE OF BIOCHEMISTRY – CARBOHYDRATES AND PROTEINS.

Importance of Biochemistry. Properties of Water, pH and Buffer. Carbohydrate: Importance and classification. Structures of Monosaccharides, Reducing and oxidizing properties of Monosaccharides, Mutarotation; Structure of Disaccharides and Poly saccharides. Lipid: Importance and classification; Structures and properties of fatty acids; storage lipids and membrane lipids. Proteins: Importance of proteins and classification; Structures, titration and zwitterions nature of amino acids; Structural organization of proteins.

UNIT II ENZYMES AND NUCLEIC ACIDS

Enzymes: General properties; Classification; Mechanism of action; Michaelis & Menten and Line Weaver Burk equation & plots; Introduction to allosteric enzymes. Nucleic acids: Importance and classification; Structureof Nucleotides, A, B & Z DNA; RNA: Types and Secondary & Tertiary structure. Metabolism of carbohydrates: Glycolysis, TCA cycle, Glyoxylate cycle, Electron transport chain. Metabolism of lipids: Beta oxidation, Biosynthesis of fatty acids.

UNIT III CONCEPT OF PLANT BIOTECHNOLOGY AND TISSUE CULTURE TECHNIQUES:

Concepts and applications of plant biotechnology: Scope, organ culture, embryo culture, cell suspension culture, callus culture, anther culture, pollen culture and ovule culture and their applications; Micro-propagation methods; organogenesis and embryogenesis, Synthetic seeds and their significance; Embryo rescue and its significance;

UNIT IV SOMATIC HYBRIDIZATION AND SOMACLONAL VARIATION

somatic hybridization and cybrids; Soma clonal variation and its use in crop improvement; cryo-preservation.

UNIT V DNA RECOMBINANT TECHNOLOGY AND DNA MARKERS

Introduction to recombinant DNA methods: physical (Gene gun method), chemical (PEG mediated) and Agrobacterium mediated gene transfer methods; Transgenics and its importance in crop improvement; PCR techniques and its applications; RFLP, RAPD, SSR; Marker Assisted Breedingin crop improvement; Biotechnology regulations.

PRACTICAL:

Preparation of solution, pH & buffers, Qualitative tests of carbohydrates and amino acids. Quantitative estimation of glucose/ proteins. Titration methods for estimation of amino acids/lipids, Effect of pH, temperature and substrate concentration on enzyme action, Paper chromatography/ TLC demonstration for separation of amino acids/ Monosaccharides. Sterilization techniques. Composition of various tissue culture media and preparation of stock solutions for MS nutrient medium. Callus induction from various explants. Micro-propagation, hardening and acclimatization. Demonstration on isolation of DNA. Demonstration of gel electrophoresis techniques and DNA finger printing

COURSE OUTCOMES (COs)

1.Able to know what the basic technologies are involved in plant biochemistry and biotechnology as well as how these technologies are used for the production of useful products

2. Students can figure out the measures to prevent the various stresses of any crop, how to identify resistant sources.

3. Know how to isolate DNA form the leaf and how to identify biochemical given in a sample.

4. Know the role various role of bio-molecules such as carbohydrate, protein, lipid etc in life.

5. They can use their skills for the identification of resistant sources for various stresses

REFERENCES

1. Berg JM, Tymoczko JL and Stryer L, (2007), Biochemistry, 7th Ed. Wiley EasternLtd. ISBN:0-7167-8724-5.
2. Thayumanavan, B, Krishnaveni, S and Parvathi, K, (2004), Biochemistry for Agricultural Sciences, Galgotia Publications Pvt Ltd., New Delhi. ISBN :81-7515-459-4.

E-REFERENCES

1. Cox, MM and Nelson, DL. (2011), Principles of Biochemistry, Fourth (Indian edition) Macmillian, Worth Publishers. http://bcs.whfreeman.com/lehninger6e -Web links/ Tutorials/ Lecture companion Art.
2. Harper's illustrated Biochemistry -https:// free med e-books. files.wordpress.com/2014/01/ harpers-illustrated-biochemistry-28th-edition.pdf

22CSAC13 - FUNDAMENTALS OF SOIL SCIENCE 3(2+1)

COURSE OBJECTIVES

1. To gain basic knowledge of soil fertility and productivity
2. To study Importance or Significance of soil macronutrient and micronutrients
3. To Assess and develop importance of soil physical and chemical properties
4. To study about soil pollution and mitigation process

THEORY:

UNIT I - CONCEPT OF SOIL

Soil as a natural body, Pedological and edaphological concepts of soil. Components of soil. Soil genesis: Composition of Earth's crust- soil forming rocks and minerals – Primary and secondary minerals. Weathering of rocks and minerals. Factors of soil formation. Soil forming processes. Soil Profile.

UNIT II - PHYSICAL PROPERTIES OF SOIL

Soil physical properties: Soil texture, structure, density and porosity, soil colour, consistence and plasticity. Soil water retention, movement and availability.

UNIT III - COMPOSITION OF SOIL

Soil air, composition, gaseous exchange-problem and its effect on crop growth. Source, amount and flow of heat in soil, Soil temperature and crop growth.

UNIT IV - PHYSICO CHEMICAL AND CHEMICAL PROPERTIES

Soil physico chemical and chemical properties: Soil reaction-pH, soil acidity and alkalinity, buffering, effect of pH on nutrient availability. Electrical conductivity. Soil colloids - inorganic and organic. Silicate clays: constitution and properties, sources of charge, ion exchange, cation and anion exchange capacity and base saturation.

UNIT V - SOIL POLLUTANTS

Soil organic matter: composition, properties and its influence on soil properties. Humic substances - nature and properties. Soil Biology : Soil organisms : macro and micro organisms, their beneficial and harmful effects. Soil enzymes. Soil pollution – Types and behaviour of pesticides. Inorganic contaminants. Prevention and mitigation of soil pollution.

PRACTICAL :

Study of soil sampling tools, collection of representative soil sample, its processing and storage, Study of soil profile in field, Study of soil forming rocks and minerals.Determination of soil density and porosity, Determination of soil colour and moisture content and porosity, Determination of soil texture by feel and

Bouyoucos Methods, Determination of soil texture by International pipette method, Studies of capillary rise phenomenon of water in soil column and water movement in soil (Infiltration Rate),Studies of capillary rise phenomenon of water in soil column and water movement in soil (Hydraulic conductivity),Determination of soil temperature and demonstration of heat transfer, Preparation and standardization of laboratory reagents, indicators and buffers, Determination of soil pH and electrical conductivity, Determination of cation exchange capacity of soil – I, Determination of cation exchange capacity of soil – II, Estimation of soil organic carbon, Study of soil map (India and Tamil Nadu)

COURSE OUTCOMES (COs)

1. To know the basics of soil crust and formation.
2. To know the basic components of soil and definitions.
3. To become acquainted with basic soil physico chemical properties.
4. To understand about the soil organic matter and microorganism interaction.
5. To understand about different soil pollution and reclamation.

REFERENCES

1. Brady, N.C. and Raymond, C.Weil. 2013. The Nature and Properties of Soils (14th Edition). Pearson Education, Inc. Publishing as Prentice Hall.
2. Fundamentals of Soil Science. 2009. ISSS Publication, New Delhi.
3. Sehgal, J. 2005. Pedology concepts and applications, Kalyani Publishers, New Delhi.
4. Das, D.K. 2013. Introductory Soil science, Kalyani Publishers, New Delhi.

E-REFERENCES

1. http://www.sciencedirect.com/science/books
2. http://202.200.144.17/sykc/hjx/content/ckzl/6/2.pdf
3. http://www.pedosphere.com/volume01/pdf/Section._01.pdf
4. http://waterquality.montana.edu/docs/homeowners/Septic Drain field Soil Suitability, Presentations /6 _Soil Texture and_Structure.pdf
5. http://wfrec.ifas.ufl.edu/landscape_horticulture/PDFdocuments/SoilProp.pdf

22CAGF14 - INTRODUCTION TO FORESTRY 2(1+1)

COURSE OBJECTIVES

1. Introduction to Forestry provides important global resources that a wide range of environmental, economic and social benefits.
2. The variety of valuable products, such as timber, fuel, wood, fiber and other wood and non-wood forest products, and contribute to the livelihoods of rural communities.

THEORY:

UNIT I - INTRODUCTION

Introduction–definitions of basic terms related to forestry, objectives of silviculture, forest classification, salient features of Indian Forest Policies.

UNIT II - FOREST REGENERATION

Forest regeneration, Natural regeneration -natural regeneration from seed and vegetative parts, coppicing, pollarding, root suckers; Artificial regeneration – objectives, choice between natural and artificial regeneration, essential preliminary considerations. Crown classification. Tending operations – weeding, cleaning, thinning –mechanical, ordinary, crown and advance thinning.

UNIT III - FOREST MENSURATION

Forest mensuration – objectives, diameter measurement, instruments used india meter measurement; Non instrumental methods of height measurement-shadow and single pole method.

UNIT IV - INSTRUMENTAL METHOD

Instrumental methods of height measurement - geometric and trigonometric principles, instruments used in height measurement; tree stem form, form factor, form quotient, measurement of volume of felled and standing trees, age determination of trees.

UNIT V - AGRO FORESTRY

Agroforestry – definitions, importance, criteria of selection of trees in agroforestry, different agroforestry systems prevalent in the country, shifting cultivation, taungya, alley cropping, wind breaks and shelter belts, home gardens Cultivation practices of two important fast growing tree species of the region.

PRACTICAL:

Identification of tree-species, Diameter measurements using calipers and tape, Diameter measurements of forked method, Diameter measurements of buttressed method, Diameter

measurements of fluted method, Diameter measurements of leaning trees, Height measurement of standing trees by shadow method, Height measurement of single pole method, Height measurement of hypsometer, Volume measurement of logs using various formulae, Seed treatment techniques of forest tree seeds, Seed hardening techniques of forest tree seeds, Nursery layout, seed sowing of forest tree species, Vegetative propagation techniques of forest tree species, Forest plantations and their management, Visits of nearby forest based industries.

ASSIGNMENT

- Collection and preparation of 50 numbers agro-forestry trees well preserved herbarium specimens
- Collection of agro-forestry seeds of 10 numbers.

COURSE OUTCOMES (COs)

1. To know the basic definition and classification of forestry.
2. To be aware of the importance of forestry.
3. To know the techniques of tree measurement
4. To acquires different techniques of tree measurement
5. To perceive agroforestry and shifting cultivation.

REFERENCES:

1. Introduction to Forestry by C. Nagamani S.R. Reddy, kalyani publication
2. Indian Forestry A Breakthrough Approach to Forest Service - 8th Edition, IFS K. Manikandan, S Prabhu (Author), Jain brothers publication.

E-REFERENCES

1. http://icar.res.in
2. ww.icar.org.in/nasm.html

22CBIO15 - INTRODUCTORY BIOLOGY 2(1+1)

COURSE OBJECTIVES

1. Basic concepts of diversity, characteristics and origin of living world
2. Knowledge of evolution and eugenics
3. Knowledge of flowing plants, seed and seed germination
4. Significance of crop and animals and its classifications
5. Basic concepts of Binomial nomenclature and classification Cell and cell division

THEORY:

UNIT I - THE LIVING WORLD, BIOLOGICAL CLASSIFICATION, PLANT KINGDOM, DIVERSITY OF LIFE, EVOLUTION AND EUGENICS

Introduction to the living world - Diversity in the living world - Taxonomic Categories – Taxonomical Aids -diversity and characteristics of life – Biodiversity - **genetic diversity,species diversity, ecosystem diversity** - origin of life, Development of Ideas on the Origin of Life- Evolution and Eugenics - Mechanism of evolution, A Brief History of Life, The Importance of Evolution in Biology, Domestication of plants - Distinguishing “old” and “new” eugenics

UNIT II - SYSTEMS OF CLASSIFICATION, CLASSIFICATION CELL AND CELL DIVISION

Bentham and Hooker’s classification of plant kingdom – Internationa code of nomenclature and its major guidelines – author citation – Agricultural classification of crops; Cell division – Function of cell division, Karokinesis and Cytokinesis - Cell division - mitosis, meiosis and their significance.

UNIT III - GENERAL MORPHOLOGICAL AND DESCRIPTION OF FLOWING PLANTS

General morphology: Life span, habit, root, stem, leaf - petiole, leaf margin, leaf apex, leaf shape, venation and phyllotaxy; Modification of roots and leaf; Floral morphology: Kinds of bracts, inflorescence; Structure of flower, androecium, gynoecium, placentation, types of fruits.

UNIT IV - FLORAL DEVELOPMENT, SEED AND SEED GERMINATION, BOTANICAL DESCRIPTION AND ECONOMIC USES OF POACEAE, FABACEAE AND BRASSICACEAE

Basic concepts of floral development, Biology of Seed and seed germination - Seed Dormancy - Steps of Seed Germination - Dicots and Monocots - Seedling Development- Botanical description and economic uses of Poaceae, Fabaceae and Brassicaceae List of cultivated crops, economic parts, chromosome number and family description of Poaceae: Key botanical features of Poaceae, Papilionaceae and Brassicaceae family crops.

UNIT V - ROLE OF ANIMALS IN AGRICULTURE

Role of animals in agriculture - importance of animals in agricultural sustainability and food security -Role of Livestock in Agriculture - Role of animal power in the field of agriculture - Contribution of livestock in India Economy - The industrialization of animal agriculture: Implications for small farmers, rural communities, the environment, and animals in the developing world.

PRACTICAL:

Observing general morphology of roots, Observing general morphology of stems, Observing general morphology of leaves, Observing general morphology of inflorescence - flowers, Observing general morphology of stamens and pistils, Study of Cell, tissues & cell division, Study of internal structure of root specimens and slides,Study of Internal structure of stem specimens and slides, Study of Internal structure of leaf specimens and slides, Family characters, Botany, Economic parts, Floral diagram and Floral formula of the following crop plants:-Poaceae: Rice and Wheat, Poaceae: Sorghum, Maize, Pearl millet, Finger millet, Poaceae: Guinea grass, Napier grass, Cenchrus and Sugarcane, Papilionaceae: Redgram, Bengal gram and Soybean, Papilionaceae: Blackgram, Greengram, Cowpea, Lab-lab, Horse gram and Groundnut, Papilionaceae: Lucerne, Stylosanthes, Clitoria, Agathi, Sunnhemp, and Sesbania, Brassicaceae: Rapeseed and Mustard, Cabbage, Cauliflower.

ASSIGNMENT

- Collection and preparation of 25 herbarium specimens representing minimum of ten families of the crop species studied.
- Collection of crop seeds of 10 traditional varieties.

COURSE OUTCOMES (COs)

1. Origin of living world- Basic concepts of diversity, characteristics
2. Evolution and eugenics- Basic concepts and knowledge
3. Significance of flowing plants, seed and seed germination
4. Basic concepts of Binomial nomenclature
5. Basic concepts of classification Cell and cell division

REFERENCES

1. Daniel Sundararaj, D. and G. Thulasidas, 1993. Botany of field crops. MacMillan India Ltd., New Delhi.

2. Sambamurthy, V.S. and N.S. Subramanian, 1989. Text Book of Economic Botany, Wiley Eastern, New Delhi

3. Purse glow, 1988. Tropical Crops - Monocotyledons. The English Language book Society and Longman Co., Singapore

6. John Joel, A., C. Vanniarajan, T.S. Raveendran, and A. Gopalan 2006. Fundamentals of Crop Botany, Directorate of ODL, Tamil Nadu Agricultural University, Coimbatore–641003.

E - RESOURCES

1. www.nmsu.edu
2. www.biology200.gsu.edu

22CAGR16 - FUNDAMENTALS OF AGRONOMY 4 (3+1)

COURSE OBJECTIVES

1. Fundamentals of Agronomy provide agricultural information about how to grow and care for plants and soils in certain environments.
2. Factors such as climate, roots, moisture, weeds, pests, can all pose significant challenges when farmers attempt to produce a plentiful harvest.

THEORY:

UNIT I - IMPORTANCE OF AGRONOMY

Agriculture, Agronomy - Definition, Importance and scope - Branches of agriculture -Evolution of human and agriculture - History of agricultural development in the World and India.

UNIT II - BASICS OF AGRONOMY

Seeds and sowing, tillage and tilth, crop density and geometry, Crop nutrition, manuresand fertilizers, nutrient use efficiency.

UNIT III - PLANT WATER RELATIONSHIP AND IRRIGATION

Soil-plant-water relationship, crop water requirement, water use efficiency, irrigation-scheduling criteria and methods, quality of irrigation water, logging.

UNIT IV - WEEDS MANAGEMENT AND ALLELOPATHY

Weeds- importance, classification, crop weed competition, concepts of weed management-principles and methods, herbicides- classification, selectivity and resistance, allelopathy. Growth and development of crops, factors affecting growth and development.

UNIT V - PLANT IDEOTYPES AND CROP ROTATION

Plant ideotypes, crop rotation and its principles, adaptation and distribution of crops, crop management technologies in problematic areas, harvesting and threshing of crops.

PRACTICAL:

Identification of crops, seeds, fertilizers, pesticides and tillage implements, Study of agro- climatic zones of India and Tamil Nadu, Identification of weeds in crops, Methods of herbicide and fertilizer application, Study of yield contributing characters and yield estimation, Seed germination and viability test, Numerical exercises on fertilizer requirement Numerical exercises on plant population, Numerical exercises on herbicides, Numerical exercises on water requirement, Uses of tillage implements, reversible plough, one way plough, harrow, leveler and seeddrill, Study of soil moisture measuring devices, Measurement of field capacity, Measurement of bulk density, Measurement of infiltration rate, Measurement of irrigation water.

COURSE OUTCOMES (COs)

1. To know the basic definition and history of agriculture.
2. To better understand seeds, sowing and tillage.
3. To know about the feature of the Soil-plant-water relationship.
4. To study all about weeds and weedicides.
5. To acquainted with plat architecture.

REFERENCE

1. Yellamananda Reddy, T. and G.H. SankaraReddi. 1997. Principles of Agronomy. Kalyani Publishers, New Delhi.
2. Sankaran, S. and V.T. Subbiah Mudaliar. 1997. Principles of Agronomy. The Bangalore Printing and Publishing Co. Ltd., Bangalore.
3. Reddy,S.R. Principles of Agronomy.2016.Kalyani Publishers, New Delhi.
4. Somasundaram,E.2017. Agronomy: Principles and Practices. NewIndia Publishing agency, New Delhi ICAR. 2015.
5. Handbook of Agriculture. Indian Council of Agricultural Research, New Delhi.

E-REFERENCES

1. http://icar.res.in
2. http://www.agritech.tnau.ac.in/

22CMAT17 - ELEMENTARY MATHEMATICS 2(2+0)

COURSE OBJECTIVES

1. Basic concepts of mathematics, distance formula, section formula (internal and external division)
2. Knowledge of Equation of co-ordinate axes, Equation of lines parallel to axes.
3. Knowledge of Parallel lines, Perpendicular lines, Angle of bisectors between two lines, Area of triangle and quadrilateral
4. General equation of a circle, Equation of circle passing through three given points
5. Basics of Differential Calculus Definition of function, limit and continuity, Simple problems on limit.

THEORY:

UNIT I - STRAIGHT LINE

Distance formula, section formula (internal and external division), Equation of co-ordinate axes, Equation of lines parallel to axes, Slope-intercept form of equation of line, Slope- point form of equation of line, Two point form of equation of line, Intercept form of equation of line, General form of equation of line, Point of intersection of two st. lines, Angles between two st. lines, Parallel lines, Perpendicular lines, Area of triangle and quadrilateral.

UNIT II - CIRCLE

Equation of circle whose centre and radius is known, General equation of a circle, Equation of circle passing through three given points, Equation of circle whose diameters is line joining two points (x1, y1) & (x2, y2), Tangent and Normal to a given circle at given point (Simple problems), Condition of tangency of a line $y = mx + c$ to the given circle $x^2 + y^2 = a^2$.

UNIT III - CALCULUS

Binomial Theorem, Derivatives of sum, difference, product and quotient of two functions, Differentiation of functions of functions (Simple problem based on it), Logarithmic differentiation (Simple problem based on it), Maxima and Minima of the functions of the form y=f (x) (Simple problems based on it), Integration of simple functions, Integration of Product of two functions, Integration by parts, Definite Integral (simple problems based on it).

UNIT IV - MATRICES AND DETERMINANTS

Definition of Matrices, Addition, Subtraction, Multiplication, Transpose and Inverse up to 3rd order, Properties of determinants up to 3rd order and their evaluation.

UNIT V - PROGRESSIONS AND PERMUTATIONS

Sequences and Series, Arithmetic Progression, Geometric Progression, Harmonic Progression, Fundamental principle of counting, Permutations, circular permutation, Permutation with restrictions, combinations.

COURSE OUTCOMES (COs)

1. Know the basic concepts of matrices, permutation & combination and evaluating the problems which involves matrices
2. Analyze the problems involving two-dimensional geometry
3. Understand the differentiable functions and solving the differential equations.
4. Evaluate the differentiable functions and optimizes the problems with single variable functions
5. Apply simple integrals to compute area and volume over curves, surface and evaluating the problems involving two dimensional and three-dimensional spaces and mathematical model in real life agricultural problems

REFERENCE

1. Harikishan.(2008). A textbook of Matrices. Delhi: Atlantic Publisher. pp.1-229
2. Narayan Shanti. (2004). Differential Calculus. New Delhi:S.Chand and Co. Ltd.pp. 1- 572
3. Narayan Shanti. (2004). Integral Calculus. New Delhi:S.Chand and Co. Ltd.pp. 1-360.
4. Narayan Shanti. (2004). A textbook of Matrices. NewDelhi:S.Chand and Co. Ltd. pp.1-309.
5. Tim Hill. (2018). Essential Permutations and Combinations. California: Create Space independent publishing platform. pp. 1-88.

E - REFERENCES

1. www.mathsisfun.com
2. www.mathinsight.org
3. https://youtu.be/WEUL1v1Mxv0
4. https://youtu.be/SSyZYWDX0Mo
5. https://youtu.be/IS2vyb3Fps8

22CAHR18 - AGRICULTURAL HERITAGE 1(1+0)

COURSE OBJECTIVES

1. Basic knowledge of Agriculture and heritage
2. Status of agriculture and farmers in society, indigenous traditional knowledge of farmers
3. Knowledge to increase the production and productivity of Agriculture
4. Significance of Crop and its classifications
5. Current scenario of Indian agriculture; Indian agricultural concerns and future prospects.

THEORY:

UNIT I - INTRODUCTION OF AGRICULTURAL HERITAGE

Introduction of Indian agricultural heritage; Ancient agricultural practices, Relevance of heritage to present day agriculture; Past and present status of agriculture and farmers in society.

UNIT II - AGRICULTURE HERITAGE JOURNEY

Journey of Indian agriculture and its development from past to modern era; Plant production and protection through indigenous traditional knowledge.

UNIT III - CROP VOYAGE

Crop voyage in India and world; Agriculture scope; Importance of agriculture and agricultural resources available in India

UNIT IV - CROP AND CLASSIFICATIONS

Crop significance and classifications; National agriculture setup in India

UNIT V - SCENARIO OF INDIAN AGRICULTURE

Current scenario of Indian agriculture; Indian agricultural concerns and future prospects.

COURSE OUTCOMES (COs)

1. Agriculture and heritage-basic knowledge and concepts
2. Basics and concepts of indigenous traditional knowledge and status of farmers
3. Importance of agriculture and agricultural resources available in India
4. classifications of crop and its significance to farmers
5. Indian agriculture Current scenario and future prospects

REFERENCES

1. Yellamananda Reddy, T. and G.H. SankaraReddi. 1997. Principles of Agronomy. Kalyani Publishers, New Delhi.

2. Sankaran, S. and V.T. Subbiah Mudaliar. 1997. Principles of Agronomy. The Bangalore Printing and Publishing Co. Ltd., Bangalore.
3. Reddy,S.R. Principles of Agronomy.2016.Kalyani Publishers, New Delhi.
4. Somasundaram,E.2017. Agronomy: Principles and Practices. NewIndia Publishing agency, New Delhi.
5. ICAR. 2015. Handbook of Agriculture. Indian Council of Agricultural Research, New Delhi.

E-REFERENCES

1. http://icar.res.in
2. ww.webcast.gov.in
3. ww.icar.org.in/nasm.html

22CAEX19 - RURAL SOCIOLOGY AND EDUCATIONAL PSYCHOLOGY 2(2+0)

COURSE OBJECTIVES

1. To understand the basic concept of Rural Sociology, Indian rural society, Importance of rural sociology in Agricultural Extension.
2. Understand Social groups, social stratification, culture, social values, social control, social change, and their relevance to Agricultural Extension.
3. Understand Educational Psychology, Intelligence, Personality, Perception, Emotion, Frustration, Motivation, Teaching, Learning.

THEORY:

UNIT I - INTRODUCTION TO SOCIOLOGY

Introduction to Sociology, Social groups, Culture and Social Values Sociology and Rural Sociology – definitions; Society - rural and urban, characteristics, differences and relationships, important characteristics of Indian rural society; Social groups definition, classification, role of social groups in extension; Culture – concept, cultural traits, characteristics, functions, Ethnocentrism, Acculturation, Cultural lag, Cultural diffusion, Marginal man, Ethos. Social Values – definition, values and norms, characteristics of values, functions;

UNIT II - SOCIAL STRUCTURE , SOCIAL STRATIFICATION AND MIGRATION

Social Structure, Social Stratification and Migration Structure of Rural Society – patterns of rural settlement, social institutions, social organizations, ecological entities (Region, Community, Neighbourhood, Family); Social Stratification –concept, functions, types, differences between class and caste system; Migration – concept, factors influencing migration.

UNIT III - SOCIAL CONTROL, SOCIAL CUSTOMS SOCIAL CONTROL

Social Control, Social Customs Social Control – definition; Customs – conventions, folkways, mores, rituals, taboos; Social Interaction Process – definition, basic social processes; Social Change – concept, factors influencing social change, indicators of social change; Social development.

UNIT IV - INTRODUCTION TO EDUCATIONAL PSYCHOLOGY

Introduction to Educational Psychology, Intelligence, Teaching-Learning Process; Education – Psychology – Educational Psychology – Social Psychology – definitions, importance in extension; Basic principles of Human behavior – Sensation, Attention, Cognitive, affective, psychomotor domain Perception – meaning, characteristics; Intelligence – concept, types, measurement, factors affecting intelligence; Personality –

concept, types, measurement, factors influencing personality; Teaching–Learning Process – Teaching – definition, meaning, principles of teaching, steps in extension teaching; Learning – definition, meaning, principles, types of learning, learning situation.

UNIT V - MOTIVATION AND ATTITUDE

Motivation, Attitude Motivation – concept, Maslow's hierarchy of needs, intrinsic and extrinsic motivation, techniques of motivation, importance in extension; Attitude – concept, factors influencing the development of attitudes.

COURSE OUTCOMES (COs)

1. Students understand the characteristics of rural society, social institutions, culture, social values and relevance in Agricultural Extension
2. Students understand the educational psychology, learning and teaching situation.
3. Students access the personality types, emotions of human beings and motivation.
4. To bring behavioral changes among the students
5. To bring in new extension activities suitable for the society

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Objectives

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DEVELOPMENT EDUCATION 1(0+1)

COURSE OBJECTIVES

1. To create awareness on thrust areas of Teaching- learning and give them a chance on exploring the opportunities.
2. To enhance the student's communication with exercises both orally and verbally

PRACTICAL

Basic principles of learning - binary terms viz., growth and development, education – for – life and life – long education, motivation and morale, Occupation and profession, training and education, lateral thinking and convergent thinking, teaching and learning – discussion, Bloom's classification of educational objectives – cognitive, affective, psychomotor domain(s), Career development – opportunity for graduates of agriculture and allied sciences – discussion, Success story of a farmer / entrepreneur – factors involved – role – play, Brainstorming – demonstration, Simulation – Educational Simulation-Interactive Teaching - Business Simulation –Company's annual report for analysis, Interpersonal communication – Transactional communication – ice breaker, The conduct of a symposium, Conferencing – the concept and presentation of a paper, Scientific Article Writing and Editing, Popular Article Writing, Editing and Blogging, Project proposal, Project Report – writing, Entrepreneur – intrapreneur – Managing an intrapreneur – motivation and entrepreneurship development – planning, monitoring and evaluation.

COURSE OUTCOME(COs)

1. Discovering the basic principles of learning and understanding the methodology involved in teaching-learning process. (understand)
2. Simulating the aspects of career development and enabling the students to apply them in their day-to-day life. (Apply)
3. Explaining the terms of entrepreneurship and motivating the students to explore their ideas. (understand)
4. Describing communication and interpersonal skill development to help them build a healthy workplace atmosphere and to explore the opportunities through writing. (remember)
5. Illustrating the concept involved in teaching and its process using the modern techniques. (Analyze)

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2. https://www.engvid.com/

22CAHE01 HUMAN VALUES & ETHICS (NON GRADIAL) 1(1+0)

COURSE OBJECTIVES:

1. To understand value and ethics, goal and mission of life
2. To solve case study of ethical lives
3. To understand basic knowledge of decision making and motivation

THEORY

UNIT I - INTRODUCTION

Introduction - Need, basic Guidelines, Content and Process for Value Education: Understanding the need, basic guidelines, content and process for Value Education. Self Exploration - what is it? - its content and process; 'Natural Acceptance' and Experiential Validation - as the mechanism for self exploration. Continuous Happiness and Prosperity - A look at basic Human Aspirations.Rightunderstanding, Relationship and Physical Facilities - the basic requirements for fulfillment of aspirations of every human being with their correct priority.Understanding Happiness and Prosperity correctly – A critical appraisal of the current scenario. Method to fulfill the above human aspirations: understanding and living in harmony at various levels.

UNIT - II: HARMONY IN HUMAN BEING

Harmony in the Human Being - Harmony in Myself! : Understanding human being as a co- existence of the sentient 'I' and the material 'Body'. Understanding the needs of Self ('I') and 'Body' - SukhandSuvidha. Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer). Understanding the harmony of I with the Body: Sanyam and Swasthya; correct appraisal of Physical needs, meaning of Prosperity in detail. Programs to ensure Sanyam and Swasthya.

UNIT - III: HARMONY IN FAMILY AND SOCIETY

Harmony in the Family and Society - Harmony in Human - Human Relationship Understanding harmony in the Family the basic unit of human interaction. Understanding values in human - human relationship; meaning of Nyayaand program for its fulfillment to ensure Ubhay-tripti; Trust (Vishwas) and Respect (Samman) as the foundational values of relationship. Understanding the meaning of Vishwas; Difference between intention and competence. Understanding the meaning of Samman, Difference between respect and differentiation; the other salient values in relationship. Understanding the harmony in the society (society being an extension of family): Samadhan, Samridhi, Abhay, Sah-astiva as comprehensive Human

Goals. Visualizing a universal harmonious order in society - Undivided Society (AkhandSamaj), Universal Order(Sarvabhaum Vyawastha) – from family to world family.

UNIT - IV: HARMONY IN NATURE

Harmony in the nature and Existence - Whole existence as Co- existence: Understanding the harmony in the Nature. Interconnectedness and mutual fulfillment among the four orders of nature - recyclability and self-regulation

in nature. Understanding Existence as Co-existence (Sah-astiva) of mutually interacting units in all-pervasive space. Holistic perception of harmony at all levels of existence.

UNIT V - HARMONY ON PROFESSIONAL ETHICS

Implications of the above Holistic Understanding of Harmony on Professional Ethics: Natural acceptance of human values, Definitiveness of Ethical Human Conduct, Basic for Humanistic Education, Humanistic Constitution and Humanistic Universal Order Competence in professional ethics:

a. Ability to utilize the professional competence for augmenting universal human order, b. Ability to identify the scope and characteristics of people-friendly and eco-friendly production systems, c. Ability to identify and develop appropriate technologies and management patterns for above production systems.

Case studies of typical holistic technologies, management models and production systems. Strategy for transition from the present state to Universal Human Order.

a. At the level of individual: as socially and ecologically responsible engineers, technologists and managers
b. At the level of society: as mutually enriching institutions and organizations.

COURSE OUTCOMES (COs):

1. Understand value and ethics of life
2. Acquaint principals and philosophy in life
3. Understand importance of motivation
4. Understand mission and vision of life
5. Understand Case on ethical lives and spirituality

REFERENCE

1. Ivan IIIich,1974,Energy&Equity,The Trinity Press, Worcester, and HarperCollins,USA,67-90.
2. E. F. Schumancher, 1973, Smallis Beautiful: a study of economics as if people mattered. Blond & Briggs, Britain,156-190.
3. A Nagraj, 1998 Jeevan Vidyaek Parichay, Divya Path Sansthan, Amarkantak,120-145.
4. Sussan George, 1976, How the Other Half Dies, Penguin Press, New Delhi,241-250.
5. P. L. Dhar, R. R. Gaur, 1990, Science and Humanism, Commonwealth Publishers.

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2. https://soaneemrana.org/onewebmedia/

22PPED12 NSS/NCC/PHYSICAL NEDUCATION & YOGA PRACTICES 2(0+2)**

NATIONAL SERVICE SCHEME

I YEAR

Orientation – NSS origin – motto – symbol – NSS administration at different levels –programme planning – Rural Projects – Urban projects – Government schemes – Career guidance – Self help groups – Environment protection – Use of natural energy – Conventional energy resources – Soil and Water conservation – Community health programmes – Women and child welfare – Education for all – National days –Commemorative days – NSS thematic programmes – literacy & computer awareness campaigns.

PRACTICAL :

I SEMESTER

Orientation of NSS volunteers and programme coordinator and Programme officers, Origin of NSS in India and its development, NSS motto, symbol and NSS awards, Organizational set up of NSS at Central, State University and college levels, Programme planning – Theme of the year – planning implementation at PC, PO and NSS volunteer level, Visit to selected village - gathering basic data on socio economic status, Participatory rural appraisal – studying the needs of the target group, Visit of urban slum and gathering data on socio economic status, Self involvement and methods of creating rapport with the target group, Awareness campaign on welfare schemes of the central and state government, Formation career guidance group with NSS volunteers and students welfare unit, Cycle rally on environmental protection, Campus development activities – clean environment campaign, formation of plastic free zones, Campus development, tree planting maintenance and greening the campus cleaning.

II SEMESTER

Motivation of rural and urban youth for formation of SHG (Self Help Groups) in collaboration with Government machineries and NGOs, Campaign on ill

effects of plastics in the adjoining campus areas – Villages /urban areas, Campaign on Parthenium eradication, Cycle rally on air pollution – Vehicle exhaust and other means, Popularization of biogas and smokeless chulah, Demonstration on the use of wind energy and solar energy, Demonstration of water harvesting techniques, Demonstration on soil conservation techniques wherever possible, Campaign on Community health programmes of central and state Government – involving Health department officials, AIDS awareness campaign; campaign on diabetes and healthy food habits and drug abuse, Planning formation of blood donors club – involving NGOs. Campaign on gender equality and women empowerment, Campaign on child health care – immunization, food habits and child labourabolition.

Besides the above, NSS volunteers will attend work during important occasions like Convocation, Farmers day, Sports meet and other University / College functions.NSS Volunteers will attend one special camp in the selected village for duration of 7 days and undertake various activities based on the need of that village. For all out door regular activities villages / slums nearby the campus may be selected to avoid transport cost (cycle able distance) Special camp activity will be conducted in a village situated within a radius of 15 - 20 KM.

NCC101 - NATIONAL CADET CORP

General - Military History -Historical – geographical – Customs and Traditions of India –Defence services– Introduction to NCC – NCC Song-Aims of NCC – Principles of NCC- NCC organization Duties of good citizen – system of NCC training –Drill- Foot drill – Arms drill – Guard of Honour – Ceremonial Drill – Weapon Training & Equipment– Communication-types-National Integration Leadership-Civil affairs- Civil defense –Disaster management-Social service- Health & Hygiene Environment and Ecology/ Nature awareness -Self Defence-Camps &Adventure training- Changing trends in Technology - Personality development-Communication Skills –Specialised subjects -Army or Navy or Air force. Specialised subject-Navy-Naval Orientation –Naval communication-Navigation-Seamanship Oceanic wealth-Gunnery-Fire Fighting and Damage control & Safety- Ship and Boat modeling, Submarine-Search and Rescue-Antisubmarine-Swimming. Besides the above schedule, NCC cadets will be involved during important occasions during convocation, Independence Day, Republic day, College days, etc. Regular Classes will be conducted on the afternoon of Saturdays from I Year to III Year. Evaluation will be conducted during I, II, III and IV as detailed below. Class grade chart will be sent at the end of V semester.

PHYSICAL EDUCATION & YOGA PRACTICES

SEMESTER I

Teaching of skills of Football – demonstration, practice of the skills, correction, involvement in game situation (For girls teaching of Tennikoit), Teaching of skills of Basketball – demonstration, practice of the skills, correction of skills, involvement in game situation, Teaching of skills of Kabaddi– demonstration, practice of the skills, correction of skills, involvement in game situation involvement of all the skills in game situation with teaching of rule of the game, Teaching of skills of Ball Badminton – demonstration, practice of the skills, correction of skills, involvement in game situation, Teaching of some of Asanas–demonstration, practice, correction and practice, Teaching of skills of Table Tennis–demonstration, practice of skills, correction and practice and involvement in game situation, Teaching–Meaning, Scope and importance of Physical Education, Definition, Type of Tournaments, Physical Fitness and Health Education, Construction and laying out of the track and field (*The girls will have Tennikoit and Throw Ball).

I YEAR II SEMESTER				
1.	PBG 101	Fundamentals of Genetics	3(2+1)	Employability
2.	AGM 101	Agricultural Microbiology	2(1+1)	Entrepreurship
3.	AEG 101	Introductory Soil and Water Conservation Engineering	2(1+1)	Skill development
4.	CRP 101	Fundamentals of Crop Physiology	2(1+1)	Employability
5.	AEC 101	Fundamentals of Agricultural Economics	2(1+1)	Employability
6.	PAT 101	Fundamental of Plant Pathology	4(3+1)	Employability
7.	AEN 101	Fundamentals of Entomology	4(3+1)	Employability
8.	AEX 102	Fundamentals of Agricultural Extension Education	3(2+1)	Employability
9.	ENG102	Comprehension & Communication Skills in English	2(1+1)	Skill development
10.	HOR102	Production Technology for Vegetables and Spices	2(1+1)	Entrepreurship
7.	NSS/NCC/ PED101	NSS/NCC/Physical Education & Yoga Practices**	2(0+2)**	Skill development
**** NC: Non-gradial courses** **Total**			**26(16+10)+2****	

I YEAR II SEMESTER

PBG101 - FUNDAMENTALS OF GENETICS 2(2+1)

COURSE OBJECTIVES

1. Basic knowledge of concept and history of genetics.
2. To learn about the Mendelian Genetics
3. To impart the knowledge of the structure and fiunctions of different cell organelles
4. To familiarize the students about the basics of gene interactions and genetic variance
5. To study the replication, transcription and translation in prokaryotes and eukaryotes.

THEORY

UNIT I: CYTOLOGY

Definition of genetics, heredity, inheritance, cytology, cytogenetics; Brief history of developments in genetics and cytogenetics.Physical basis of heredity. Structure and function of cell and cell organelles – Differences between Prokaryotes and Eukaryotes.Cell division – mitosis- meiosis and their significance - Gametogenesis and syngamy in Plants- identical and fraternal twins. Chromosome structure, chemical composition, nucleosome, centromere, telomere, euchromatin, heterochromatin, NOR, satellite chromosome, karyotype, ideogram. Types of chromosomes based on position of centromere, based on structure and function: normal and special chromosomes - polytene, lampbrush, Bchromosomes, ring and isochromosomes.Chromosomal aberration: Variation in chromosome structure – deletion, duplication, inversion and translocation – genetic and cytological implications.Chromosomal aberration: Variation in chromosome number – euploid, aneuploid, types of aneuploids and their origin; Klinefelter syndrome and Turner syndrome; Polyploid - auto and allopolyploids, their characters; meaning of genome; evolution of wheat, triticale, cotton, tobacco, *Brassica*

UNIT II: MENDELIAN LAWS AND MODIFICATIONS OF MENDELIAN LAWS

Pre-Mendelian ideas about heredity – Vapour and fluid theory, Magnetic power theory, Preformation theory, Lamarck's theory, Darwin's theory, Germplasm theory and Mutation theory.Mendel's complete dominance, codominance, incomplete dominance,thresholdcharacters.Deviation from Mendelian inheritance – Non allelic interaction without modification in Mendelian ratio – Bateson and Punnett's experiment on fowl comb shape. Non allelic interaction with modification in Mendelian ratio – i.) Dominant epistasis (12:3:1). ii.) Recessive epistasis(9:3:4) iii.) Duplicate and additive epistasis(9:6:1). iv.) Duplicate dominant epistasis(15:1). v) Duplicate recessive epistasis (9:7) vi.) Dominant and recessive

epistasis (13:3); Summary of epistatic ratios (i) to (vi).Lethal genes, Pleiotrophy, penetrance and expressivity, Multiple alleles, blood group in human, coat colour in rabbits, self incompatibility in plants; pseudo alleles, isoalleles.experiments and laws of inheritance.Rediscovery of Mendel's work.Terminologies: gene, allele, locus, homozygous, heterozygous, hemizygous, genotype, phenotype, monohybrid, dihybrid, trihybrid, polyhybrid.Chromosomal theory of inheritance.Allelic interactions – Dominance vs recessive.

UNIT III: QUANTITATIVE INHERITANCE, LINKAGE AND CROSSING OVER

Quantitative inheritance – Multiple factor hypothesis – Nilsson Ehle experiment on wheat kernel colour.Polygenes – transgressive segregation, comparison of quantitatively and qualitatively inherited characters; modifiers; Linkage - coupling and repulsion; Experiment on Bateson and Punnet. Chromosomal theory of linkage of Morgan – Complete and incomplete linkage- Linkage group.Crossing over – significance of crossing over; cytological proof for crossing over - Stern's experiment - Factors controlling crossing over.Strength of linkage and recombination; Two point and three point test cross.Double cross over, interference and coincidence; genetic map, physical map.

UNIT IV: SEX DETERMINATION, SEX LINKAGE AND CYTOPLASMIC INHERITANCE

Sex determination: Autosomes and sex chromosomes - chromosomal theory of sex determination - different types – sex determination in human, fowl, butterfly, grasshopper, honey bee, fumea; Sex determination in plants – *Melandrium*, papaya, maize.Genic balance theory of Bridges – Gynandromorphs.Sex linked inheritance – criss cross inheritance – reciprocal difference; holandric genes; sex influenced and sex limited inheritance - Genetic disorders.Cytoplasmic inheritance and maternal effects – features of cytoplasmic inheritance, chloroplast, mitochondrial - plastid colour in *Mirabilis jalapa*- cytoplasmic male sterility in maize, kappa particles of paramecium.

UNIT V: MODERN CONCEPT OF GENETICS AND MUTATION

DNA, the genetic material – Griffith's experiment, Avery, McCleod and McCarthy Experiment – confirmation by Hershey and Chase; RNA as genetic material – Frankel, Conrat and Singer experiment. Structure of DNA – Watson and Crick model. Proof for semi conservative method of DNA replication; Models of DNA replication; steps involved in DNA replication. RNA types - mRNA, tRNA, rRNA. Protein synthesis - Regulation of gene expression – Operon model of Jacob and Monad – Lac and Trpoperons. Cistron,muton and recon. Mutation – characteristics of mutation – micro and macro mutation – ClB technique - molecular basis of mutation- Transition and transversion; major physical and chemical mutagens.

PRACTICAL

Study of microscopes – Preparation of fixatives and stains – pre treatment of materials for mitosis and meiosis – study of mitosis and meiosis. Study of genetic ratios of – monohybrid, dihybrid – incomplete

dominance. Gene interaction - multiple alleles and multiple factors. Study of linkage, Estimation of strength of linkage and recombination frequency in three point test cross data and F2 data - Drawing of genetic map – interference and coincidence.Studies on sex linked inheritance in Humans and Drosophila.

COURSE OUTCOMES (COs)

1. Students learned about the definition, history and concept of genetics
2. Know the experiments performed by Mendel and also the Mendel's Law
3. Students familiarize with the different cell organelles, structure and functions.
4. Gained the knowledge of the various gene interactions, cytoplasmic genes and the genetic variance
5. Studied the mechanism of replication, transcription and translation in both prokaryotes and eukaryotes.

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AGM101 - AGRICULTURAL MICROBIOLOGY 2(1+1)

COURSE OBJECTIVES

1. To know about microbes structure
2. Familiar with different types of useful microbes in agriculture.
3. Knowledge of microbiology in silage production, biofertilizers, biopesticides, biofuel production and biodegradation of agro-waste
4. Knowledge of different microbes, their mode of reproduction, genetics

THEORY

UNIT I : INTRODUCTION

Soil microorganisms and their role in soil fertility and crop production. Historical developments in soil microbiology. Diversity of soil microorganisms - culturable (bacteria, actinobacteria, yeasts, molds and algae) and unculturable microorganisms - metagenomic approach; factors influencing soil microbial diversity. Soil enzymes and their role in soil fertility.

UNIT II : BIOGEOCHEMICAL CYCLING OF NUTRIENTS

Carbon cycle; organic matter decomposition in oxygenic and anoxygenic environments; humus formation. Nitrogen cycle – ammonification, nitrification, denitrification and biological nitrogen fixation (BNF) – bacterial and algal nitrogen fixers (diazotrophs) ; free living, associative, symbiotic, endophytic and epiphytic diazotrophs; nodulation in leguminous and non-leguminous plants; biochemistry and molecular biology of BNF. Phosphorus cycle – mineralization, phosphate mobilization and solublization Microbial transformation of sulphur, potassium, zinc and silica in soil.

UNIT III :MICROBIAL DEGRADATION AND BIOREMEDIATION

Role of microbes in reclamation of problematic soils. Microbes in solid waste management. Biodegradation of agricultural residues and chemicals – processes involved in remediation.

UNIT IV: MICROBIOMES AND PLANT GROWTH

Rhizosphere, spermosphere, phyllosphere, epiphytic and endophyticmicrobiomes and their significance. Plant growth promoting rhizobacteria. Soil microorganisms and their interactions – positive and negative interactions.

UNIT V: MICROBES IN HUMAN WELFARE

An overview of industrially important microorganisms and products. Silage production. Bioinoculants (biofertilizers and biopesticides); types of biofertilisers – nitrogen fixers, phosphate, zinc and silicate

solubilizers, potassium releasers, phosphate mobilizers, sulphur oxidizers and Pink Pigmented Facultative Methylotroph (PPFM). Biopesticides- types and mechanism of action. Mass production and quality control of bacterial and fungal bioinoculants. Methods of application of bioinoculants. Biofuel production.

PRACTICAL

Enumeration of soil microbial population - quantitative and qualitative methods. Organic matter decomposition - CO2 evolution and BOD. Isolation of symbiotic nitrogen fixing bacteria, free living, associative and endophytic nitrogen fixing bacteria. Isolation of phosphobacteria and sulfur oxidizing bacteria. Isolation of zinc and silicate solubilizing/ potassium releasing bacteria. Isolation of plant growth promoting rhizobacteria(*Pseudomonas* sp) and phyllosphere (PPFM) microbes. Examination of AM fungal infection in plants and recovery of AM spores from soil. Examination of Blue Green Algae (BGA) from soil and azolla. Mass production of bacterial bioinoculants, blue green algae, azolla and AM fungi. Visit to biopesticides, silage production and compost yard.

COURSE OUTCOMES (COs)

1. Student is able to know regarding microbial world, cell structure, Prokaryotic and eukaryotic microbes.
2. Learn about Bacterial genetics, Role of microbes in soil fertility and crop production
3. Students are able to know about sowing time of different varieties according to temperature
4. Regarding atmospherics biological nitrogen fixation, Rhizosphere and phyllosphere.

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AEG101 - INTRODUCTORY SOIL AND WATER CONSERVATION ENGINEERING 2(1+1)

COURSE OBJECTIVES

1. To introduce the concept of soil and water conservation.
2. To learn about the meaning, definition and agents of soil erosion.
3. To study about the soil estimation and soil loss measurement techniques.
4. To familiarize the students about the concept of contouring.
5. To aware the students about the water harvesting and its techniques.

THEORY

UNIT I: SURVEYING

Surveying and levelling – chain and compass – levelling – land measurement – difference in elevation.

UNIT II: SOIL EROSION

Soil Erosion – causes and evil effects of soil erosion – geologic and accelerated erosion – universal soil loss equation –agents of soil and water erosion- water erosion - causes - stages of water erosion - splash, sheet, rill and gully erosion- gully classification and control - ravines - landslides – wind erosion - factors influencing wind erosion - mechanics of wind erosion – suspension, saltation, surface creep- soil loss measurement by USLE equation- soil loss measurement techniques- principles of erosion control.

UNIT III : SOIL CONSERVATION AND WATERSHED MANAGEMENT

Erosion control measures for agricultural lands – biological measures – contour cultivation – strip cropping – cropping systems – vegetative barriers- introduction to contouring – grassed water ways and design – windbreaks and shelterbelts - shifting cultivation - mechanical measures – contour bund – graded bund – broad beds and furrows – basin listing – random tie ridging – mechanical measures for hill slopes – contour trench – bench terrace – contour stone wall – Rain water harvesting — Runoff computation - rational formula - water harvesting – farm ponds and percolation ponds -watershed concept – integrated approach and management.

UNIT IV: IRRIGATION AND DRAINAGE

Irrigation - measurement of flow in open channels - velocity area method - rectangular weir - Cippoletti weir - V notch - orifices - Parshall flume - duty of water - irrigation efficiencies - conveyance of irrigation water - surface irrigation methods - borders, furrows and check basins - drip and sprinkler irrigation component– agricultural drainage - surface and sub-surface drainage systems - drainage coefficient.

UNIT V : WELLS AND PUMPS

Types of wells– pump types – reciprocating pumps – centrifugal pumps – turbine pumps –submersible pumps – jet pumps – airlift pumps.

PRACTICAL

General status of soil conservation in India – Calculation of erosion index – Estimation of soil loss – Measurement of soil loss – Preparation of contour maps – Design of grassed waterways – Design of contour bunds – Design of graded bunds – Design of bench terracing system – Problem on wind erosion - Problems on water measurement - Problems on duty of water and irrigation efficiencies - Visit to soil and water conservation areas - Design of drip Irrigation systems - Design of sprinkler irrigation system - Problems on water measurement

COURSE OUTCOMES (COs)

1. Students learned about the meaning, definition and concept of soil and water conservation.
2. Learned about the meaning, definition and agents of soil erosion
3. Students learned about the soil estimation and soil loss measurement techniques.
4. Students knew about the concept of contouring.
5. Familiarized about the water harvesting and its techniques

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1. Basak, N.N. 2008. Surveying and Leveling. 25th reprint. Tata Mc-Graw Hill Publishing Company Ltd
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CRP101 – FUNDAMENTALS OF CROP PHYSIOLOGY 1(1+1)

COURSE OBJECTIVES

1. To introduce the basic knowledge of crop physiology.
2. To introduce the history of crop physiology
3. To introduce the recent advances in crop physiology
4. To familiar students different practical aspects of crop physiology.

THEORY

UNIT I: INTRODUCTION OF CROP PHYSIOLOGY

Introduction to crop physiology and its importance in Agriculture; Plant cell: an Overview; Diffusion and osmosis; Absorption of water, transpiration and Stomatal Physiology.

UNIT II: NUTRITION'S OF PLANTS

Mineral nutrition of Plants: Functions and deficiency symptoms of nutrients, nutrient uptake mechanisms

UNIT III: PHOTOSYNTHESIS, C3, C4 AND CAM

Photosynthesis: Light and Dark reactions, C3, C4 and CAM plants; Respiration: Glycolysis, TCA cycle and electron transport chain; Fat Metabolism: Fatty acid synthesis and Breakdown**.**

UNIT IV: GROWTH REGULATORS AND USES

Plant growth regulators: Physiological roles and agricultural uses, Physiological aspects of growth and development of major crops:

UNIT V: GROWTH ANALYSIS OF CROPS

Growth analysis, Role of Physiological growth parameters in crop productivity.

PRACTICAL

Study of plant cells, structure and distribution of stomata, imbibitions, osmosis, plasmolysis,
measurement of root pressure, rate of transpiration-evaporation Separation of photosynthetic pigments through paper chromatography, Rate of transpiration, photosynthesis, respiration, tissue test for mineral nutrients, diagnosis of physiological disorder, estimation of relative water content, Measurement of photosynthetic CO 2 assimilation by Infra Red Gas Analyser (IRGA).

COURSE OUTCOMES (COs)

1. Able to know what are the basic technologies involved in physiology and how they are used in crop improvement.
2. Can use the basic knowledge regarding plant physiology in crop improvement.

3. Impart knowledge to the students on different plant metabolic processes and their functions in plants
4. By the end of course the students will be able to study the growth and development of plants
5. Study of nutrients and plant growth regulator and their applications in agriculture

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AEC101 - FUNDAMENTALS OF AGRICULTURAL ECONOMICS 2(1+1)

COURSE OBJECTIVES

1.To study the basic micro and macro-economic principles, economic theories applied to agriculture and its role in Indian Economy.

2. To understand why farmers response to polices and economic opportunities in the ways they do.

THEORY

UNIT I NATURE AND SCOPE OF ECONOMICS

Economics: Meaning, scope and subject matter, definitions, activities, approaches to economic analysis; micro and macroeconomics, positive and normative analysis. Nature of economic theory; rationality assumption, concept of equilibrium, economic laws as generalization of human behavior. Basic concepts: Goods and services, classification and characteristics, desire, want - meaning and characteristics, demand, utility, cost and price, wealth, capital, income and welfare. Agricultural economics: meaning, definition, characteristics of agriculture, importance and its role in economic development. Agricultural planning and development in the country.

UNIT II THEORY OF CONSUMPTION

Demand: meaning, kinds of demand, law of demand, demand schedule and demand curve, determinants; *Utility theory* - cardinal and ordinal utility; law of diminishing marginal utility, equi-marginal utility principle, Indifference curve analysis and properties - budget line: definition, assumptions, limitationsand applications - consumer's equilibrium and derivation of demand curve. Concept of consumer surplus and its importance. *Elasticity of demand*: concept and measurement of price elasticity, income elasticity and cross elasticity. Factors influencing elasticity of demand - Importance of elasticity of demand – Standard of Living: Definition, Engel's Law of Family Expenditure.

UNIT III THEORY OF PRODUCTION

Production: process, creation of utility, factors of production definition and characteristics - Input Output Relationship. *Laws of returns*: Law of variable proportions and Law of returns to scale. *Cost:* Cost concepts, short run and long run cost curves. *Supply:* Stock versus supply, law of supply, supply schedule, supply curve, determinants of supply, elasticity of supply.

UNIT IV EXCHANGE AND THEORY OF DISTRIBUTION

Market structure: meaning and types of market, basic features of perfectly competitive and imperfect markets. Price determination under perfect competition; short run and long run equilibrium of firm and

industry, shut down and break even points. *Distribution theory*: meaning, factor market and pricing of factors of production - Concepts of Rent and Quasi rent - *Wages:* Real wage and money wage - *Interest:* Pure interest and gross interest – *Profit:* Meaning of economic profit.

UNIT V MACROECONOMIC CONCEPTS

National income: Meaning and importance, circular flow, concepts of national income – accounting and approaches to measurement, difficulties in measurement. *Population:* Importance, Malthusian and Optimum population theories, natural and socio-economic determinants, current policies and programmes on population control. *Money:* Barter system of exchange and its problems, evolution, meaning and functions of money, classification of money, money supply, general price index, inflation and deflation. *Banking:* Role in modern economy, types of banks, functions of commercial and central bank, credit creation policy. *Agricultural and public finance:* meaning, micro versus macro finance, need for agricultural finance, public revenue and public expenditure. *Tax:* meaning, direct and indirect taxes, agricultural taxation, VAT and GST. *Economic systems:* Concepts of economy and its functions, important features of capitalistic, socialistic and mixed economies, elements of economic planning.

PRACTICAL

Law of Diminishing Marginal Utility - Law of Equi-Marginal Utility - Indifference Curve analysis - consumer equilibrium; Individual and market demand- Measurement of Arc and Point elasticities of demand - own price, income and cross price elasticities of demand – Estimation of Consumer surplus – Law of Diminishing Marginal Returns: Relationship among TPP, APP and MPP - Cost concepts and graphical derivation of cost curves - Estimation of total revenue and profit- Producer surplus - Supply elasticity – Exchange: Market Structure and Price determination – Computation of National Income – Study of structural changes in the economy - Estimation of Growth Rate - Money: Quantity theory of money - Measures of standard of living – Indices of human development.

COURSE OUTCOMES

1. To study micro and macroeconomic theories To study micro and macroeconomic theories and Understand the application of theories on agriculture
2. To Gain knowledge on fundamental concepts about factors of production.
3. To understand the characteristic features of market structures
4. To study thetheory of macro and welfare economics.
5. To integrate Agri-economics knowledge with real time applications.

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PAT101 - FUNDAMENTALS OF PLANT PATHOLOGY 4(3+1)

COURSE OBJECTIVES

1. To study the basic concepts of Plant Pathology and causes of plant diseases
2. To know about pathogenesis and plant defense mechanisms
3. To study the general characters and classification of fungal kingdom Protozoa
4. To study the general characters and classification of Phylum Ascomycota and basidiomycota.
5. Study of general characters of bacteria, virus, virusoids, algae

THEORY

UNIT I: INTRODUCTION TO PLANT PATHOLOGY

Plant Pathology- Definition – Importance of plant diseases, scope and objectives of Plant Pathology. History of Plant Pathology with special reference to Indian work. Terms and concepts in Plant Pathology. Causes / factors affecting disease development, disease triangle and tetrahedron and classification of plant diseases. Important plant pathogenic organisms/different groups**:** fungi, bacteria, fastidious vesicular bacteria, phytoplasmas, spiroplasmas, viruses, viroids, algae, protozoa and phanerogamic parasites nematodes with examples of diseases caused by them. Diseases and symptoms due to abiotic causes.

UNIT II: PATHOGENESIS AND FUNGI

Koch's postulates- Types of parasitism and variability in plant pathogens - Pathogenesis - Mode of infection – pre-penetration, penetration and post penetration - Role of enzymes, toxins and growth regulators on disease development - Defense mechanism in plants - Liberation / dispersal and survival of plant pathogens - Effect of pathogen on physiological functions of the plants. Epidemiology: Factors affecting disease development. Principles and methods of plant disease management. Nature, chemical combination, classification, mode of action and formulations of fungicides and antibiotics. Fungi: General characters, definition of fungus, somatic structures, types of fungal thalli, fungal tissues, modifications of thallus, Growth and reproduction of plant pathogens (asexual and sexual). Nomenclature, Binomial system of nomenclature, rules of nomenclature, classification of fungi. Key to divisions, sub-divisions, orders and classes based on Ainsworth and Bisby's dictionary of fungi 10th edition complied by Kirk *et al.*, (2008).

Unit III: GENERAL CHARACTERS AND TAXONOMY OF *PROTOZOA, CHROMISTA:* General characters and symptoms of **Kingdom: *Protozoa*, Phylum: *Plasmodiophoromycota***, *Plasmodiophorabrassicae*. **Kingdom** : ***Chromista*, Phylum: *Oomycota*-** *Pythium, Phytophthora,*

Sclerospora, Plasmopara and *Albugo* **Kingdom:***Fungi***, Phylum:***Chytridiomycota*-*Synchytrium*,**Phylum:** ***Zygomycota*** -*Mucor, Rhizopus*

UNIT IV: GENERAL CHARACTERS AND TAXONOMY OF FUNGI - *ASCOMYCOTA* AND *BASIDIOMYCOTA:*

Phylum: ***Ascomycota***: Classification, symptoms and taxonomy characters of *Taphrina, Capnodium, Mycosphaerella, Macrophomina, Cochliobolus, Lewia, Venturia, Eurotium, Talaromyces, Sclerotinia, Erysiphe, Leveillula, Phyllactinia,Claviceps, Gibberella, Ustilaginoidea, Verticillium, Glomerella, Pestalotiopsis and Magnaporthe* **Phylum**:***Basidiomycota*:** Classification, symptoms and life cycle of *Puccinia, Uromyces, Hemileia*and *Ustilago*. Important taxonomic characters of *Ganoderma , Agaricus, Pleurotous* and *Calocybe.* Symptoms and Important taxonomic characters of *Athelium, Rhizoctonia* and *Exobasidium*

UNIT V: BACTERIA, PHYTOPLASMA, VIRUS, VIROID, ALGAE, PHANEROGAMS , ABIOTIC DISORDERS AND NEMATODES: Bacteria and Mollicutes: General morphological characters, classification, reproduction and symptoms - *Candidatus Phytoplasma*, Spiroplasma, viruses: nature, structure, replication and transmission – study of viroids, algae, Phanerogamic plant parasites –Abiotic disorders. *Nematodes:* General morphology and reproduction, classification, symptoms and nature of damage caused by plant nematodes (*Heterodera, Meloidogyne, Anguina, Radopholus* etc.)

PRACTICAL

Acquaintance with various laboratory equipments and microscopy. Preparation of media, isolation and Koch's postulates. General study of different characters of fungi – Types of mycelia -Types of vegetative, asexual and sexual spores- asexual and sexual fruiting bodies. Study of representative fungal genera their important taxonomic characters and symptoms produced by *Plasmodiophora, PythiumPhytophthora, Sclerospora, Plasmopara , Albugo, Mucor, Rhizopus, Taphrina, Capnodium,Cercospora,* (*Mycospaerella*), *Botryodiplodia* (*Botryosphaeria*), *Curvularia, Drechslera* (*Helminthosporium), Alternaria, Venturia, Erysiphe, Phyllactinia, Uncinula, Leveillula , Claviceps, Fusarium* (*Gibberella ,Nectria*), *Verticillium ,Colletotrichum (Glomerella) Pestalotia (Pestalosphaeria), Pyricularia*(*Magnoporthe*) *Sarocladium, Macrophomina, ,Puccinia, Uromyces , Hemileia, Ustilago Sphacelotheca (Sporisorium), Tolyposporium (Moesziomyces), Exobasidium, Sclerotium, Rhizoctonia* (*Thanatephorus*), *Ganoderma, Agaricus, Pleurotus* and *Calocybe.* Study of symptoms of various plant diseases –Fungal, bacterial- Staining and identification of plant pathogenic bacteria, Virus, Transmission of plant viruses, *Candidatus Phytoplasma*, Fastidious vascular bacteria, algal parasite, phanerogamic plant parasites and non-parasitic diseases. Collection and preservation of disease specimen. Nematodes: Study of morphological features and identification of plant parasitic

nematodes. Sampling and extraction of nematodes from soil and plant material, preparation of nematode mounting. Study of fungicides and their formulations. Methods of pesticide application and their safeuse. Calculation of fungicide sprays concentrations**.**

COURSE OUTCOMES

1. Aware of basic principles of plant pathology,causes and importance of crop diseases.
2. Having knowledge of pathogenesis and plant defence mechanisms and depth knowledge of fungal kingdom protozoa.
3. Having in depth knowledge of phylum Ascomycota and Basidiomycota
4. Knowing the general characters of bacteria and virus.
5. Knowing the general characters of virisoids and algae.

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AEN101 - FUNDAMENTALS OF ENTOMOLOGY 4(3+1)

COURSE OBJECTIVES

1. To impart knowledgeto the students onposition of insect in animal kingdom and their relationship with other arthropods and reason behind the insect dominance, morphology
2. To Recite the technical knowledge on the physiology of insects
3. To know about Insect Ecology
4. To impart knowledge on concept of IPM and classifications of Insecticides
5. To Interpret taxonomical feature of insects

THEORY

UNIT I HISTORY AND IMPORTANCE OF ENTOMOLOGY; INSECT MORPHOLOGY; ANATOMY AND PHYSIOLOGY

History of Entomology in India. Major points related to dominance of Insecta in Animalkingdom.ClassificationofphylumArthropodauptoclasses.RelationshipofclassInsectawithotherclassesofArthropoda.Morphology:Structureandfunctionsofinsectcuticleandmolting.Body segmentation. Structure of Head, thorax and abdomen. Structure and modifications of insect antennae, mouth parts, legs, Wing venation, modifications and wing coupling apparatus. Structure of male and female genital organ. Metamorphosis and diapause in insects. Types of larvae and pupae. Structure and functions of digestive, circulatory, excretory, respiratory, nervous, secretary (Endocrine) and reproductive system, in insects. Types of reproduction in insects. Major sensory organs like simple and compound eyes, chemoreceptor.

UNIT II INSECT ECOLOGY

Insect Ecology: Introduction, Environment and its components. Effect of abiotic factors – temperature, moisture, humidity, rainfall, light, atmospheric pressure and air currents. Effect of biotic factors –food competition, natural and environmental resistance.

UNIT III CONCEPT OF IPM AND CLASSIFICATIONS OF INSECTICIDES

Categories of pests. Concept of IPM, Practices, scope and limitations of IPM. Classification of insecticides, toxicity of insecticides and formulations of insecticides. Chemical control - importance, hazards and limitations. Recent methods of

control, repellents, anti-feedants, hormones, attractants, gamma radiation. Insecticides Act 1968- Important provisions. Application techniques of spray fluids. Symptoms of poisoning, first aid and antidotes.

UNIT IV SYSTEMATICS: TAXONOMY OF APTERYGOTA AND EXOPTERYGOTA

Systematics : Taxonomy –importance, history and development and binomial nomenclature. Definitions of Biotype, Sub-species, Species, Genus, Family and Order. Distinguishing characters of agriculturally important orders and families of Hexapoda.Apterygota (Thysanura, Diplura, Protura and Collembola); Exopterygota (Ephemeroptera, Odonata, Orthoptera, Phasmida, Dictyoptera, Embioptera, Dermaptera, Hemiptera, Isoptera, Psocoptera, Mallophaga, Thysanoptera and Siphunculata).

UNIT V **SYSTEMATICS: TAXONOMY OF ENDOPTERYGOTA**

Distinguishing characters of agriculturally important families of Lepidoptera, Coleoptera, Diptera, Hymenoptera, Siphonaptera, Neuroptera and Strepsiptera.

PRACTICAL

Methods of collection and preservation of insects including immature stages; External features of Grasshopper/Blister beetle; Types of insect antennae, mouthparts and legs; Wing venation, types of wings and wing coupling apparatus. Types of insect larvae and pupae; Dissection of digestive system in insects (Grasshopper); Dissection of male and female reproductive systems in insects (Grasshopper); Study of characters of orders Orthoptera, Dictyoptera, Odonata, Isoptera, Thysanoptera, Hemiptera, Lepidoptera, Neuroptera, Coleoptera, Hymenoptera, Diptera and their families of agricultural importance. Insecticides and their formulations. Pesticide appliances and their maintenance. Sampling techniques for estimation of insect population and damage.

COURSE OUTCOMES (COs)

1. To get knowledge about history of entomology and also learn about insects relation with other classes of Athropoda
2. To impart knowledge to student about General organisation of insect body wall and Body regions of insect head, thorax and abdomen, their structure and appendages
3. To get knowledge on digestive, excretory, circulatory, respiratory, nervous system reproductive system, exocrine and endocrine gland function of insect.
4. Students expose to practical observations on external features of grasshopper /

cockroach and other members of phylum Arthropoda .

5. To learn methods of insect collection, preservation, display and storage.

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AEX102 - FUNDAMENTALS OF AGRICULTURAL EXTENSION EDUCATION 3(2+1)

COURSE OBJECTIVE

1. This course intends to expose students to the fundamentals of extension education, extension systems in India, programme planning and rural development efforts and extension administration.

2. To expose the students towards various rural development programs aimed to poverty alleviation, to increase employment opportunities and analysis.

THEORY

UNIT I EXTENSION EDUCATION AND PROGRAMME PLANNING

Education- meaning, definition & types; extension education –meaning, definition, scope and process; objectives and principles of extension education. Programme planning – definition, meaning, process, principles and steps in programme development.

UNIT II :EXTENSION SYSTEM IN INDIA

Extension efforts in pre-independence era (Sriniketan, Marthandam, Firka Development scheme, Gurgaon Experiment, etc.) Post – independence era (Etawah pilot project, Nilokheri Experiment, etc.,) Various extension/ agricultural development programmes launched by ICAR/Govt. of India(IADP, IAAP, HYVP,KVK, ORP, ND, NATP, NAIP etc.,).

UNIT III :RURAL DEVELOPMENT, ADMINISTRATION, MONITORING AND EVALUATION

Rural Development –Concept, meaning, definition: various rural development programmes launched by Govt. of India. Community development –meaning, definition, concepts and principles, physiology of community development. Rural leadership: concept and definition, types of leaders in rural context: extension administration: meaning, concept, principles and functions. Monitoring and evaluation: concept and definition, monitoring and evaluation of extension programmes.

UNIT IV :NEW TRENDS IN AGRICULTURAL EXTENSION

New trends in agricultural extension –Privatization of extension, Cyber extension/ E-extension, (Internet, cyber cafes, video and teleconferencing, Interactive Multimedia

Compact disk (IMCD), Agri portals, Information Kiosks, Kisan Call Centre (KCC), Mobile phone, Village Knowledge Centre (VKC), DEMIC, Geographical Information System (GIS), market led extension, farmer led extension, expert systems etc.,

UNIT V :TRANSFER OF TECHNOLOGY, DIFFUSION OF INNOVATIONS AND EXTENSION METHODS

Transfer of technology concept, models, capacity building of extension personnel, extension teaching methods: meaning, classification, individual, group and mass contact methods, media mix strategies: communication: meaning, definition, models elements, characteristics and barriers to communication

Agricultural Journalism: Agricultural journalism (Print media) - definition, principles, importance, ABC of news, types of news. Diffusion of Innovations – definition, elements; Innovation – definition, attributes; Adoption – meaning, steps in adoption process, adopter categories, factors influencing adoption of innovations; process and stages of adoption, adopter categories.

PRACTICAL

To get acquainted with university extension system. Group discussion- exercise; handling and use of audio visual equipments and digital camera and LCD projector; preparation and use of AV aids, preparation of extension literature – leaflet, booklet, folder, pamphlet news stories and success stories; Presentation skills exercise; micro teaching exercise; A visit to village to understand the problems being encountered by the villagers/ farmers; to study organization and functioning of DRDA and other development departments at district level; visit to NGO and learning from their experience in rural development; understanding PRA techniques and their application in village development planning; exposure to mass media: visit to community radio and television studio for understanding the process of programme production; script writing, writing for print and electronic media, developing script for radio and television.

COURSE OUTCOMES

1. To impart knowledge to the students on extension education and development programmes offered in India
2. To acquire knowledge on extension systems in India
3. To provide opportunity to students to visit organizations involved in extension activities
4. To gain knowledge on transfer of technology and innovations towards agricultural development.
5. To enable students to develop practical skills on preparation of extension teaching methods to survey farmers and to disseminate information and technology through audio visual aids.

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3. Dahama, O.P and O.P. Bhatnagar. 1985. Education and Communication for Development, Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.

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4. https://wcd.nic.in/

ENG101 - COMPREHENSION AND COMMUNICATION SKILLS IN ENGILISH 2(1+1)

COURSE OBJECTIVES

1. Enhance the learner's communication skills by giving adequate exposure in LSRW – Listening, Speaking, Reading, Writing skills and the related sub-skills.
2. Help the learners recognize and operate in various styles and registers in English.

THEORY:

UNIT I - COMMUNICATION SKILLS

Basic Elements of Communication Skills – Purpose of Communication Skills – Need of Communication Skills in Current society – Types of Communication Skills – Applications of Communication Skills

UNIT II - COMPREHENSION WAR

Minus Shooting- The Sporting Spirit by George Orwell, A Dilemma- A layman looks at science by Raymond B. Fosdick, You and Your English – Spoken English and Broken English by G B Shaw, Reading Comprehension, Written Skills: Paragraph writing, Precise writing, Report writing and Proposal writing. The Style: Importance of professional writing.

UNIT III - VOCABULARY BUILDING

Vocabulary-building using Journals, Word Walls, Using words in context. Antonym, Synonym, Homophones, Homonyms, often confused words, Writing of Stories, Drafting News articles, Note making and content development.

UNIT IV - PROFESSIONAL AND LIFE SKILLS

Career–orientation – Ambition, dream job – Motivation, building self-confidence, Interpersonal skills- Team work- Mass communication - Group discussion, writing exercises – Articles, conducting an interview with any ambassador and writing the interview, Review writing - visiting places and meeting people to write review

UNIT V - LANGUAGE SKILLS

LSRW (listening, speaking, reading & writing) - Written English – correspondences letters, memos, minutes, agenda, resume, curriculum vitae and bio-data, writing project report and project proposal. Spoken English - phonetics, dialogues, conversations, extempore, delivering speech. Grammar - subject-

verb agreement, jumbled words, sentences, parts of speech, degrees of comparison, sentence structure, Voice forms, Vocabulary and Conditionals. English for competitive exams – IELTS, TOEFL, GRE and others.

PRACTICAL:

Listening - introduction - Listening vs Hearing - listening modes - types of listening - intensive and extensive listening – practice, Process of listening - methods of enhancing listening - barriers to listening and ways to overcome them – practice, Oral communication - organs of speech – English phonemes (consonant table, vowel table) – practice, English stress and intonation – exercises, Conversation techniques and practice, Rate of speech (slow pace, medium pace, rhetoric), Reading - types - skimming and scanning - SQ4R - critical reading - analytical reading – exercises, Principles and practice of presentation skills - PowerPoint preparation and presentation, Handout preparation - lecture notes preparation - practice and evaluation, Writing skills - note taking – precise writing – abstract writing – practice, Mind-mapping and article writing, Letter writing and rejoinder writing, Text writing - practice on table to text conversion, Interview skills – types of interview (group interview – panel interview – telephone interview – behavioral interview – videoconferencing interview – mock interview),Practice on speaking skills – welcome address - vote of thanks - short extemporal speech, Group discussion – techniques – types and practice.

COURSE OUTCOMES (COs)

1. Understanding and differentiating the concept of comprehension and its types with enhancement of listening skills that helps interpret texts and its basic grammatical structure.
2. Describing the techniques involved in interpretation of content and enhancing the syntax structure gradually
3. Identifying the linguistic process and enabling the students to experiment on speaking English effectively with regular practice and exercises
4. Practicing the students to learn the convincing writing techniques and approaches that may help them in future aspect.
5. Experimenting and preparing the students compatible and competitive enough based on work place environment with sharing knowledge on interview skill and interpersonal skill

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E - RESOURCES:

1. www.orwell.ru/library/articles/spirit/english/e_spirit
2. www.reportingskills.com
3. www.essays.com

HOR202 - PRODUCTION TECHNOLOGY FOR VEGETABLE AND SPICES 2(1+1)

COURSE OBJECTIVE

1. Will enable the students to learn about the production technology of vegetable and spice crops.
2. Impart the knowledge about vegetable and spice crops production technology.

THEORY

UNIT I: SCOPE, IMPORTANCE AND CLASSIFICATION OF VEGETABLES

Importance of vegetable growing –area and production of vegetables in India and Tamil Nadu- National economy- nutritive value of vegetables and human nutrition.

UNIT II: PRODUCTION TECHNOLOGY OF TROPICAL VEGETABLE CROPS

Origin - climate and soil – varieties and hybrids – seeds and sowing – transplanting – water and nutrient management – fertigation – weed management – use of micronutrients and plant growth regulators - physiological disorders - maturity indices – harvest – pest and diseases – seed production

Crops: Tomato, chilli, brinjal, bhendi, gourds (ash gourd, pumpkin, bitter gourd, ridge gourd, bottlegourd, snake gourd and watermelon) onion, cassava, amaranthus and moringa.

UNIT III: PRODUCTION TECHNOLOGY OF TEMPERATE VEGETABLE CROPS

Origin -climate and soil – varieties and hybrids – seeds and sowing – transplanting - water and nutrient management – fertigation – weed management – use of micronutrient and plant growth regulators- physiological disorders- maturity indices – harvest – pest and diseases – seed production

Crops: Cabbage, cauliflower, potato, carrot, radish, beetroot, peas and french beans, Protected cultivation of vegetables (tomato, capsicum and cucumber).

UNIT IV: CROP PRODUCTION TECHNIQUES OF MAJOR SPICES

Spices- scope and importance - classification of spices - origin, area and production - role of commodity boards- export potential of spices.

Climate and soil - varieties - propagation - nursery management and planting – cropping systems-training practices - nutrient, water and weed management - shade regulation - maturity indices - harvest and yield - pests and diseases - processing - value addition.

Crops: Black pepper, Cardamom, Turmeric, Ginger and Garlic

UNIT V: CROP PRODUCTION TECHNIQUES IN SEED SPICES, TREE SPICES AND OTHER SPICES

Climate and soil- varieties - propagation, nursery management and planting- training , pruning canopy management- weed and water management- shade regulation- nutrient management including drip and fertigation – harvest and yield – pests and diseases – processing – value addition. Crops: Coriander, Fenugreek, Cumin, Fennel, Clove, Nutmeg, Cinnamon, Curry leaf, Tamarind and Herbal spices.

PRACTICALS

Identification of vegetables & spice crops and their seeds. Nursery raising. Direct seed sowing and transplanting. Study of morphological characters of different vegetables & spices. Fertilizers applications. Harvesting & preparation for market. Economics of vegetables and spices cultivation.

COURSE OUTCOME

1. To understand the horticultural practices followed in the planting system and special practices to be followed in the planting system.
2. To gain knowledge on principles of designing a garden
3. To have sufficient knowledge on layout on orchard and nursery system.
4. To demonstrate on scheduling of fertilizer and irrigation.
5. To acuquire knowledge on propogation techniques of vegetable and spices.

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3. George Acquaah, 2002. Horticulture – principles and practices. Prentice Hall of India Pvt. Ltd., New Delhi.
4. Jagadish Chandra Jana., Tanmay Kumar Koley., Arghya Mani., ChandanKarak.,Dipak Kumar Murmu. 2018. Advances in post harvest management, processing and value addition of horticultural crops-Part 2: Vegetables, spices and plantation crops. Today and Tomorrow's Printers and Publishers, India.
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NSS 101 - NATIONAL SERVICE SCHEME 2(0+2)

COURSE OBJECTIVE

1.Enable the students to understand the community in which they work and to understand themselves in relation to their community.

2. To understand the importance of social service.

PRACTICAL

Motivation of rural and urban youth for formation of SHG (Self Help Groups) in collaboration with Government machineries and NGOs- Motivation of rural and urban youth for formation of SHG (Self Help Groups) in collaboration with Government machineries and NGOs- Motivation of rural and urban youth for formation of SHG (Self Help Groups) in collaboration with Government machineries and NGOs- Campaign on ill effects of plastics in the adjoining campus areas – Villages / urban areas- Campaign on *Parthenium* eradication- Cycle rally on air pollution – Vehicle exhaust and other means- Popularization of biogas and smokeless chulah- Demonstration on the use of wind energy and solar energy- Demonstration of water harvesting techniques- Demonstration on soil conservation techniques wherever possible- Campaign on Community health programmes of central and state Government – involving Health department officials- AIDS awareness campaign ; campaign on diabetes and healthy food habits and drug abuse- Planning formation of blood donors club – involving NGOs- Campaign on gender equality and women empowerment- Campaign on child health care – immunization, food habits and child labour abolition- Campaign on child health care – immunization, food habits and child labour abolition.

Besides the above, NSS volunteers will attend work during important occasions like Convocation, Farmers day, Sports meet and other University / College functions. For all out door regular activities villages / slums nearby the campus may be selected to avoid transport cost (cycle able distance)

COURSE OUTCOMES(COs)

1. To evoke social consciousness among students through various activities.
2. To develop youth leadership in the students.
3. To utilize their knowledge in finding practical solutions to individual and community problems.
4. To create the awareness of all kinds of discipline to the students.
5. To practice national integration and social harmony, To Gain skills in mobilizing community participation.

NCC101 - NATIONAL CADET CORPS 2(0+2)

PRACTICAL

Drill - Weapon drill – Word of Commands; National integration- unity in diversity; Guard of Honour and Ceremonial drill; Types of weapon, Parts, Stripping and Assembling of light gun; Rifle firing and follow up activities; Camps, types of Camps, Preparation and participation; Awards, different types, Ranks of officers and Cadets; Map reading – judging distance, conventional signs and uses of compass; Leadership traits, types, perception; Fire Fighting, Role of NCC during natural hazards; Field Engineering – section formation; Obstacle training; Health and Sanitation – preventable diseases, Fractures and types of treatments; Environment and Ecology-Pollution and its control; Social Service – contribution of youth towards social welfare; First Aid – Snake bite and other common medical Emergencies.

Besides the above schedule, NCC cadets will be involved during important occasions during convocation, Independence day, Republic day, etc.

PED101 - PHYSICAL EDUCATION 2(0+2)

COURSE OBJECTIVE

1. Participation in sports will yield optimum physical fitness and positive health for all.
2. Physical activities play an important role in the development of students to have a tremendous energy and desire to explore. These activities increase strength, speedand overall development and have considerable import not only in their physical growth but also on social and emotional development.
3. Physical education and sports, being an integral part of education, experience the impact of scientific advancements.
4. Physical education in the development of neuro muscular skills.

PRACTICAL

Exercises for strength, agility, co-ordination, flexibility, co-operation, vital capacity endurance, speed and for various systems of our body and team spirit. Exercise for Good Posture – Conditioning and calisthenics for various Athletic activities *i.e (*a) Before start – Arm stretch, hand stretch and cat stretch (b) Loosening up jogging, bending and twisting (c) Standing – Lateral Arc, triangle and hands to feet pose (d) Sitting – camel kneel, spinal twist and supine knee bend (e) Relaxation – The corpse pose, quick and deep relaxation. Basic gymnastic exercises – participation of athletic events – running, throwing and jumping events.

Basket Ball **:** Dribbling, pass, two or three men pass, pivot, lay up shot, shooting, pass break, hook pass,screening, positional play, defence and offence tactics.

Volley Ball **:** Fingering, under arm pass, over head pass, setting, spiking, back pass, jump pass, stunts,elementarty dive, flaying dive, roll, blacking and various types of services.

Ball Badminton **:** Grip, service, foot work, fore hand stroke, back hand stroke, lob, smash, volley, wallpractice, spin service and defence tactics.

Foot ball **:** Dribbling, passing, dodging, kicking, heading, screening, chest pass, throwing, dragging, goalkick, defence and offence tactics.

Hockey **:** Grip, bully, dribbling, hitting, drive, push strokes, scoop, flick, stopping, various types ofpasses, dodging, defence and offience tactics.

Kho-Kho **:** Quadra ped, bi-ped, how to given kho, taking a direction, recede, parallel toe

method, bullettow method, distal method, foot out, dive, ring game, chains and persue and defence skills.

Chess : Moves, move of king, move of pawns, move of rooks, move of bishops, move of queen, move ofknights, en passant, castling, check and notation.

Kabaddi : Raid, touch, cant, catch, struggle, various types of defence and offence tactics.

Cricket : Grip, bowling, spin, leg spin, off spin, medium, batting, dive, sweep, mode of delivery, fielding,rolling etc.

Tennis : Grip, forehand drive, back hand drive, stroke, backhand ground stroke, service, volley, smash,wall practice, foot work, defence and offence tactics.

Table Tennis : Grip, tossing and serving, spin serve, rally, smash, flick, defence and offence tactics

Shuttle Badminton : Grip, foot work, service, setting, smash, volley, forehand and back hand stroke,back hand serve and defence.

Gymnastics : Balanced walk, execution, floor exercise, tumbling/acrobatics, grip, release, swinging,parallel bar exercise, horizontal bar exercise, flic-flac-walk and pyramids.

ATHLETICS

a) Sprint : Medium start, long start, bunch start, set, pick up, finish, upsweep, downsweep,placement, receiving and exchanging

b) Jumps : Western roll, belly roll, eastern cut off, fass ferry flop, approach, take off, straddle,hitch-kick, handging, clearance, landing, strides etc

c) Throws : Grip, momentum, pre shift, sub phase, the wind up, foot work, entry to the turn, shift,angle of release, follow throw, delivery, front cross step, rear cross step, hop step, fuck method paryobraine, discoput, rotation, carry and glide.

d) Hurdles : Finding lead leg, use of lead leg and trial leg, flight, clearing, finish

Lead up games, advance skills and game for any one of the above games.

- Rules and regulations of anyone of the games and athletic events.
- Aims and objectiaves of yoga – asanas :ie. padmasana, pujankasana, sarvangasana, chakrasana,dhanurasana, halasana, mayurasana and savasana, asanas for ailments, back pain, arthritis, abdominal problesm, stress, fatiguel, Insomnia, obsity, circulation, hypertension, varicose veins, respiration, heart, digenstion, headaches, depression, addiction and eye problems.
- Mental balance and importance – development of concentration suriyanamaskar – advance skills of any one of the games which were taught in the I semester.

COURSE OUTCOMES(COs)

1. Physical education encourage through games and sports sportsmanship, Co-operation loyalty, sociality, self-control, leadership, patriotism, friendship, kindness, sympathy, tolerance, forgiveness and other similar qualities.
2. Physical Education helps to improve one's ability for work and self expression in the competitive condition of our modern life.
3. Physical fitness is the combination of strength, flexibility, agility, power, speed, muscular endurance and cardio vascular endurance.

II YEAR III SEMESTER				
1.	AGR 203	Crop Production Technology – I (Kharif Crops)	2(1+1)	Entrepreneurship
2.	PBG 202	Fundamentals of Plant Breeding	3(2+1)	Skill development
3.	AEC 202	Agricultural Finance and Cooperation	3(2+1)	Skill development
4.	AGI 201	Agri-Informatics	2(1+1)	Skill development
5.	AEG 202	Farm Machinery and Power	2(1+1)	Entrepreneurship
6.	HOR 203	Production Technology for Ornamental Crops, MAP and Landscaping	2(1+1)	Entrepreneurship
7.	ENS 201	Environmental Studies and Disaster Management	3(2+1)	Skill development
8.	MAT 202	Statistical Methods	2(1+1)	Skill development
9.	AMP 201	Livestock and Poultry Management	4(3+1)	Entrepreneurship
10	NSS/NCC PED101	NSS/NCC/Physical Education & Yoga Practices**	2(0+2)**	Skill development
	TOTAL		**23(14+9)+2****	

II YEAR III SEMESTER

AGR 203 - CROP PRODUCTION TECHNOLOGY – I (KHARIF CROPS) 2(1+1)

COURSE OBJECTIVES

1. To understand the basics cultivation and management practices of kharif crops.
2. To understand the inputs management of all kharif crops.

THEORY

UNIT I : INTRODUCTION

Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of Kharif crops.

UNIT II CEREALS

Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of Cereals – rice, maize, sorghum, pearl millet, vari and finger millet,

UNIT III PULSES

Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of pulses-pigeonpea, mungbean and urdbean, cluster bean

UNIT IV OILSEEDS

Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of oilseeds- groundnut, Castor, Sesame and Soybean

UNIT V FIBER CROPS

Fibre crops- cotton & Jute; forage crops sorghum, cowpea and napier hybrid, fodder maize Cash crop- Bidi tobacco Green manure Crops-Sunhemp and Dhaincha

PRACTICAL

Rice nursery preparation, transplanting of Rice, sowing of soybean, pigeon pea and mung bean. maize, groundnut and cotton, effect of seed size on germination and seedling vigour of kharif season crops, effect of sowing depth on germination of kharif crops, identification of weeds in kharif season crops, top dressing and foliar feeding of nutrients, study of yield contributing characters and yield calculation of kharif season crops,

study of crop varieties and important agronomic experiments at experimental farm. Study of forage experiments, morphological description of kharif season crops.

COURSE OUTCOMES

1. Gain the understanding about origin, geographical distribution, and economic importance of Kharif crops
2. Study about Soil and climatic requirements, varieties, cultural practices and yield of Kharif crops.
3. Knowledge on crop production technologies of different Kharif crops.
4. Analysis of comparative benefits of the different kharif crops.
5. To study the management practices and constarints in the production of kharif crops.

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PBG202 - FUNDAMENTALS OF PLANT BREEDING 3(2+1)

COURSE OBJECTIVE

1. To impart knowledge to the students on the principles and procedures of plant breeding In self and cross pollinated crops for development of the high yielding varieties / hybrids with the help of various conventional and modern molecular approaches.
2. Acquire knowledge on floral biology and selection of proper breeding method.

THEORY

UNIT I REPRODUCTIVE SYSTEMS IN PLANT BREEDING

Objectives and role of plant breeding - historical perspective – activities in Plant Breeding. Centres of origin – contribution of Vavilov, Harlan, Zhukovosky – law of homologous series. Plant genetic resources – importance – germplasm – types – activities – gene erosion - gene bank – collection - conservation – types of conservation. Germplasm: evaluation – use of descriptors, documentation, utilization; Agencies – national and international; germplasm exchange – quarantine. Modes of reproduction – sexual – asexual – mechanisms promoting self and cross pollination – significance of pollination. Self incompatibility – classifications – mechanisms – application – measures to overcome and limitations. Sterility – male sterility – introduction – classification – CMS, GMS, CGMS -inheritance and applications. EGMS - TGMS, PGMS, Gametocides, Transgenic Male sterility and applications. Apomixis – introduction – classification - applications; Parthenocarpy and its types.

UNIT II: BREEDING METHODS OF SELF POLLINATED CROPS

Polygenic variation-components of variance - phenotypic, genotypic and environmental variance-heritability and genetic advance. Plant introduction as a breeding method – types of introduction – objectives – quarantine - acclimatization – achievements - merits and demerits. Genetic basis of self pollinated crops – Vilmorin's principle of progeny selection - Johannsen's pure line theory. Breeding methods for self pollinated crops without involving artificial hybridization: Pure line selection – procedure – merits and demerits – achievements; Mass selection– procedure - types – merits and demerits-achievements- comparison of mass and pureline selection. Breeding methods of self pollinated crops involving artificial hybridization: Creating variability in self pollinated crops - Hybridization and selection – objectives – steps in hybridization - choice of parents – kinds of emasculation – hybridization-

transgressive breeding. Handling segregating generations- Pedigree breeding – procedure – mass pedigree – merits – demerits – achievements; Bulk breeding – procedure – merits – demerits – achievements. Comparison of pedigree and bulk breeding methods. Single Seed Descent (SSD) method – procedure – application – merits and demerits. Backcross breeding – genetic basis — procedures for transferring dominant and recessive genes. Back cross breeding – merits – demerits – multilines- types- procedure- merits and demerits.

UNIT III: BREEDING METHODS OF CROSS POLLINATED CROPS AND CLONALLY PROPAGATED CROPS

Genetic structure of a population in crosses pollinated crops – Hardy Weinberg law – gene frequencies in random mating population. Breeding methods of cross pollinated crops without involving artificial hybridization: Mass selection in cross pollinated crops – modified mass selection – Grid selection – progeny selection. Breeding methods of cross pollinated crops involving artificial hybridization: Recurrent selection principles – types – merits and demerits. Heterosis breeding – theories - genetic basis – hybrid vigour – estimation of heterosis – inbreeding depression. Heterosis breeding – procedure – development of inbreds- evaluation of inbred lines – top cross method and single cross method-prediction of double cross performance- hybrids – single cross- double cross- three way cross hybrids. achievements – merits and demerits. Synthetics and composites - steps in development of synthetics and composites – achievements – merits and demerits. Genetic characters of asexual reproduction – clonal selection – hybridization and clonal selection – merits and demerits – achievements.

UNIT IV: SPECIAL BREEDING METHODS

Polyploidy breeding – classification – induction of polyploidy - achievements – limitations. Wide hybridization-importance-barriers and techniques for overcoming barriers-utilization- Pre-breeding. Mutation breeding: mutation – types – mutagens – breeding procedure – achievements – limitations. Concepts in biotic stress resistance breeding- diseases and pests - gene for gene hypothesis-mechansims of resistance - sources of resistance- multilines-gene pyramiding-gene deployment-Breeding methods. Concepts in abiotic stress resistance breeding- drought- mechansims of drought resistance – basis of drought resistance- morphological and physiological characters- sources of drought resistance- Breeding methods.

UNIT V: VARIETAL RELEASE, SEED PRODUCTION, MARKERS AND IPR

Procedure for release of new varieties-stages in seed multiplication-steps in nucleus and breeder seed production. Introduction to markers – morphological – biochemical- DNA markers – advantages and

disadvantages- marker assisted selection in plant breeding. Participatory plant breeding- Intellectual Property Rights- Patenting- Plant Breeders and Farmers Rights.

PRACTICAL

Floral biology, emasculation and hybridization techniques in different crop species; viz., Rice, Jute, Maize, Sorghum, Pearl millet, Ragi, Pigeonpea, Urdbean, Mungbean, Soybean, Groundnut, Seasame, Caster, Cotton, Cowpea, Tobacco, Brinjal, Okra and Cucurbitaceous crops. Maintenance breeding of different kharif crops. Handling of germplasm and segregating populations by different methods like pedigree, bulk and single seed decent methods; Study of field techniques for seed production and hybrid seeds production in Kharif crops; Estimation of heterosis, inbreeding depression and heritability; Layout of field experiments; Study of quality characters, donor parents for different characters; Visit to seed production plots; Visit to AICRP plots of different field crops.

COURSE OUTCOMES

1. Learn breeding procedures in self and cross pollinated crops.
2. Understand exploitation of heterosis utilizing male sterility and other methods.
3. Know about the various population improvement programmes.
4. Study about the fundamentals of mutation, polyploidy and wide hybridization and their role in crop improvement.
5. Orientation regarding modern molecular approaches like Marker Assisted Selection.

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AEC202 - AGRICULTURAL FINANCE AND CO-OPERATION 3(2+1)

COURSE OBJECTIVE

1. Help students to contribute to better decision making by farmers, or by agencies servicing agriculture.
2. Help students to understand why farmers respond to policies and economic opportunities in the ways they do.
3. Enable students to gain knowledge on agricultural marketing, challenges and prospects for improving agricultural marketing system.

THEORY

UNIT I AGRICULTURAL FINANCE – NATURE AND SCOPE

Agricultural Finance- meaning, scope and significance,credit needs and its role in Indian agriculture. Agricultural credit: meaning, definition, need, classification. Sources of credit - advantages and disadvantages - Rural indebtedness- History and Development of rural credit in India.

UNIT II FINANCIAL INSTITUTIONS:

Sources of agricultural finance: institutional and non-institutional sourcesand their roles, commercial banks - social control and nationalization of commercial banks. Micro financing including KCC, Micro finance – SHG Models, Lead Bank Scheme, RRBs, Scale of finance and unit cost. Cost of credit. An introduction to higher financing institutions – RBI, NABARD, ADB, IMF, world bank, Insurance and Credit Guarantee Corporation of India. Recent development in agricultural credit: Rural credit policies of Government – Subsidized farm credit - Differential Interest Rate (DIR) Scheme – Loan relief measures

UNIT III FARM FINANCIAL ANALYSIS

Credit analysis: 4 R’s,7 P's and 3C’s of credit. Preparation of bankable projects / Farm credit proposals – Feasibility; Appraisal - Time value of money: Compounding and Discounting - Undiscounted and Discounted measures. Preparation and analysis of financial statements – Balance Sheet, Income Statement and Cash Flow Statement. Basic guidelines for preparation of project reports - Bank norms – SWOT analysis.

UNIT IV CO-OPERATION

Agricultural Cooperation in India–Meaning, brief history of cooperative development in India - Pre and Post - Independence periods and Co-operation in different plan periods, objectives, principles of

cooperation, significance of cooperatives in Indian agriculture. Co-operating credit structure: short termand long term. Agricultural Cooperation - credit, marketing, consumer and multi-purpose cooperatives, farmers' service cooperative societies, processing cooperatives, farming cooperatives, cooperative warehousing; role of ICA, NCUI, NCDC, NAFED. Strength and weakness of co-operative credit system, Policies for revitalizing co-operative credit.

UNIT V BANKING AND INSURANCE

Negotiable Instruments: Meaning, Importance and Types - Central bank: RBI – functions - Credit control – Objectives and Methods: CRR, SLR and Repo rate - Credit rationing - Dear money and cheap money - Financial Inclusion and Exclusion: credit widening and credit deepening monetary policies. Credit gap: Factors influencing credit gap. Non - Banking Financial Institutions (NBFI). NPA – Causes, consequences, and mitigation. Crop Insurance: Schemes, Coverage, Advantages and Limitations in Implementation - Estimation of Crop Yields - Assessment of crop losses, Determination of compensation - Weather based crop insurance, features, determinants of compensation. Livestock Insurance Schemes Agricultural Insurance Company of India Ltd (AIC): Objectives and functions.

PRACTICAL

Determination of most profitable level of capital use. Optimum allocation of limited amount of capital among different enterprise. Analysis of progress and performance of cooperatives using published data. Analysis of progress and performance of commercial banks and RRBs using published data. Visit to a commercial bank, cooperative bank / cooperative society to acquire first - hand knowledge of their management, schemes, and procedures. Visit to District Central Co-operative Bank (DCCB) to study its role, functions, and procedures for availing loan – Fixation of Scale of Finance. Estimation of credit requirement of farm business – A case study. Preparation and analysis of Balance Sheet, and Cash Flow Statement – A case study. Exercise on Financial Ratio Analysis. Appraisal of farm credit proposals – A case study. Preparation and analysis of income statement – A case study. Preparation of Bankable projects / Farm Credit Proposals and appraisal - Undiscounted methods and Discounted methods. Techno-economic parameters for preparation of projects for various agricultural products and its value-added products. Seminar on selected topics. Analysis of Different Crop Insurance Products / Visit to crop insurance implementing agency.

COURSE OUTCOMES (COs)

1. To know the farmers financial opportunities and also about the function of financial institutes .
2. To learn the principles of banking, credit and deposit services of private and public banks.

3. To understand various financial statements for farm business viability.
4. To gain practical knowledge in dealing with banking and loan application procedures.
5. To analyze farmer-friendly schemes under Crop insurance, Cooperative warehousing and their contribution to farmers' welfare.

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2. https://www.agrimoon.com
3. http://www.tnau.ac.in
4. http://www.hillagric.ac.in
5. http://www.apeda.com

AGI201 - AGRI- INFORMATICS 2(1+1)

COURSE OBJECTIVE

1. To learn the use of computer and computer programming applications in agriculture.
2. To know about the use information and communication technologies (IT) in agriculture.

THEORY

UNIT I INTRODUCTION

Introduction to computers; Anatomy of computers; Memory concepts, units of memory; Operating system, definition and types; Applications of MS-Office for creating, editing and formatting a document; Data presentation, tabulation and graph creation; Statistical analysis, mathematical expressions; Database, concepts and types, creating data base; Uses of DBMS in Agriculture; Internet and World Wide Web (WWW), concepts, components and creation of web; HTML & XML coding.

UNIT II COMPUTER PROGRAMMINAG AND VISUAL BASICS

Computer programming, concepts; Documentation and programme maintenance; Debugging programmes; Introduction to Visual Basic, Java, Fortran, C/ C++, etc.; Standard input/output operations; Variables and constants; Operators and expressions; Flow of control; Inbuilt and user defined functions; Programming techniques for agriculture.

UNIT III E AGRICULTURE

e-Agriculture, concepts, design and development; Application of innovative ways to use information and communication technologies (IT) in agriculture; ICT for data collection; Formation of development programmes, monitoring and evaluation;

UNIT IV USE OF SOFTWARE IN AGRICULTURE

Computer models in agriculture: statistical, weather analysis and crop simulation models - concepts, structure, input-output files, limitations, advantages and application for understanding plant processes, sensitivity, verification, calibration and validation; IT application for computation of water and nutrient requirement of crops; Computer-controlled devices (automated systems) for agri-input management; Smart phone mobile apps in agriculture for farm advice, market price, post-harvest management, etc,

UNIT V GEOSPATIAL TECHNOLOGY

Geospatial technology, concepts, techniques, components and uses for generating valuable agri-information; Decision support systems, taxonomy, components, framework, classification and applications in agriculture; Agriculture Information/Expert System; Soil Information Systems, etc. for supporting farm decisions; Preparation of contingent crop-planning and crop calendars using IT tools.

PRACTICALS

Study of computer components, accessories; Practice of important DOS commands; Introduction of different operating systems such as windows, Unix, Linux; Creating files and folders; File management; Use of MS-WORD and MS Power point for creating, editing and presenting a scientific document; Handling of tabular data; Animation, video tools, art tool, graphics, template and designs; MS-EXCEL-Creating a spreadsheet, use of statistical tools, writing expressions, creating graphs, analysis of scientific data, handling macros; MS-ACCESS: Creating database, preparing queries and reports, demonstration of agri-information system; Introduction to World Wide Web (WWW) and its components, creation of scientific website, presentation and management agricultural information through web; Introduction of programming languages- Visual Basic, Java, Fortran, C, C++, and their components; Hands-on practice on writing small programmes; Hands-on practice on Crop Simulation Models (CSM); DSSAT/Crop-Info/CropSyst/ Wofost; Preparation of input file for CSM and study of model outputs; Computation of water and nutrient requirements of crop using CSM and IT tools; Use of smart phones and other devices in agro-advisory and dissemination of market information; Introduction of Geospatial Technology; Demonstration of generating information important for agriculture; Hands on practice on preparation of Decision Support System.

COURSE OUTCOMES (COs)

1. To learn the basic components and working of computer and its applications.
2. To understand the use of computer application in Agriculture.
3. Know the basics of computer networking system and its application in agriculture.
4. To understand the functioning and working of geospatial technology in agriculture.
5. To understand the basics of programming languages.

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2. Office 2013 All-In-One For Dummies by Peter Weverka.
3. Computer Fundamentals (With CD) 6th Edition 6th Edition by Pradeep Sinha and Priti Sinha.
4. Principles of Programming Languages by Er. Anil Panghal.

5. E-Agriculture and Rural Development by Charalampos Patrikakis, Blessing Maumbe.

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AEG202 - FARM MACHINERY AND POWER 2(1+1)

COURSE OBJECTIVES

1. Enable the students in better understanding about need and scope of agricultural mechanization.
2. To learn about basic agricultural machineries and equipment for agricultural mechanization.

THEORY

UNIT I INTRODUCTION

Status of Farm Power in India, Sources of Farm Power, I.C.engines, working principles of IC engines, comparison of two stroke and four stroke cycle engines.

UNIT II INTERNAL COMBUSTION ENGINE

Study of different components of I.C. engine, I.C. engine terminology and solved problems, Familiarization with different systems of I.C.engines: Air cleaning, cooling, lubrication, fuel supply and hydraulic control system of a tractor.

UNIT III POWER TRANSMISSION SYSTEM

Familiarization with Power transmission system : clutch, gear box, differential and final drive of a tractor , Tractor types, Cost analysis of tractor power and attached implement.

UNIT IV PRIMARY AND SECONDARY TILLAGE IMPLEMENTS

Familiarization with Primary and Secondary Tillage implement, Implement for hill agriculture, implement for intercultural operations.

UNIT V AGRICULTURAL MECHANISATION EQUIPMENTS

Familiarization with sowing and planting equipment, calibration of a seed drill and solved examples, Familiarization with Plant Protection equipment, Familiarization with harvesting and threshing equipment.

PRACTICALS

Study of different components of I.C. engine. To study air cleaning and cooling system of engine, Familiarization with clutch, transmission, differential and final drive of a tractor, Familiarization with lubrication and fuel supply system of engine, Familiarization with brake, steering, hydraulic control system of engine, Learning of tractor driving, Familiarization with operation of power tiller, Implements for hill agriculture, Familiarization with different types of primary and secondary tillage implements: mould plough, disc plough and disc harrow. Familiarization with seed-cum-fertilizer drills their seed

metering mechanism and calibration, planters and transplanter Familiarization with different types of sprayers and dusters Familiarization with different inter-cultivation equipment, Familiarization with harvesting and threshing machinery.

COURSE OUTCOMES (COs)

1. Students will learn about the types of IC Engines and its system associated with it.
2. Students will learn about the system associated with tractor and function.
3. Student gains information about various primary and secondary tillage systems which can operate manually or by animal power.
4. Study the functioning of sowing and plant protection equipment such as seed drill, planter, sprayers and duster.
5. Gives brief knowledge on harvesting, threshing equipment and cost analysis.

REFERENCES

1. S.C.Jain and C.R.Rai. Farm Tractor – Maintenance and Repair. Standard Publishers, 1705-B, NaiSarak, Delhi – 110006
2. Senthil kumar, T., R. Kavitha and V.M.Duraisamy 2015. A Text Book of Farm Machinery, Thannambikkai Publications, Coimbatore . ISBN: 978-9381102305.

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2. www.farmmachineryshow.org
3. http://www.hillagric.ac.in/edu/coa/agengg/lecture/243/agriengg-243.htm
4. http://www.digitalbookindex.org/subject_search/search010agricultureequipmenta
5. http://ecoursesonline.iasri.res.in/course/view.php?id=540.

HOR203 - PRODUCTION TECHNOLOGY FOR ORNAMENTAL CROPS, MAP AND LANDSCAPING 2(1+1)

COURSE OBJECTIVES

1. To impart knowledge on the production techniques of major cut flowers, loose flowers, medicinal crops and aromatic crops both under open and protected conditions
2. To impart knowledge and hands on training on landscaping and value addition of ornamentals.

THEORY

UNIT I – LANDSCAPING

Importance and scope of ornamental crops. Principles of landscaping. Landscape uses of trees, shrubs and climbers.

UNIT II - PRODUCTION TECHNOLOGY OF CUT FLOWER CROPS UNDER PROTECTED CONDITIONS

Production technology of important cut flowers like rose, gerbera, carnation, lilium and orchids under protected conditions

UNIT III - PRODUCTION TECHNOLOGY OF FLOWERS UNDER OPEN CONDITIONS

Production technology of important cut flowers like gladiolus, tuberose, chrysanthemum under open conditions. Package of practices for loose flowers like marigold and jasmine under open conditions. Processing and value addition in ornamental crops.

UNIT IV - PRODUCTION TECHNOLOGY OF MEDICINAL CROPS

Medicinal crops- importance and scope – current status - soil and climate – varieties – propagation– planting methods – nutrient, irrigation and organic practices – harvest – post-harvest handling – storage, packaging of Periwinkle, Asparagus, Aloe, Costus, Isabgol, Glory lily, extraction and value addition of medicinal crops.

UNIT V - PRODUCTION TECHNOLOGY OF AROMATIC CROPS

Aromatic crops - importance and scope – current status - soil and climate – varieties – propagation– planting methods – nutrient, irrigation and organic practices – harvest – post-harvest handling – storage, packaging of Ocimum, Mint, Geranium, Citronella, Lemon grass, Palmarosa and Vetiver – Distillation of oil and value addition.

PRACTICAL

Planting, care and maintenance of trees, shrubs and climbers used in garden. Varieties of cut flowers under protected and open conditions. Nursery bed preparation, seed sowing in ornamental plants. Training and pruning and intercultural operations in Ornamental plants. Garden layout. Protected structures – care and maintenance. Harvesting and post harvest handling of cut and loose flowers. Identification, propagation techniques, planting, cultural operations in Periwinkle, Asparagus, Aloe, Costus, Isabgol, poppy, Ocimum, Mint, Geranium, lemon grass, palmarosa, vetiver and citronella. Extraction and distillation of medicinal & Aromatic crops. Visit to commercial floriculture and oil extraction units

COURSE OUTCOMES (COs)

1. Learn about the importance of landscaping design, principles and types of garden

2. Acquire knowledge and experience on commercial production technology of cut flowers under protected condition

3. Acquire knowledge and experience on commercial production technology of flowers under open condition and value addition of ornamentals

4. Gain knowledge on the crop production techniques of medicinal and aromatic crops

5. Demonstrate various propagation methods, special practices and post harvest practices of major flower crops and value addition of ornamental plants

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1. Ravindra sharma (2004) Agro techniques of Medicinal plants. Daya publishing, New Delhi.
2. Trivedi, P.C. (2004) Medicinal Plants: Utilization and Conservation, Aavishkar Publisher, Distributors, Jaipur.
3. Allan M. Armitage and Judy M. Laushman “Speciality Cut Flowers” , Second Edition, Published by Timber press 2003, ISBN – 0881925799

4. Atal. C. K. and B. M. Kapur. 1992. Cultivation and utilization of medicinal plants RRL. CSIR, Jammu – Tawi.

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2. http://www.webct.uark.edu
3. http://www.pubmed.com
4. http://www.bestgarden.net/

ENS201 - ENVIRONMENTAL STUDIES AND DISASTER MANAGEMENT 3(2+1)

COURSE OUTCOME

1. To impart basic knowledge on natural resources, ecosystems, biodiversity, environmental pollution and disaster management.
2. To know about the rescue during disaster ad his holistic approach.

THEORY

UNIT I NATURAL RESOURCES

Multidisciplinary nature of environmental studies Definition, scope and importance. Renewable and non-renewable resources, Natural resources and associated problems. a) Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forest and tribal people. b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems. c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies. d) Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. e) Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources Case studies. f) Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles. Ecosystems: Concept of an ecosystem, Structure and function of an ecosystem, Producers, consumers and decomposers, Energy flow in the ecosystem. Ecological succession, Food chains, food webs and ecological pyramids.

UNIT II ECOSYSTEM

Introduction, types, characteristic features, structure and function of the following ecosystem: a. Forest ecosystem b. Grassland ecosystem c. Desert ecosystem d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) Biodiversity and its conservation: - Introduction, definition, genetic, species & ecosystem diversity and bio geographical classification of India. Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values. Biodiversity at global, National and local levels, India as a mega-diversity nation. Hot-sports of biodiversity. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts. Endangered and endemic species of India. Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity. Environmental

Pollution: definition, cause, effects and control measures of: a. Air pollution b. Water pollution c. Soil pollution d. Marine pollution e. Noise pollution f. Thermal pollution g. Nuclear hazards. Solid Waste Management: causes, effects and control measures of urban and industrial wastes. Role of an individual in prevention of pollution.

UNIT III SOCIAL ISSUES

Social Issues and the Environment: From Unsustainable to Sustainable development, Urban problems related to energy, Water conservation, rainwater harvesting, watershed management. Environmental ethics: Issues and possible solutions, climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust dies. Waste land reclamation. Environment Protection Act Air (Prevention and Control Of Pollution)Act.Water (Prevention and control of Pollution) Act. Wildlife Protection Act. Forest Conservation Act.

Issues involved in enforcement of environment all Legislation. Public awareness. Human Population and the Environment: population growth, variation among nations, population explosion, Family Welfare Programme. Environment and human health: Human Rights, Value Education, HIV/AIDS. Women and Child Welfare. Role of Information Technology in Environment and human health.

UNIT IV NATURAL AND MAN MADE DISASTER

Natural Disasters-Meaning and nature of natural disasters, their types and effects. Floods, drought, cyclone, earthquakes, landslides, avalanches, volcanic eruptions, Heat and cold waves, Climatic change: global warming, Sea level rise, ozone depletion. Man Made Disasters- Nuclear disasters, chemical disasters, biological disasters, building fire, coal fire, forest fire, oil fire, air pollution, water pollution, deforestation, industrial waste water pollution, road accidents, rail accidents, air accidents, sea accidents.

UNIT V DISASTER MANAGEMENT

Disaster Management- Effect to migrate natural disaster at national and global levels. International strategy for disaster reduction. Concept of disaster management, national disaster management framework; financial arrangements; role of NGOs, community –based organizations and media. Central, state, district and local administration; Armed forces in disaster response; Disaster response; Police and other organizations.

PRACTICAL

Pollution case studies. Case Studies – Field work: Visit to a local area to document environmental assets river/ forest/ grassland/ hill/ mountain, visit to a local polluted site-Urban/Rural/Industrial/Agricultural, study of common plants, insects, bird sand study of simple ecosystems - pond, river, hill slopes, etc.

COURSE OUTCOMES

1. Students will learn about the natural resources and agricultural problems.
2. Students will learn about the ecosystem
3. Gain knowledge on environmental studies and its management
4. Gain knowledge on different forms of disaster and its management.
5. Attain knowledge on social issues related to environment and environmental ethics

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1. DharChakrabarti. P.G., 2011. Disaster management - India's risk management policy frameworksand key challenges. Published by Centre for Social Markets (India), Bangalore. 36 pp.

2. Proceedings of 2nd India disaster management congress, New Delhi. Organized by National Institute of Disaster Management, New Delhi during 4 – 6, November 2009.

MAT202 - STATISTICAL METHODS 2(1+1)

COURSE OBJECTIVE

1. Will enable the students in learn about the statistical methods and its importance in agriculture.
2. To know about the statistical application in agriculture.

THEORY

UNIT I INTRODUCTION

Introduction to Statistics and its Applications in Agriculture, Graphical Representation of Data, Measures of Central Tendency & Dispersion.

UNIT II PROBABILITY

Definition of Probability, Addition and Multiplication Theorem (without proof). Simple Problems Based on Probability. Binomial &Poisson Distributions.

UNIT III CORRELATION

Definition of Correlation, Scatter Diagram. Karl Pearson's Co-efficient of Correlation. Linear Regression Equations.

UNIT IV TEST OF SIGNIFICANCE

Introduction to Test of Significance, One sample & two sample test t for Means, Chi-Square Test of Independence of Attributes in 2 ×2 Contingency Table. Introduction to Analysis of Variance, Analysis of One Way Classification.

UNIT V SAMPLING METHODS

Introduction to Sampling Methods, Sampling versus Complete Enumeration, Simple Random Sampling with and without replacement, Use of Random Number Tables for selection of Simple Random Sample.

PRACTICALS

Graphical Representation of Data. Measures of Central Tendency (Ungrouped data) with Calculation of Quartiles, Deciles & Percentiles. Measures of Central Tendency (Grouped data) with Calculation of Quartiles, Deciles & Percentiles. Measures of Dispersion (Ungrouped Data). Measures of Dispersion (Grouped Data). Moments, Measures of Skewness & Kurtosis (Ungrouped Data). Moments, Measures of Skewness & Kurtosis (Grouped Data).Correlation & Regression Analysis. Application of One Sample-test. Application of Two Sample Fisher's -test. Chi-Square test of Goodness of Fit. Chi-Square test of Independence of Attributes for 2×2 contingency table. Analysis of Variance One Way Classification. Analysis of Variance Two Way Classification. Selection of random sample using Simple Random Sampling.

COURSE OUTCOMES

1. Learn the computation of basic measures in Statistics
2. Apply the concept of probability and binomial distributions in Agricultural Science.
3. Analyze testing of hypothesis and various statistical test to find the solution in various agricultural problems.
4. Learn the importance of Correlation, and Regression coefficients and their importance in agricultural projects.
5. Analyse the procedure involved in sampling and testing the parameters

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3. S.C. Gupta and V.K. Kapoor, Fundamentals of Mathematical Statistics, 2003, Sultan Chand and Sons, New Delhi
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5. www.stats.gla.ac.uk/steps/glossary/index.html

AMP201 - LIVESTOCK AND POULTRY MANAGEMENT 4(3+1)

COURSE OBJECTIVES

1. To provide a comprehensive knowledge about the scientific rearing of the broiler.
2. To enable the students to acquire practical knowledge to manage a profitable small-scale commercial broiler farm.

THEORY

UNIT I INTRODUCTION

Role of livestock in the national economy. Reproduction in farm animals and poultry. Housing principles, space requirements for different species of livestock and poultry.

UNIT II MANAGEMENT OF LIVESTOCK

Management of calves, growing heifers and mulch animals. Management of sheep, goat and swine. Incubation, hatching and brooding. Management of growers and layers.

UNIT III BREEDS

Important Indian and exotic breeds of cattle, buffalo, sheep, goat, swine and poultry. Improvement of farm animals and poultry. Digestion in livestock and poultry.

UNIT IV FEED

Classification of feed stuffs. Proximate principles of feed. Nutrients and their functions. Feed ingredients for ration for livestock and poultry. Feed supplements and feed additives. Feeding of livestock and poultry.

UNIT V LIVE STOCK DISEASES

Introduction of livestock and poultry diseases. Prevention (including vaccination schedule) and control of important diseases of livestock and poultry.

PRACTICAL

External body parts of cattle, buffalo, sheep, goat, swine and poultry. Handling and restraining of livestock. Identification methods of farm animals and poultry. Visit to IDF and IPF to study breeds of livestock and poultry and daily routine farm operations and farm records. Judging of cattle, buffalo and poultry. Culling of livestock and poultry. Planning and layout of housing for different types of livestock. Computation of rations for livestock. Formulation of concentrate mixtures. Clean milk production, milking methods. Hatchery operations, incubation and hatching equipments. Management of

chicks, growers and layers. Debeaking, dusting and vaccination. Economics of cattle, buffalo, sheep, goat, swine and poultry production.

COURSE OBJECTIVES

1. Students will learn livestock and poultry species in our country.
2. To acquire knowledge on livestock production and rearing
3. Will enable students to get knowledge on dairy and cattle disease and their management.
4. Learn the techniques of sheep and goat management.
5. Will learn Import breeds of live stock and poultry management systems.

REFERENCES

1. A Text Book of Livestock Production and Management, V. N. Gautam and Shraddha Shrivastava
2. Livestock Production Management, Nilotpal' Ghosh

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1. http://www.elearnvet.net/
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NSS 101 - NATIONAL SERVICE SCHEME 2(0+2)**

COURSE OBJECTIVE

1. Enable the students to understand the community in which they work and to understand themselves in relation to their community
2. To understand social service by students.

PRACTICAL

Conducting field days with KVK to popularize improved agro techniques; Conducing seminar / workshop in a nearby village to motivate the youth on agribusiness (involving DEE, KVK, NGO and local agro-entrepreneurs); Campaign on self employment opportunities like Apiculture, mushroom cultivation, Food processing and value addition, production of biocontrol agents and biofertilizers, nursery techniques, seed production, tissue culture, vermicompost, manufacture of small gadgets and agricultural implements as per local needs and feasibility.; Campaign on self employment opportunities like Apiculture, mushroom cultivation, Food processing and value addition, production of biocontrol agents and biofertilizers, nursery techniques, seed production, tissue culture, vermicompost, manufacture of small gadgets and agricultural implements as per local needs and feasibility; Campaign on self employment opportunities like Apiculture, mushroom cultivation, Food processing and value addition, production of biocontrol agents and biofertilizers, nursery techniques, seed production, tissue culture, vermicompost, manufacture of small gadgets and agricultural implements as per local needs and feasibility; Animal health care campaign – Dairy and poultry farming - Forage production techniques and silage making; Training the NSS volunteers on road safety measures in involving traffic wardens and RTO; Training NSS volunteers on First AID and emergency call involving NGOs and organizations like St. John's Ambulance, Red Cross, etc.; Organizing road safety rally; Motivating NSS Volunteers on small savings concept and conveying the message to the public through them; Observation of National integration and communal harmony; Campus development and greening activities.

Besides the above, NSS volunteers will attend work during important occasions like Convocation, Farmers day, Sports meet and other University / College functions. For all out door regular activities villages / slums nearby the campus may be selected to avoid transport cost (cycle able distance)

COURSE OUTCOMES (COs)

1. To evoke social consciousness among students through various activities.
2. To develop youth leadership in the students.
3. To utilize their knowledge in finding practical solutions to individual and community problems.
4. To create the awareness of all kinds of discipline to the students.
5. To practice national integration and social harmony, To Gain skills in mobilizing community participation.

NCC - NATIONAL CADET CORPS 2(0+2)**

PRACTICAL

Drill – Individual word of command; Weapon training – parts of heavy weapons; Stripping and assembling of heavy weapons; Importance of team work values, code of ethics; Disaster management during Earth Quake; Evacuation of Causalities; Map reading – Campus and Service Protractor; Aids to civil authority; Section and platoon formation; Social service, NGO's and their contribution to the society; Roll of NCC cadets in civil administration; Traffic rules and Road signs; Mines and types of mine fields; Dressing of Wounds, physical and mental health; Field signals; Air raid warning, Fire fighting.

Besides the above schedule, NCC cadets will be involved during important occasions during convocation, Independence day, Republic day, etc.

II YEAR IV SEMESTER				
1.	AGR204	Crop Production Technology – II (Rabi crops)	2(1+1)	Entrepreneurship
2.	AEX203	Communication Skills and Personality Development	2(1+1)	Skill development
3.	AEG203	Renewable Energy and green technology	2(1+1)	Employability
4.	SAC202	Problematic soils and their management	2(2+0)	Skill development
5.	HOR204	Production Technology for Fruit and Plantation Crops	2(1+1)	Entrepreneurship
6.	SST203	Principles of Seed Technology	3(1+2)	Entrepreneurship
7.	AGR205	Farming System & Sustainable Agriculture	2(1+1)	Employability
8.	AEC203	Agricultural Marketing, Trade & Prices	3(2+1)	Entrepreneurship
9.	AGR206	Introductory Agro-meteorology & Climate Change	2(1+1)	Skill development
10.	OPT 201-204	Elective Courses*	3(2+1)*	Employability
11.	AGR207	Short Tour**	1(0+1)0**	Skill development
12.	NSS/NCC/ PED 101	NSS/NCC/ Physical Education & Yoga Practices**	2(0+2)**	Skill development
	TOTAL		**22(11+8)+3****	
****Non-gradial compulsory courses * List of optinal courses listed below**				

LIST OF OPTIONAL FOR COURSES IV SEMESTER**

Sl. No	Course Code	Title of the Elective courses	Credits	
1.	OPT 201	Agribusiness Management	3(2+1)	Employability
2.	OPT 202	Agrochemicals	3(2+1)	Employability
3.	OPT 203	Commercial Plant Breeding	3(1+2)	Employability
4.	OPT 204	Landscaping	3(2+1)	Employability

II YEAR IV SEMESTER

AGR204 - CROP PRODUCTION TECHNOLOGY – II (RABI CROPS) 2(1+1)

COURSE OBJECTIVES

1. To study the Origin, geographical distribution, economic importance and different practices and yield of Rabi crops
2. To impact practical experience on cultivation of Rabi crops

THEORY

UNIT I: CEREALS

Wheat, barley and Oats - Origin, geographic distribution, economic importance, soil and climatic requirement, varieties, cultural practices, yield.

UNIT II: PULSES

Chickpea, lentil and peas - Origin, geographic distribution, economic importance, soil and climatic requirement, varieties, cultural practices, yield

UNIT III: OIL SEEDS

Rapeseed, mustard and sunflower- Origin, geographic distribution, economic importance, soil and climatic requirement, varieties, cultural practices, yield

UNIT IV: SUGAR CROPS

Sugarcane - Origin, geographic distribution, economic importance, soil and climatic requirement, varieties, cultural practices, yield

UNIT IV: FORAGE CROPS

Berseem, lucerne and oat: Origin, geographic distribution, economic importance, soil and climatic requirement, varieties, cultural practices

PRACTICAL

Sowing methods of wheat and sugarcane, identification of weeds in rabi season crops, study of morphological characteristics of rabi crops, study of yield contributing characters of rabi season crops, yield and juice quality analysis of sugarcane, study of important agronomic experiments of rabi crops at experimental farms. Study of rabi forage experiments, oil extraction of medicinal crops, visit to research stations of related crops.

COURSE OUTCOMES (COs)

1. Student get knowledge on origin, geographical distribution, economic importance of rabi crops
2. Student will able to understand the cultural practices and yield of Rabi crops.
3. Identify weeds in rabi season crops, pulses-chickpea, lentil, peas; oilseeds-rapeseed, mustard and sunflower; sugar crops-sugarcane, medicinal and aromatic crops-mentha, lemon grass and citronella, forage crops-berseem, lucerne and oat.
4. Students get knowledge of irrigation scheduling in rabi crops, additional area can be increased of low water requiring crops.
5. It will be helpful to know about basic morphological characteristics of rabi crops.

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AEX203 - COMMUNICATION SKILLS AND PERSONALITY DEVELOPMENT 2(1+1)

COURSE OBJECTIVES

1. To develop communication skills as well as positive personality traits
2. To acquire a language suitable for technical communication
3. To inculcate the habit of regular reading and writing.

THEORY

UNIT I COMMUNICATION SKILLS

Communication Skills: meaning and process of communication, verbal and nonverbal communication

UNIT II LISTENING AND PRESENTATION SKILLS

Listening and note taking, writing skills, oral presentation skills; field diary and lab record; indexing, footnote and bibliographic procedures

UNIT III READING AND COMPREHENSION SKILLS

Reading and comprehension of general and technical articles, precise writing, summarizing, abstracting

UNIT IV PRESENTATION SKILLS

Individual and group presentations, impromptu presentation, public speaking.

UNIT V DISCUSSIONS

Group discussion. Organizing seminars and conferences

PRACTICAL

Practicing active listening, Exercise on note taking methods, Exercise on technical writing and practicing proof correction, Practicing oral presentation, Exercise on writing field diary and Lab record, Visit to library and learn indexing, Exercise on preparing foot notes and citations, Practice on effective reading skills, Comprehension of technical article, Comprehension of general article, Exercise on precise writing, Practice on summarizing articles, Practice on preparing abstracts, Developing skill on individual presentation, Developing skill on group presentation

COURSE OUTCOMES

1. To impart the knowledge on Communication Skills
2. To learn about communication models and modes
3. To gain basic knowledge on listening, reading and writing skills, parts and types of research
4. To get knowledge on technical writings and library sciences

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1. Indu Grover, Lali Yadav & Deepak Grover Extension Management, Agrotech
2. Everett Rogers, and Floyd Shoemaker, Communication of Innovation – a Cross Cultural Approach, New York Free Press
3. Knapp, Mark L., & Hall, Judith A .(2007) Nonverbal Communication in Human Interaction. (8^{th} ed.) Wadsworth: Thomas Learning
4. Kathleen M. German, Bruce E Gronbeck Principles of Public Speaking

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AEG203 - RENEWABLE ENERGY AND GREEN TECHNOLOGY 2(1+1)

COURSE OBJECTIVES

1. To enable better understanding of students about identifying the new methodologies / technologies for effective utilization of renewable energy sources.
2. To know about the renewable energy for future endeavor.

THEORY

UNIT I: INTRODUCTION TO RENEWABLE ENERGY SOURCES

Classification of energy sources, contribution of these of sources in agricultural sector, Familiarization with biomass utilization for biofuel production and their application.Energy crisis – classification of energy sources – renewable energy – significance – potential - achievements in India. Biomass – methods of energy conversion.

UNIT II: BIOTHERMAL CONVERSION OF BIOMASS

Biofuels – importance- Bio gas plant- Biogas technology – classification - types - factors affecting biogas plants- alternate feedstocks – applications - biodigested slurry and enrichment.Familiarization with types of biogas plants and gasifiers, biogas, bio alcohol, biodiesel and bio oil production and their utilization as bioenergy resource

UNIT III: SOLAR ENERGY

Introduction of solar energy, collection and their application, Solar Energy – characteristics - types of radiation Familiarization with solar energy gadgets:

UNIT IV: SOLAR ENERGY GADGETS

solar cooker, solar water heater, application of solar energy:Solar drying, solar pond, solar distillation, solar photovoltaic system and their application

UNIT V: WIND ENERGY

Introduction of wind energy and their application- Wind – formations - Wind mills – types – horizontal and vertical axis – components – working principles – applications. Geothermal energy – wave energy – tidal energy – ocean energy – principle and operation - types – advantages and disadvantages

PRACTICAL

Familiarization with renewable energy gadgets. To study biogas plants, To study gasifier, To study the production process of biodiesel, To study briquetting machine, To study the production process of bio-

fuels. Familiarization with different solar energy gadgets. To study solar photovoltaic system: solar light, solar pumping, solar fencing. To study solar cooker. To study solar drying system. To study solar distillation and solar pond

COURSE OUTCOMES (COs)

1. Students will understand the need, importance and scope of non-conventional energy resources.
2. Students shall learn about the engineering techniques and principles and functioning of various solar energy gadgets.
3. Students understand the role and significance of wind energy.
4. Students will able to learn about various biochemical conversion process of biomass.
5. Students gain the knowledge on basic methodology of thermo chemical conversion process from biomass.

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2. S. Rao and B.B. Parulekar. 2007. Energy Technology: Non-Conventional, Renewable and Conventional. Khanna Publishers, Naisarak, Delhi.
3. G.D. Rai. 1993. Solar Energy Utilisation. Khanna Publishers, New Delhi.
4. J. F. Manwell, J. G. McGowan and A. L. Rogers. 2009. Wind Energy Explained: Theory, Design and Application. Wiley & Sons Ltd.,

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SAC202 - PROBLEMATIC SOILS AND THEIR MANAGEMENT 2(2+0)

COURSE OBJECTIVES

1. To impart knowledge of problematic soil and their management practices.
2. To know about their uses and rectification strategies.

THEORY

UNIT I SOIL QUALITY

Soil quality and health, Distribution of Waste land and problem soils in India. Their categorization based on properties.

UNIT II SOIL PHYSICAL AND CHEMICAL CONSTRAINTS

Reclamation and management of Saline and sodic soils, Acid soils, Acid Sulphate soils, Eroded and Compacted soils, Flooded soils, Polluted soils. Irrigation water – quality and standards, utilization of saline water in agriculture.

UNIT III REMOTE SENSING AND GIS TECHNOLOGY

Remote sensing and GIS in diagnosis and management of problem soils.

UNIT IV BIO -REMEDIATION

Multipurpose tree species, bio remediation through MPTs of soils, land capability and classification, land suitability classification.

UNIT V SOIL AGRO-ECOSYSTEM

Problematic soils under different Agro-ecosystems.

COURSE OUTCOMES (COs)

1. Describe the problem soils and their distributions in India and Tamil Nadu.
2. Understanding the classification of soils based on their chemical properties.
3. Discriminate the soil on the basic of physical and chemical properties
4. Assess the different types of soil physical problems and their management practices.
5. Identify the soil chemical problems and management practices

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3. Richards, L.A. 2012. Diagnosis and improvement of saline and alkali soils. Scientific Publishers.
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HOR204 - PRODUCTION TECHNOLOGY FOR FRUIT AND PLANTATION CROPS 2(1+1)

COURSE OBJECTIVES

1. To impart wide knowledge on the production technology of tropical, sub-tropical, temperate fruit and plantation crops.
2. To impart hands on experience on the propagation techniques and processing techniques of fruit and plantation crops

THEORY

UNIT I: PRODUCTION STATUS OF FRUIT AND PLANTATION CROPS

Importance and scope of fruit and plantation crop industry in India – nutritional value of fruit crops - classification of fruit crops – area, production, productivity and export potential of fruit and plantation crops.

UNIT II: PRODUCTION TECHNIQUES IN TROPICAL FRUIT CROPS

Climate and soil requirements – varieties – propagation and use of rootstocks- planting density and systems of planting - High density and ultra-high-density planting - cropping systems - after care - training and pruning - water, nutrient and weed management – fertigation - special horticultural techniques - plant growth regulation - important disorders – maturity indices and harvest- value addition.

Fruit crops: Mango, Banana, Papaya, Guava, Sapota

UNIT III: PRODUCTION TECHNIQUES IN SUBTROPICAL FRUIT CROPS

Climate and soil requirements – varieties – propagation and use of rootstocks- planting density and systems of planting - High density and ultra-high-density planting - cropping systems - after care - training and pruning - water, nutrient and weed management – fertigation - special horticultural techniques - plant growth regulation - important disorders – maturity indices and harvest and value addition**.**

Fruit crops: Citrus, Grape, Litchi, Pineapple, Pomegranate, Jackfruit and Minor Fruits

UNIT IV: PRODUCTION TECHNIQUES IN TEMPERATE FRUIT CROPS

Climate and soil requirements – varieties – propagation and use of rootstocks - planting density and systems of planting -High density and ultrahighdensity planting -cropping systems - after care - training and pruning - water, nutrient and weed management –fertigation - special horticultural techniques - plant growth regulation - important disorders – maturity indices and harvest and value addition.

Fruit crops: Apple, Pear, peach, Strawberry, Nut crops.

UNIT V: PRODUCTION TECHNIQUES IN PALMS AND PLANTATION CROPS

Climate and soil requirements - varieties - propagation - nursery management - planting and - planting systems - cropping systems - after care - water, nutrient and weed management - intercropping - multi-tier cropping system - mulching - special horticultural practices - maturity indices, harvest and yield - pests and diseases - processing - value addition

Palms: Coconut, Arecanut, Oil palm and Palmyrah

Climate and soil requirements - varieties- propagation - nursery management - planting and planting systems - cropping systems- after care- training and pruning - water, nutrient and weed management - shade management - intercropping - mulching - cover cropping - special horticultural practices - maturity indices, harvest and yield - pests and diseases - processing - value addition.

Plantation crops: Tea, Coffee, Cocoa, Cashew, Rubber

PRACTICAL

Seed propagation. Scarification and stratification of seeds. Propagation methods for fruit and plantation crops. Description and identification of fruit. Preparation of plant bio regulators and their uses, Important pests, diseases and physiological disorders of above fruit and plantation crops, Visit to commercial orchards.

COURSE OUTCOMES (COs)

1. Learn about the importance, nutrition and production status of fruits and plantation crops
2. Acquire knowledge and practical experience on production technology of tropical fruits
3. Acquire knowledge and practical experience on production technology of subtropical fruit crops
4. Learn about the crop production techniques of temperate fruits
5. Gain knowledge and experience on the crop production and processing techniques of palms and plantation crops

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SST 203 - PRINCIPLES OF SEED TECHNOLOGY 3(1+2)

COURSE OBJECTIVES

1. Students get basic knowledge on structures of seeds
2. To impact knowledge on importance and principles of seed production and seed storage.

THEORY

UNIT I: IMPORTANCE AND BIOLOGY

Seed and seed technology: introduction, definition and importance. Deterioration causes of crop varieties and their control; Maintenance of genetic purity during seed production, seed quality; Definition, Characters of good quality seed, different classes of seed.

UNITII: SEED PRODUCTION AND CERTIFICATION

Foundation and certified seed production of important cereals, pulses, oilseeds, fodder and vegetables. Seed certification, phases of certification, procedure for seed certification, field inspection. Seed Act and Seed Act enforcement.

UNIT IV: SEED TESTING

Duty and powers of seed inspector, offences and penalties. Seeds Control Order 1983, Varietal Identification through Grow Out Test and Electrophoresis, Molecular and Biochemical test. Detection of genetically modified crops, Transgene contamination in non-GM crops, GM crops and organic seed production.

UNIT III: SEED DRYING

Seed drying, processing and their steps, seed testing for quality assessment, seed treatment, its importance, methods of application and seed packing.

UNIT V: SEED STORAGE AND MARKETING

Seed storage; general principles, stages and factors affecting seed longevity during storage. Measures for pest and disease control during storage. Seed marketing: structure and organization, sales generation activities, promotional media. Factors affecting seed marketing, Role of WTO and OECD in seed marketing. Private and public sectors and their production and marketing strategies.

PRACTICAL

Seed production in major cereals: Wheat, Rice, Maize, Sorghum, Bajra and Ragi. Seed production in major pulses: Urd, Mung, Pigeonpea, Lentil, Gram, Field bean, pea. Seed production in major oilseeds: Soybean, Sunflower, Rapeseed, Groundnut and Mustard. Seed production in important vegetable crops. Seed sampling and testing: Physical purity, germination, viability, etc. Seed and seedling vigour test. Genetic purity test: Grow out test and electrophoresis. Seed certification: Procedure, Field inspection, Preparation of field inspection report. Visit to seed production farms, seed testing laboratories and seed processing plant.

COURSE OUTCOMES (COs)

1. Acquire knowledge on Seed quality characteristics and its significance
2. Understand the Seed production techniques of Agricultural and Horticultural crops.
3. Understand the Post harvest seed handling techniques and seed quality enhancement techniques
4. Understand the Seed Legislation and seed certification procedures
5. Understand the Seed quality testing, Storage and Marketing seed germination, method of testing the seed for various quality parameters and production technology of seeds of crop varieties and hybrids as well as genetically modified crops.

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1. Agrawal, R.L. 1996. Seed Technology, Oxford & IBH Publishing Co., New Delhi.
2. Bhaskaran, M., A.Bharathi and K.Vanangamudi. 2013. Text Book on Principles of seed production and quality control. Kalyani Publishers, New Delhi.
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AGR205 - FARMING SYSTEM & SUSTAINABLE AGRICULTURE 1(1+0)

COURSE OBJECTIVES

1. To impact on basic knowledge of farming system and concepts of sustainable agriculture
2. Students will understand the importance and advantages of sustainable agriculture

THEORY

UNIT I: FARMING SYSTEM

Farming System - scope, importance, and concept, Types and systems of farming system and factors affecting types of farming, farming system components and their maintenance

UNIT II: CROPPING SYSTEM

Cropping system and pattern, multiple cropping system, efficient cropping system and their evaluation, Allied enterprises and their importance, Tools for determining production and efficiencies in cropping and farming system

UNIT III: SUSTAINABLE AGRICULTURE

Sustainable agriculture - problems and its impact on agriculture, indicators of sustainability, adaptation and mitigation, conservation agriculture strategies in agriculture, HEIA, LEIA and LEISA and its techniques for sustainability

UNIT IV: INTEGRATED FARMING

Integrated farming system-historical background, objectives and characteristics, components of IFS and its advantages, Site specific development of IFS model for different agro-climatic zones, resource use efficiency and optimization techniques

UNIT V: RESOURCE CYCLING

Resource cycling and flow of energy in different farming system, farming system and environment, Visit of IFS model in different agro-climatic zones of nearby states University/ institutes and farmers field.

COURSE OUTCOMES (COs)

1. Student will able to understand different farming and cropping system
2. Student will able to understand sustainable agriculture problems and its impact
3. Knowledge about modern agriculture in relation to sustainable agriculture and discuss the sustainable indicators on ecological basis.
4. Understand the sustainable agriculture in relation to tillage, fertilizers, irrigation, weed management and plant protection measures.

5. Understand the important cropping system for sustainable agriculture in India.

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1. Palaniappan, SP and K. Sivaraman.1996. Cropping systems in the tropics, principles and management. New Age International (P) Ltd., New Delhi.
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AEC203 - AGRICULTURAL MARKETING, TRADE AND PRICES 3(2+1)

COURSE OBJECTIVES

1. To explore the knowledge on agricultural marketing system in India, institutions responsible for the sector and various schemes in facilitating agricultural marketing.
2. To know about the agricultural marketing, trade and prices strategies.

THEORY

UNIT I AGRICULTURAL MARKETING – NATURE AND SCOPE

Agricultural Marketing: Concepts and definitions of market, marketing, agricultural marketing, market structure, marketing mix and market segmentation, classification and characteristics of agricultural markets**;** nature and determinants of demand and supply of farm products. Producer's surplus – meaning and its types, marketable and marketed surplus, factors affecting marketable surplus of agri-commodities. Approaches to the study of marketing - Market functionaries and Market forces. Marketing of agricultural versus manufactured goods.

UNIT II MARKETING FUNCTIONS, PRICING AND PROMOTION STRATEGIES

Marketing process and functions: Marketing process - concentration, dispersion and equalization; exchange functions – buying and selling; physical functions – storage, transport and processing; facilitating functions – packaging, branding, grading, quality control and labeling (AGMARK); Standardization, Finance, Storage and Warehousing, Processing, Value Addition and Risk Taking - Market Structure, Conduct and Performance paradigm (SCP) – Market Structure: Meaning, Components, Dynamics of Conduct and Performance – Market structure and Price determination under perfect and imperfect competition. Product Life Cycle (PLC) and competitive strategies: Meaning and stages in PLC; characteristics of PLC; strategies in different stages of PLC; pricing and promotion strategies: pricing considerations and approaches – cost based and competition based pricing; market promotion – advertising, personal selling, sales promotion and publicity – their meaning and merits and demerits.

UNIT III MARKETING EFFICIENCY AND MARKETING INSTITUTIONS

Market functionaries and marketing channels: Types and importance of agencies involved in agricultural marketing; meaning and definition of marketing channel; number of channel levels; marketing channels for

different farm products; Integration over space, time and form: Meaning, definition and types of market integration; marketing efficiency; marketing costs, margins and price spread; factors affecting cost of marketing reasons for higher marketing costs of farm commodities; ways of reducing marketing costs; Modern marketing systems versus traditional agricultural marketing systems; Role of Government in agricultural marketing - Public sector institutions - CWC, SWC, FCI and DMI – their objectives and functions; cooperative marketing in India; Market Intelligence -Legal measures for improving agricultural marketing: APMC Act. New EXIM policy of India – Advantages of AEZs, ITPO, Export Promotion Councils, APEDA, MPEDA, and Commodity Boards.

UNIT IV TRADE IN AGRICULTURAL PRODUCTS

International Trade: Concept of International Trade and its need - Free trade, Autarky and it needs - Theories of Trade: Absolute and comparative advantage; Present status and prospects of Agriculturalexports / imports from India and their share - Barriers to Trade: Tariff and non tariff barriers - Trade policy instruments – Terms of Trade - Role of institutions like UNCTAD and GATT - WTO in promoting trade in agricultural products - Free Trade Agreements – AoA and its implications on Indian agriculture: Sanitary and Phyto-sanitary issues, Market Access, Domestic Support and Export Subsidies - IPR.

UNIT V AGRICULTURAL PRICES AND RISK ANALYSIS

Agricultural Prices and Policy: Meaning and functions of price; administered prices; need for agricultural price policy; Objectives of Price Policy and Price Stabilization – Role of CACP – Concept of MSP, FRP (SMP) and SAP – Price Parity - Procurement of food grains and buffer stock - Risk in marketing: Meaning and Importance - Types of risk in marketing: Speculation and Hedging and Forward and Futures trading; an overview of futures trading; – Role of Contract Farming in risk mitigation.

PRACTICAL

Plotting and study of demand and supply curves and calculation of elasticities; Study of relationship between market arrivals and prices of some selected commodities; Computation of marketable and marketed surplus of important commodities; Study of price behaviour over time for some selected commodities; Construction of index numbers; Visit to a local market to study various marketing functions performed by different agencies, identification of marketing channels for selected commodity, collection of data regarding marketing costs, margins and price spread and presentation of report in the class; Visit to market institutions – NAFED, SWC, CWC, cooperative marketing society, etc. to study their organization and functioning; Application of principles of comparative advantage of international trade.

COURSE OUTCOMES (COs)

1. To understand the basics about Agricultural marketing, markets, types and its structure
2. To gain information on Marketing Functions, Pricing and Promotion strategies.
3. To impart knowledge about Marketing Efficiency and price spread in Agricultural marketing
4. To learn about basic concepts in export, principles and agreements involved in international trade
5. To detail about agricultural prices, types, fixation and risks in Agriculture

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1. John J. Shaw. 1999. International Marketing Analysis and Strategy. Prentice Hall of India. New Delhi.
2. Sivarama Prasad A. 1999. Agricultural Marketing in India. Mittal Publications, New Delhi.
3. Kohls R. L. and N. Uhl. Joseph. 1980. Marketing of Agricultural Products. Collier Macmillan. New York.

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AGR206 - INTRODUCTORY AGRO- METEOROLOGY & CLIMATE CHANGE 2(1+1)

COURSE OBJECTIVES

1. To know about the basic idea on agro meteorology and agro-climatology
2. To get the knowledge about various weather phenomenon
3. To get practical knowledge about using various agro meteorology instruments on crop production

THEORY

UNIT I: AGRICULTURAL METEOROLOGY

Meaning and scope of agricultural meteorology; Earth atmosphere- its composition, extent and structure; Atmospheric weather variables; Atmospheric pressure, its variation with height; Wind, types of wind, daily and seasonal variation of wind speed, cyclone, anticyclone, land breeze and sea breeze

UNIT II: SOLAR RADIATION

Nature and properties of solar radiation, solar constant, depletion of solar radiation, short wave, longwave and thermal radiation, net radiation, albedo; Atmospheric temperature, temperature inversion, lapse rate, daily and seasonal variations of temperature, vertical profile of temperature, Energy balance of earth; Atmospheric humidity, concept of saturation, vapor pressure, process of condensation, formation of dew, fog, mist, frost, cloud

UNIT III: PRECIPITATION

Precipitation, process of precipitation, types of precipitation such as rain, snow, sleet, and hail, cloud formation and classification, Artificial rain making.

UNIT IV: WEATHER HAZARDS

Monsoon - mechanism and importance in Indian agriculture, Weather hazards - drought, floods, frost, tropical cyclones and extreme weather conditions such as heat-wave and cold-wave.

UNIT V: AGRICULTURE AND WEATHER RELATIONS

Modifications of crop microclimate, climatic normals for crop and livestock production. Weather forecasting- types of weather forecast and their uses. Climate change, climatic variability, global warming, causes of climate change and its impact on regional and national Agriculture.

PRACTICAL

Visit of Agro-meteorological Observatory, site selection of observatory, exposure of instruments and weather data recording. Measurement of total, shortwave and longwave radiation, and its estimation using Planck's intensity law. Measurement of albedo and sunshine duration, computation of Radiation Intensity

using BSS. Measurement of maximum and minimum air temperatures, its tabulation, trend and variation analysis. Measurement of soil temperature and computation of soil heat flux. Determination of vapor pressure and relative humidity. Determination of dew point temperature. Measurement of atmospheric pressure and analysis of atmospheric conditions. Measurement of wind speed and wind direction, preparation of wind rose. Measurement, tabulation and analysis of rain. Measurement of open pan evaporation and evapotranspiration. Computation of PET and AET.

COURSE OUTCOMES (COs)

1. To know about the importance of agricultural meteorology and its impact on crop production
2. It gives knowledge about various weather factors and its effect on crops
3. It deals with different atmospheric pressure systems ,wind systems of the world
4. It gives information about various agro-climatic zones of India and Tamil Nadu
5. Students get knowledge on weather forecasting and impact of climate and weather on crop production

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OPT 201 - AGRIBUSINESS MANAGEMENT 3(2+1)

COURSE OBJECTIVE

1. To learn the managerial aspects in the field of agribusiness.
2. To know about agri business and their values.

THEORY

UNIT I INTRODUCTION

Transformation of agriculture into agribusiness, various stakeholders and components of agribusiness systems. Importance of agribusiness in the Indian economy and New Agricultural Policy. Distinctive features of Agribusiness Management: Importance and needs of agro-based industries, Classification of industries and types of agro based industries. Institutional arrangement, procedures to set up agro based industries. Constraints in establishing agro-based industries.

UNIT II AGRI-VALUE CHAIN

Agri-value chain: Understanding primary and support activities and their linkages. Business environment: PEST & SWOT analysis. Management functions: Roles & activities, Organization culture.

UNIT III PLANNING

Planning, meaning, definition, types of plans. Purpose or mission, goals or objectives, Strategies, polices procedures, rules, programs and budget. Components of a business plan, Steps in planning and implementation. Organization staffing, directing and motivation. Ordering, leading, supervision, communications, control.

UNIT IV CAPITAL MANAGEMENT AND FINANCIAL MANAGEMENT OF AGRIBUSINESS

Capital Management and Financial management of Agribusiness. Financial statements and their importance. Marketing Management: Segmentation, targeting & positioning. Marketing mix and marketing strategies. Consumer behaviour analysis, Product Life Cycle (PLC).

UNIT V SALES AND DISTRIBUTION MANAGEMENT

Sales & Distribution Management. Pricing policy, various pricing methods. Project Management definition, project cycle, identification, formulation, appraisal, implementation, monitoring and evaluation. Project Appraisal and evaluation techniques.

PRACTICAL

Study of agri-input markets: Seed, fertilizers, pesticides. Study of output markets: grains, fruits, vegetables, flowers. Study of product markets, retails trade commodity trading, and value added products. Study of

financing institutions- Cooperative, Commercial banks, RRBs, Agribusiness Finance Limited, NABARD. Preparations of projects and Feasibility reports for agribusiness entrepreneur. Appraisal/evaluation techniques of identifying viable project- Non-discounting techniques. Case study of agro-based industries. Trend and growth rate of prices of agricultural commodities. Net present worth technique for selection of viable project. Internal rate of return.

COURSE OUTCOMES

1. Understand the fundamentals of management with reference to agribusiness.
2. Acquints with various functional areas of agribusiness.
3. Study the managerial fuctions and its applications with reference to agribusiness.
4. Learn the concepts and process of planning and organizing.
5. Provides knowledge about the staffing, directing and control.

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OPT 202 - AGROCHEMICALS 3(2+1)

COURSE OBJECTIVE

1. Main objective of this subject is familiarize the students about the different types of agro chemicals used in the form of insecticides, pesticides and fertilizers.
2. Analysis and interpret the results of agrochemicals.

THEORY

UNIT I INTRODUCTION

An introduction to agrochemicals, their type and role in agriculture, effect on environment, soil, human and animal health, merits and demerits of their uses in agriculture, management of agrochemicals for sustainable agriculture. Herbicides-Major classes, properties and important herbicides. Fate of herbicides.

UNIT II FUNGICIDES

Fungicides - Classification – Inorganic fungicides - characteristics, preparation and use of sulfur and copper, Mode of action-Bordeaux mixture and copper oxychloride. Organic fungicides- Mode of action- Dithiocarbamates-characteristics, preparation and use of Zineb and maneb.Systemic fungicides- Benomyl, carboxin, oxycarboxin, Metalaxyl, Carbendazim, characteristics and use.

UNIT III INSECTICIDES

Introduction and classification of insecticides: inorganic and organic insecticides Organochlorine, Organophosphates, Carbamates, Synthetic pyrethroids Neonicotinoids, Biorationals, Insecticide Act and rules, Insecticides banned, withdrawn and restricted use, Fate of insecticides in soil & plant. IGRs Biopesticides, Reduced risk insecticides, Botanicals, plant and animal systemic insecticides their characteristics and uses.

UNIT IV FERTILIZERS

Fertilizers and their importance. Nitrogenous fertilizers: Feedstocks and Manufacturing of ammonium sulphate, ammonium nitrate, ammonium chloride, urea. Slow release N-fertilizers. Phosphatic fertilizers: feedstock and manufacturing of single superphosphate. Preparation of bone meal and basic slag. Potassic fertilizers: Natural sources of potash, manufacturing of potassium chloride, potassium sulphate and potassium nitrate.Mixed and complex fertilizers: Sources and compatibility– preparation of major, secondary and micronutrient mixtures. Complex fertilizers: Manufacturing of ammonium phosphates, nitrophosphates and NPK complexes. Fertilizer control order. Fertilizer

logistics and marketing.

UNIT V BIOPESTICIDES

Plant bio-pesticides for ecological agriculture, Bio-insect repellent.

PRACTICAL

Sampling of fertilizers and pesticides. Pesticides application technology to study about various pesticides appliances. Quick tests for identification of common fertilizers. Identification of anion and cation in fertilizer. Calculation of doses of insecticides to be used. To study and identify various formulations of insecticide available kin market. Estimation of nitrogen in Urea. Estimation of water soluble P_2O_5 and citrate soluble P_2O_5 in single super phosphate. Estimation of potassium in Muraite of Potash/ Sulphate of Potash by flame photometer. Determination of copper content incopper oxychloride. Determination of sulphur content in sulphur fungicide. Determination of thiram. Determination of ziram content.

COURSE OUTCOMES

1. Students will understand the agrochemicals, their type and role in agriculture.
2. Students will learn about herbicides-major classes, properties and important herbicides.
3. Students will learn different fertilizers and their importance
4. Students will acquire knowledge on various types of agrochemicals and their effect on environment, soil, human and animal health
5. Students will learn agrochemical efficient management for sustainable agriculture.

REFRENCES

1. Agro Chemical Industries -EIRI
2. Manures, Fertilizers and Agrochemicals ,ECource -ICAR ICA.

OPT 203 - COMMERCIAL PLANT BREEDING 3(2+1)

COURSE OBJECTIVE

1. Main objective of this subject is to familiarize the student about the commercial plant breeding techniques which are used to produce new high yielding varieties by the industries.
2. To know about the commercialization of plant breeding and their values.

THEORY

UNIT-I INTRODUCTION

Types of crops and modes of plant reproduction. Line development and maintenance breeding in self and cross pollinated crops (A/B/R and two line system) for development of hybrids and seed production.

UNIT-II GENETIC PURITY TEST OF COMMERCIAL HYBRIDS

Genetic purity test of commercial hybrids. Advances in hybrid seed production of maize, rice, sorghum, pearl millet, castor, sunflower, cotton pigeon pea, Brassica etc.

UNIT-III DEVELOPMENT OF CULTIVARS

Quality seed production of vegetable crops under open and protected environment. Alternative strategies for the development of the line and cultivars: haploid inducer, tissue culture techniques and biotechnological tools.

UNIT-IV ISSUES IN COMMERCIAL PLANT BREEDING

139 IPR issues in commercial plant breeding: DUS testing and registration of varieties under PPV & FR Act. Variety testing, release and notification systems in India.

UNIT V PRINCIPLES AND TECHNIQUES OF SEED PRODUCTION

Principles and techniques of seed production, types of seeds, quality testing in self and cross pollinated crops.

PRACTICAL

Floral biology in self and cross pollinated species, selling and crossing techniques-Techniques of seed production in self and cross pollinated crops using A/B/R and two line system.-Learning techniques in hybrid seed production using male-sterility in feld crops- Understanding the difficulties in hybrid seed production, Tools and techniques for optimizing hybrid seed production- Concept of rouging in seed production plot. Concept of line its multiplication and purification in hybrid seed production-Role of pollinators in hybrid seed production-Hybrid seed production techniques in sorghum, pearl millet, maize, rice, rapeseedmustard, sunflower, castor, pigeon pea, cotton and vegetable crops-Sampling and analytical procedures for purity testing and detection of spurious seed. Seed drying and storage structure in quality

seed management. -Screening techniques during seed processing viz., grading and packaging-Visit to public private seed production and processing plants.

COURSE OUTCOMES (COs)

1. Students will understand the aims and objectives of commercial plant breeding.
2. Students will understand principles and techniques of hybrid seed production and registration
3. Students will understand intellectual property rights
4. To understand about principles and techniques of seed production.
5. Students will understand the issues of commercial breeding.

REFERENCES

1. Plant Breeding Singh, B.D Kalyani Publishers. New Delhi
2. Principles of Plant Genetics and Breeding (Second Edition) George Acquaah John Wiley & Son.

OPT 204 LANDSCAPING 3(2+1)

COURSE OBJECTIVES

1. To educate students on ornamental horticulture, types and styles of gardens and identification of ornamental plants suitable for landscaping.
2. To know about Landscaping values for commercialization.

THEORY

UNIT I SCOPE, IMPORTANCE AND COMPONENTS OF GARDENS

History, scope and importance - aesthetic values and different types of gardening - definition, historical background - basic principles and components- principles of gardening – garden components, adornments

UNIT II TYPES OF GARDENS AND ORNAMENTAL PLANTS FOR LANDSCAPING

Types of gardens - Hindu, Persian, Italian, Mogul, English and Japanese gardens and its constructed features - Methods of lawn making, turf planting materials for sports grounds, designing of rockery and water garden - Propagation and role of trees, shrubs, climbers and creepers, palms, ferns, herbaceous perennials, flowering ornamentals, cacti and succulents in landscaping and tree transplanting techniques

UNIT III FLOWER ARRANGEMENTS AND BONSAI MAKING

Principles and methods of fresh and dry flower arrangement - Culture and art of making bonsai

UNIT IV BIO-AESTHETIC PLANNING, VERTICAL AND ROOF GARDENS

Bio-aesthetic and urban planning, definition, concepts and principles – vertical gardens and roof gardens

UNIT V INTERIORSCAPING

Scope, importance, selection of plants for interiorscaping - environmental and media requirements for Interiorscaping- study of terrarium, bottle gardens and dish gardens

PRACTICAL

Identification and description of annuals, herbaceous perennials, ground covers, trees, shrubs, climbers & creepers, cacti & succulents, palms, ferns and ornamental grasses - description and design of non-plant components viz., arches, bowers, pergolas, paths, walks, bridges, fountains and statues - designing of garden components – edges, hedges, flower beds and borders - designing of traffic islands and planting - practices in preparation of land for lawn making and planting of lawn grasses- practices in design and layout of rock garden, water garden, sunken garden, terrace garden and Japanese garden, recreational gardens, children’s garden,

terrariums, bottle garden and dish garden - practices in design and making of fresh and dry flower arrangements - selection of plants for bonsai and practices in bonsai making - visit to public and private gardens - practices in interiorscaping.

COURSE OUTCOMES(COs)

1. Student will be able to landscaping terrace gardening, vertical gardening, garden components, adornments etc.
2. Students will learn about climber: importance, selection, propagation, planting.
3. Students will learn about creepers: importance, selection, propagation, planting
4. Students will learn different landscaping of urban areas
5. Students will learn different landscaping of rural areas

REFERENCES

1. S. K. Bhattacharjee, S. K. 2004. Landscape Gardening and Design with plants. Aavishkar Publishers and Distributers, Jaipur.
2. Bose T. K., B. Chowdhury and S.P. Sharma 2001. Tropical garden plants in colour. Horticulture and Allied Publishers, Kolkata.
3. Randhawa, G. S. and A. Mukhopadyay. 1998. Floriculture in India. Allied publishers Limited, New Delhi
4. Lancaster, P. 1991. Gardening in India. Oxford and IBH publishers Pvt. Ltd.,Calcutta. Gopalasamy lyengar. 1990. Complete gardening in India. IBH. Bangalore.

III YEAR V SEMESTER				
1.	PAT302	Principles of Integrated Pest and Disease Management	3(2+1)	Skill development
2.	SAC303	Manures, Fertilizers and Soil Fertility Management	3(2+1)	Skill development
3.	AEN302	Pest of Crops and Stored Grains and their Management	3(2+1)	Entrepreneurship
4.	PAT303	Diseases of Field and Horticultural Crops and their Management – I	3(2+1)	Entrepreneurship
5.	PBG304	Crop Improvement – I (Kharif Crops)	2(1+1)	Employability
6.	AEX304	Entrepreneurship Development and Business Communication	2(1+1)	Skill development
7.	AGR308	Geo informatics and Nano-technology and Precision Farming	2(1+1)	Employability
8.	AGR309	Practical Crop Production – I (Kharif Crops)	2(0+2)	Entrepreneurship
9.	APR301	Intellectual Property Rights	1(1+0)	Skill development
10.	OPT 311-314	Elective Course**	3(2+1)**	
TOTAL ** Elective courses are listed below			**21(12+09) + 3****	

LIST OF ELECTIVE COURSES FOR V SEMESTER**

Sl. No	Course Code	Title of the Elective courses	Credits	
1.	OPT 311	Food Safety and Standards	3(2+1)	Employability
2.	OPT 312	Biopesticides & Biofertilizers	3(2+1)	Entrepreneurship
3.	OPT 313	Protected Cultivation	3(2+1)	Entrepreneurship
4.	OPT 314	Micro propogation Technologies	3(1+2)	Entrepreneurship

III YEAR V SEMESTER

PAT302 - PRINCIPLES OF INTEGRATED PEST AND DISEASE MANAGEMENT 3(2+1)

COURSE OBJECTIVES

1. To study the concepts of integrated pest & disease management in crop Production.
2. To study the principles of integrated pest & disease management in crop production.

THEORY

UNIT I: INTRODUCTION OF IPM

Categories of insect pests and diseases, IPM: Introduction, history, importance, concepts, principles and tools of IPM. Economic importance of insect pests, diseases and pest risk analysis.

UNIT II: DIAGNOSIS OF INSECT PEST AND DISEASES

Methods of detection and diagnosis of insect pest and diseases. Calculation and dynamics of economic injury level and importance of Economic threshold level.

UNIT III: DISEASE MANAGEMENT AND HOST PLANT RESISTANCE

Methods of control: Host plant resistance, cultural, mechanical, physical, legislative, biological and chemical control. Ecological management of crop environment. Introduction to conventional pesticides for the insect pests and disease management.

UNIT IV SURVEILLANCE AND FORECASTING OF INSECT PEST AND DISEASES

Survey surveillance and forecasting of Insect pest and diseases. Development and validation of IPM module. Implementation and impact of IPM (IPM module for Insect pest and disease. Safety issues in pesticide uses).

UNIT V HISTORY OF IMPORTANT IPM PROGRAMMES

Political, social and legal implication of IPM. Case histories of important IPM programmes. Case histories of important IPM programmes.

PRACTICAL

Methods of diagnosis and detection of various insect pests, and plant diseases, Methods of insect pests and plant disease measurement, Assessment of crop yield losses, calculations based on economics of IPM, Identification of biocontrol agents, different predators and natural enemies. Mass multiplication of *Trichoderma*, *Pseudomona*s, *Trichogramma*, NPV etc. Identification and nature of damage of

important insect pests and diseases and their management. Crop (agro-ecosystem) dynamics of a selected insect pest and diseases. Plan & assess preventive strategies (IPM module) and decision making. crop monitoring attacked by insect, pest and diseases. Awareness campaign at farmers fields

COURSE OUTCOMES

1. Student should be able to detect the plant diseases along with its level of incidence.

2. Student should be able to detect the insect pest along with its level of incidence.

3. Student should know the integrated disease management with respect to forecasting.

4. Student should know the integrated pest management with respect to forecasting & use of bio-control agents.

5. Student should know the production of bio-control agents AND use of bio-control agents

REFERENCES

1. Singh, R. S.2002.Introduction to Principles of Plant Pathology. Oxford& IBH Publishing Co. Pvt.Ltd. ,New Delhi.

2. Dhaliwal, G. S.and Ramesh Arora 2001.Integrated pest management: Concepts and approaches, Kalyani Publishers, Ludhiana

3. VenugopalaRao, N. ,Umamaheswari, T. , Rajendraprasad, P. , Naidu, V. G.andSavithri, P. 2004.Integrated Insect Pest Management, Agrobios (India) Limited, Jodhpur.

4. Chaube, H. S.andRamji Singh.2001.Introductory Plant Pathology. International Book Distribution Co, Lucknow.136.

SAC303 - MANURES, FERTILIZERS AND SOIL FERTILITY MANAGEMENT 3(2+1)

COURSE OBJECTIVES

1. To impart knowledge about soil fertility management with application of manures and fertilizers.
2. To know about soil fertility versus application management.

THEORY

UNIT I : CLASSIFICATION OF DIFFERENT MANURES

Introduction and importance of organic manures, properties and methods of preparation of bulky and concentrated manures. Green manuring and green leaf manuring. Integrated nutrient management. Carbon sequestration- Carbon trading.

UNIT II: IMPORTANT OF CHEMICAL FERTILIZERS, THEIR USE EFFICIENCY AND NORMS OF FCO

Chemical fertilizers: classification, composition and properties of major nitrogenous, phosphatic, potassic fertilizers, secondary & micronutrient fertilizers. Mixed/ Complex/customized/designer fertilizers, water soluble and liquid fertilizers, nano fertilizers & Soil amendments. Fertilizer Storage and Fertilizer Control Order.

UNITIII: HISTORY OF SOIL FERTILITY STATUS AND NUTRIENT INTERACTION IN PLANTS

History of soil fertility and plant nutrition. Criteria of essentiality. Role, deficiency and toxicity symptoms of essential plant nutrients. Mechanisms of nutrient transport to plants, factors affecting nutrient availability to plants. Chemistry of soil nitrogen, phosphorus, potassium, calcium, magnesium, sulphur and micronutrients.

UNIT V : DIFFERENT METHODS OF SOIL FERTILITY EVALUATIONS

Soil fertility evaluation-Soil testing, Critical levels of different nutrients in soil. Forms of nutrients in soil, plant analysis, and rapid plant tissue tests. Indicator plants.

UNIT V : EFFECTIVE METHODS OF FERTILIZER APPLICATION

Methods of fertilizer recommendations to crops. Factor influencing nutrient use efficiency (NUE), methods of application under rainfed and irrigated conditions.

PRACTICAL

Introduction of analytical instruments and their principles, calibration and applications, Colorimetry and flame photometry. Estimation of soil organic carbon, Estimation of alkaline hydrolysable N in soils. Estimation of soil extractable P in soils. Estimation of exchangeable K; Caand Mg in soils . Estimation of soil extractable S in soils.. Estimation of DTPA extractable Zn in soils. Estimation of N in plants. Estimation of P in plants. Estimation of K in plants. Estimation of S in plants.

COURSE OUTCOMES (COs)

1. Discriminate the bulky organic manure, concentrated organic manure and relationship of carbon and soil.
2. Compare the chemical fertilizers and its composition.
3. Explain the important of soil testing and nutrient management.
4. Describe the history of fertilizers and its role in agriculture.
5. Demonstrate the methods of fertilizer application and nutrient use efficiency.

REFERENCES

1. John L. Havlin, James D. Beaton, Samuel L. Tisdale and Werner L. Nelson. 2011. Soil Fertility and Fertilizers- An Introduction to Nutrient Management. PHL Learning Pvt. Ltd. ,New Delhi
2. Gupta, P. K. 2012. A Handbook of Soil, Fertilizer and Manure. Agrobios (India), Jodhpur.
3. Michael, A. M. 2009. Irrigation Theory and Practice. Second Edition. Vikas Publishing House Pvt. Ltd. , New Delhi.
4. Ramesh Chandra and S. K. Singh. 2009. Fundamental and Management of soil quality. Westville Publishing House, New Delhi.

E - REFERENCES

1. www. fspublishers. org/ijab/past-issues/IJAB Vol_5_No_3/47. pdf
2. www. springerlink. com/index/IQ11256h8t325054. pdf
3. www. ipni. net/ppiweb/bcrops. nsf/$webindex/. . . /Better_Crops_2009-4 J_. pdf

AEN302 - PEST OF CROPS AND STORED GRAINS AND THEIR MANAGEMENT 3(2+1)

COURSE OBJECTIVES

1. To know how the pest attack to stored grains and what are the pest attack to crops, Different losses of stored grain can involved and how it can be stored without attack of insects with preventive measures.
2. To know about the economic threshold levels of Pest management.

THEORY

UNIT I PESTS OF CEREALS, PULSES AND OIL SEEDS

Distribution, bionomics, symptoms of damage and management strategies for insects and non-insect pests of rice, wheat, maize, sorghum, cumbu, ragi, tenai, redgram, green gram, black gram, bengal gram, cowpea, groundnut, castor, gingelly, sunflower, safflower, jatropa, soybean and mustard.

UNIT II PESTS OF CASH AND FORAGE CROPS

Distribution, bionomics, symptoms of damage and management strategies of insects and non-insect pests of cotton and sugarcane, green manures (Sunnhemp, Sesbania, Daicha. Glyricidia),forage crops (Lucere and Subabul)

UNIT III PESTS OF VEGETABLES AND FRUITS

Distribution, bionomics, symptoms of damage and management strategies of insect and non-insect pests of Brinjal, Bhendi, Tomato, Chillies, Onion, Garlic, Moringa, Amaranthus, Crucifers, Cucurbits, Mango, Citrus, Banana, Guava, Grapevine and Sapota

UNIT IV PESTS OF FRUITS, AND PLANTATION CROPS

Distribution, bionomics, symptoms of damage and management strategies of insect and non-insect pests of Pomegranate, Papaya, Aonla, Apple, Pine apple, Custard apple and Jack, Potato,Sweet potato, Tapioca, Yam, Colocasia, Coconut, Arecanut, Tea, Coffee, Cashew, Cocoa,

Betelvine, Ginger, Turmeric, Coriander, Cardamom, Pepper, Curry leaf and Tamarind.

UNIT V PESTS OF FLOWERS AND MEDICINAL CROPS

Distribution, bionomics, symptoms of damage and management strategies of insect and non-insect pests of Rose, Jasmine, Crossandra, Chrysanthemum, Tuberose, Cut flowers, Glory lily, Coleus, Stonebreaker, Aswagantha, Senna, Periwinkle and Lawn. Distribution, bionomics, symptoms of damage and management strategies of pests of and stored products. Rodents and birds of agricultural importance and their management. Locusts and their management.

PRACTICAL

Identification of different types of damage. Identification and study of life cycle andseasonal history of various insect pests attacking crops and their produce: (a) Field Crops; (b)Vegetable Crops; (c) Fruit Crops; (d) Plantation, gardens, Narcotics, spices & condiments. Identification of insect pests and Mites associated with stored grain. Determination of insect infestation by different methods. Assessment of losses due to insects. Calculations on the doses of insecticides application technique. Fumigation of grain store / godown. Identification of rodents and rodent control operations in godowns. Identification of birds and bird control operations in godowns. Determination of moisture content of grain. Methods of grain sampling under storage condition. Visit to nearest FCI godowns.

COURSE OUTCOMES (COs)

1. Imparting skills on management of insects and non-insect pests of major filed crops
2. Gaining knowledge of management strategies for insects and non-insect pests of cotton,sugarcane, forage and fodder crops
3. Understand the pests of vegetables and leafy vegetables and their management
4. Obtain basic knowledge on pests fruit crops, plantation and aromatic crops and their Management
5. Gaining knowledge on the major ornamental crop pest and their management

REFERENCE

3. Manisegaran, S. and R.P.Soundararajan. 2010. Pest Management in Field Crops-Principles and Practices. Agrobios, Jodhpur, India. 316p. {ISBN (10): 81-7754-321-
4. David, B.V. and V.V. Ramamurthy. 2011. Elements of Economic Entomology, Namrutha Publications, Chennai. 386 p. {ISBN: 978-81-921477-0-3}
5. Muthukrishnan,N., N.Ganapathy, R.Nalini and R.Rajendran.2005. Pest Management in Horticultural Crops. New Madura Publishers, Madurai. 325p.

6. Awasthi, V.B. 2007. Agricultural Insect Pests and their Control, Scientific publishers (India), Jodhpur, 267p. {ISBN 81-7233-491-5}

7. Dhaliwal, G.S. and Ramesh Arora. 2004. Integrated pest management Concepts and Approaches, Kalyani Publishers, Ludhiana, 427p**.**

E - REFERENCE

1. http://www.ncipm.org.in

2. http://agritech.tnau.ac.in/

3. http://www.nbaii.res.in/

PAT303 - DISEASES OF FIELD AND HORTICULTURAL CROPS AND THEIR MANAGEMENT - I 3(2+1)

COURSE OBJECTIVE

1. To acquire knowledge on etiology, symptoms, epidemiology, mode of spread, survival and integrated management of important diseases due to fungi, bacteria, viruses, phytoplasma, phanerogamic parasites and non-parasitic causes of the field and horticultural crops.
2. To know about the management strategies of the field and horticultural crops.

THEORY

UNIT I : DISEASES OF CEREALS AND MILLETS

Cereals: Rice and Maize; **Millets:** Sorghum, Bajra, Finger millet and Small millets.

UNIT II : DISEASES OF PULSES AND OILSEEDS

Pulses : pigeon pea, urd bean, mung bean, soyabean, cowpea; **Oilseeds:** ground nut, castor and Sesame

UNIT III : DISEASES OF CASH CROPS

Tobacco, Jute and Mulberry

UNIT IV: DISEASES OF FRUITS AND VEGETABLES CROPS

Fruits: banana, guava, papaya, pomegranate; **Vegetables:** tomato, brinjal, okra , cruciferous vegetables, beans, colacasia and sweet potato

UNIT V : DISEASES OF PLANTATION CROPS

Plantation: coconut, arecanut, tea, coffee, rubber and cocoa

PRACTICAL

Identification and histopathological studies of selected diseases of field and horticultural crops covered in theory. Field visit for the diagnosis of field problems. Collection and preservation of plant diseased specimens for Herbarium; Note: Students should submit 50 pressed and well- mounted specimens.

COURSE OUTCOMES

1.To acquire the knowledge on about new emerging diseases of cereals and millets.

2.Having expertise in identifying and managing diseases in pulses and oil seeds.

3. Having expertise in identifying and managing diseases in cash crops.

4. Having expertise in identifying and managing diseases in fruit and vegetable crops.

5.Trained in identifying and managing diseases of plantation crops.

REFERENCES

1. Arjunan.G. Karthikeyan, G, Dinakaran ,D. Raguchander,T. 1999 Diseases of Horticultural Crops, AE Publications, Coimbatore.
2. Rangasawmi ,G and Mahadevan, A. 1998. Diseases of crop Plants in India, Prentice Hall of India Pvt. Ltd., New Delhi
3. Prakasam, V., Valluvaparidasan, V., Raguchander, T. and K.Prabakar. 1997. Field crop diseases, AE Publication, Coimbatore.

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1. Agrobios, G.N. 2008. Plant Pathology, Academic Press, New York.
2. Rangaswami, G. 2005. Diseases of Crop plants in India. Prentice Hall of India Pvt. Ltd., New Delhi.
3. Thakur, B.R. 2006. Diseases of field crops and their management.

PBG304 CROP IMPROVEMENT – I (KHARIF CROPS) 2(1+1)

COURSE OBJECTIVES

1. To acquire the knowledge about the breeding of field and horticultural crops
2. To impart knowledge on specific breeding techniques followed in crop improvement of various Field crops and Horticultural crops.

THEORY

UNIT I: PULSES

Place of origin – putative parents – related wild species – breeding objectives–breeding methods– conventional and innovative methods-heterosis breeding and important varieties in Pulses: Redgram , Bengal gram, Greengram, Blackgram, Cowpea, Soybean.

UNIT II: OILSEEDS AND FIBRES

Place of origin – putative parents – related wild species – breeding objectives–breeding methods– conventional and innovative methods-heterosis breeding and important varieties in following crops Oilseeds: Groundnut, Sunflower, Gingelly, Castor, Rape and Mustard.

UNIT III: CASH CROPS, FODDER AND HORTICULTURAL CROPS

Place of origin – putative parents – related wild species – breeding objectives–breeding methods– conventional and innovative methods-heterosis breeding and important varieties in following crops ash crops: tobacco, Fibres: Cotton; Fodder: Guinea grass, Napier, Cumbu – Napier, Lucerne, *Stylosanthes*; Horticultural crops: Bhendi, Tomato, Brinjal, Papaya, Banana

UNIT IV: BREEDING FOR BIOTIC AND ABIOTIC STRESSES AND QUALITY

Breeding for insect resistance – mechanisms, basis, genetics of insect resistance - suitable breeding methods- merits and demerits of resistance breeding; Breeding for disease resistance – horizontal and vertical resistance- Gene for gene hypothesis – mechanisms, genetics of disease resistance; Suitable breeding methods for disease resistance- exploitation of vertical resistance in plant breeding- multilines, gene pyramiding, gene deployment.

Breeding for Abiotic stress – drought – mechanisms, basis, genetics of drought resistance - suitable breeding methods -limitations of drought resistance breeding; Breeding for Abiotic stress – salinity and alkalinity; Breeding for quality traits- Important quality traits in different crops- nutritional quality of cereals and pulses-Genetics of nutritional traits-breeding methods- Breeding for low toxic substances-limitations of breeding for enhanced nutritional quality.

UNIT V: HYBRID SEED PRODUCTION TECHNIQUES AND IDEOTYPE BREEDING

Hybrid seed production techniques in maize, pulses and oil seeds, Ideotype breeding- main features-difference between traditional and ideotype breeding- - crop ideotypes in rice, pulses and cotton- steps in ideotype breeding- merits and demerits of ideotype breeding.

PRACTICAL

Floral biology, emasculation and hybridization techniques in different crop species; viz., Rice,Jute, Maize, Sorghum, Pearl millet, Ragi, Pigeonpea, Urdbean, Mungbean, Soybean, Groundnut, Seasame, Caster, Cotton, Cowpea, Tobacco, Brinjal, Okra and Cucurbitaceous crops. Maintenance breeding of different *kharif* crops. Handling of germplasm and segregating populations by differentmethods like pedigree, bulk and single seed decent methods; Study of field techniques for seed production and hybrid seeds production in *Kharif* crops; Estimation of heterosis, inbreeding depression and heritability; Layout of field experiments; Study of quality characters, donor parents for different characters; Visit to seed production plots; Visit to AICRP plots of different field crops.

COURSE OUTCOMES(COs)

1. Able to identify putative parents and wild relatives
2. Differentiate the crops based on its floral biology
3. The students will be in a position to identify and understand the methodologies employed for self, cross and vegetatively propagated crops
4. Understand the various crossing and emasculation techniques in various crops
5. Understand the problems in hybrid seed production

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1. Singh, B.D. 2007. Plant breeding - Principles and methods.
2. Phundan Singh. 2015. Essentials of Plant Breeding. Kalyani Publishers, New Delhi

3. Harihar Ram and HariGovind Singh, 1994. Crop breeding and Genetics. Kalyani Publishers, New Delhi.
4. D.N.Bharadwaj.2012. Breeding Field Crops. Agrobios (India),Jodhpur – 342002
5. HariHar Ram, 2011. Vegetable Breeding– Principles and Practice, Kalyani Publishers, New Delhi.
6. N.Kumar.2006. Breeding of horticultural crops- Principles and Practices. New India Publishing Agency. New Delhi.

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1. www.nmsu.edu,
2. www.biology200.gsu.edu

AEX304 - ENTREPRENEURSHIP DEVELOPMENT AND BUSINESS COMMUNICATION 2(1+1)

COURSE OBJECTIVES

1. To familiarize the students understand with key concepts and processes in entrepreneurship and business development.
2. To provide context to the processes in the form of differences between small and large firms, and the economic environment.
3. To introduce key debates around entrepreneurship and small businesses.

THEORY

UNIT I : ENTREPRENEUR AND ENTREPRENEURIAL PROCESS

Concept and Types of Entrepreneurship - Characteristics of Entrepreneurs and Entrepreneurial Skills - Entrepreneurial process – Importance of Entrepreneurship.

UNIT II : ENTREPRENEURSHIP OPPORTUNITIES

Innovation - principles of innovation - Sources of innovative opportunities - Business environment – Micro and Macro environment - MSME Classification and Opportunities for rural entrepreneurship - KVIC classification, Startup and Business incubators. Agribusiness – Importance, Opportunities and Challenges.

UNIT III : MANAGERIAL FUNCTIONS – PLANNING AND ORGANIZING

Management Functions – Planning – Types of Plans and Steps in Planning, Organizing – Principles and Departmentation.

UNIT IV – MANAGERIAL FUNCTIONS – STAFFING, DIRECTING AND CONTROL

Staffing – Job Analysis, Human Resource Planning Process, Recruitment and Selection, Directing- Principles, Techniques and Supervision, Controlling – Process and Types.

UNIT V – FUNCTIONAL AREAS OF MANAGEMENT

Operations Management – Meaning and Scope, Supply Chain Management – Drivers and flows and Total Quality Management – Meaning and Principles, Marketing Management – Market Segmentation and Marketing Mix Financial Management – Meaning, Objectives and Scope.

PRACTICAL

Assessing entrepreneurial traits, problem solving skills, managerial skills and achievement motivation, exercise in creativity, time audit through planning, monitoring and supervision, identification and selection of business idea, preparation of business plan and proposal writing, visit to entrepreneurship development institute and entrepreneurs.

COURSE OUTCOMES

1. To explore agri-business opportunities that are commercially successful and the procedures involved in start-ups.
2. To learn skills possessed by an entrepreneur
3. To teach art and science of business plan and project formulation.
4. To perform SWOT analysis of an entity for any prospective agribusiness/ideas.
5. To formulate business proposal for successful implementation of the business plan

REFERENCES

1. Mohanty S K. 2007. Fundamentals of Entrepreneurship. Prentice Hall India Ltd. , New Delhi.
2. Peter F. Drucker, 2006. Innovation and Entrepreneurship. HarperBusiness; Reprint edition, New York.
3. Poornima M. Charantimath 2005. Entrepreneurship Development and Small Business Enterprise, Pearson Education India, New Delhi.
4. Prasanna Chandra, 2007. Financial Management: Theory and Practice, McGraw-Hill Education, New Delhi.

E-REFERENCES

1. http://www.eagri.org
2. https://www.agrimoon.com
3. http://www.tnau.ac.in
4. http://www.hillagric.ac.in
5. http://www.apeda.com

AGR308 - GEO INFORMATICS AND NANO-TECHNOLOGY AND PRECISION FARMING 2(1+1)

COURSE OBJECTIVE

1. To give basic idea to students about Precision agriculture, GIS, Remote sensing concepts and application in agriculture, System Simulation, crop Simulation Models, STCR approach for precision agriculture, Nanotechnology.

2. To know about the application techniques of agriculture and allied.

THEORY

UNIT I INTRODUCTION

Precision agriculture: concepts and techniques; their issues and concerns for Indianagriculture;

UNIT II GEO-INFORMATICS

Geo-informatics- definition, concepts, tool and techniques; their use in Precision Agriculture. Crop discrimination and Yield monitoring, soil mapping; Fertilizer recommendation using geospatial technologies; Spatial data and their management in GIS.

UNIT III REMOTE SENSING

Remote sensing concepts and application in agriculture; Image processing and interpretation; Global positioning system(GPS), components and its functions

UNIT IV CROP SIMULATION MODELS

Introduction to crop Simulation Models and their uses for optimization of Agricultural Inputs; STCR approach for precision agriculture;

UNIT V NANOTECHNOLOGY

Nanotechnology, definition, concepts and techniques, brief introduction about nanoscale effects, nano-particles, nano-pesticides, nano-fertilizers, nano-sensors, Use of nanotechnology in seed, water, fertilizer, plant protection for scaling-up farm productivity.

PRACTICAL

Introduction to GIS software, spatial data creation and editing. Introduction to image processing software. Visual and digital interpretation of remote sensing images. Generation of spectral profiles of different objects. Supervised and unsupervised classification and acreage estimation. Multispectral

remote sensing for soil mapping. Creation of thematic layers of soil fertility based onGIS. Creation of productivity and management zones. Fertilizers recommendations based of VRT and STCR techniques. Crop stress (biotic/abiotic) monitoring using geospatial technology. Use of GPS for agricultural survey. Formulation, characterization and applications of nanoparticles in agriculture. Projects formulation and execution related to precision farming.

COURSE OUTCOMES

1. The concept of "doing the right thing in the right place at the right time" has a strong intuitive appeal which gives farmers the ability to use all operations and crop inputs more effectively.
2. More effective use of inputs results in greater crop yield and/or quality, without polluting the environment.
3. Precision agriculture can address both economic and environmental issues that surround production agriculture today.
4. Encourage the farmers to study of spatial and temporal variability of the input parameters using primary data at field level.
5. Creating awareness amongst farmers about consequences of applying imbalanced doses of farm inputs like irrigation, fertilizers, insecticides and pesticides

REFERENCES

1. Nanotechnology Applications in Agriculture – C.R. Chinnamuthu, B.Chandrasekaran and C. Ramasamy – 2008.
2. Nano: The essentials understanding nanoscience and Nano- T.Pradeep - 2009 - Mc Graw Hill.
3. Nano materials - B.Viswanathan - 2009 -Narosa.
4. Introduction to nanotechnology - Charles P. Poole; Frank J. Owens – 2008 – Wiley

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2. www.ncbi.nlm.nih.gov
3. www.online library.willey.com

AGR309 - PRACTICAL CROP PRODUCTION – I (KHARIF CROPS) 2(0+2)

COURSE OBJECTIVES

1.Practical Crop Production – I (Kharif crop) provide agronomical management of different stages of crop in Rice. From ecosystem to post harvest process to be learn by practically.

2. Practically cultivate the Rice (Transplanted rice or Direct sown rice): Transplanted rice.

PRACTICAL

UNIT I ECOSYSTEMS -CLIMATE AND WEATHER OF RICE

Rice ecosystems -Climate and weather- Seasons and varieties of Tamil Nadu.

UNIT II NURSERY, SEED TREATMENT AND WEED MANAGEMENT

Preparation of nursery - Application of manures to nursery - seed treatment- Forming nursery beds and sowing seeds - Weed management and plant protection to nursery.

UNIT III MAIN FIELD PREPARATION AND MANURES

Preparation of main field - Application of organic manures - Green manuring - Bio-fertilizers - Pulling out seedlings and transplanting - Rajarajan 1000 (SRI).

UNIT IV INTER CULTIVATION PRACTICES AND YIELD ATTRIBUTES

Application of herbicides - Water management - Nutrient management - Plant protection measures - Mechanization in rice cultivation - Recording growth, yield attributes and yield.

UNIT V POST HARVEST PROCESS AND COST OF CULTIVATION IN RICE

Harvesting, threshing, drying and cleaning the produce - Working out cost of cultivation and economics.

COURSE OUTCOMES (COs)

1. To learn about different ecosystem of Rice.
2. Understand the procedure of different nursery preparation.
3. Practically does the field preparation by doing by learning.
4. Know about the importance of weed and its management.

5. Perceive the economical production in Rice.

REFERENCES

1. Ahlawat, I. P. S., Om Prakash and G. S. Saini. 1998. Scientific Crop Production in India. Rama Publishing House, Meerut.
2. Chidda Singh. 1997. Modern techniques of raising field crops. Oxford and IBH Publishing Co.Pvt. Ltd., New Delhi.
3. Crop Production Guide. 2012. Directorate of Agriculture, Chennai and Tamil Nadu Agricultural University, Coimbatore.
4. Rajendra Prasad. 2004. Text Book on Field Crop Production, Indian Council of Agrl. Research,New Delhi.
5. K. Annadurai and B. Chandrasekaran. 2009. AText Book of Rice Science. Scientific Publishers.

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2. www. crri. nic. in
3. www. drrindia.org

APR301 - INTELLECTUAL PROPERTY RIGHTS 1(1+0)

COURSE OBJECTIVES

1. To understand the concept of Intellectual property rights and its implications.
2. To know about the various patent rights registrations, rules and regulations.

THEORY

UNIT I INTRODUCTION

Introduction and meaning of intellectual property, brief introduction to GATT, WTO, TRIPsand WIPO, Treaties for IPR protection: Madrid protocol, Berne Convention, Budapest treaty, etc.

UNIT II IPR AND PATENTS

Types of Intellectual Property and legislations covering IPR in India:-Patents, Copyrights,

UNIT III TRADEMARK

Trademark, Industrial design, Geographical indications, Integrated circuits, Trade secrets. Patents Act 1970 and Patent system in India, patentability, process and product patent, filing of patent, patent specification, patent claims, Patent opposition and revocation, infringement, Compulsory licensing, Patent Cooperation Treaty, Patent search and patent database.

UNIT IV UPOV AND PPV & FR ACT

Origin and history including a brief introduction to UPOV for protection of plant varieties, Protection of plant varieties under UPOV and PPV&FR Act of India, Plant breeders rights, Registration of plant varieties under PPV&FR Act 2001, breeders, researcher and farmers rights. Traditional knowledge-meaning and rights of TK holders.

UNIT V CONVENTION ON BIOLOGICAL DIVERSITY

Convention on Biological Diversity, International treaty on plant genetic resources for food and agriculture (ITPGRFA). Indian Biological Diversity Act, 2002 and its salient features, access and benefit sharing.

COURSE OUTCOMES (COs)

1. Skill to understand the concept of intellectual property rights.

2. Develops procedural knowledge to Legal System and solving the problem relating to intellectual property rights.

3. Skill to pursue the professional programs in Company Secretaryship, Law, Business, Agriculture, International Affairs, Public Administration and Other fields.
4. Employability as the Compliance Officer, Public Relation Officer and Liaison Officer.
5. Establishment of Legal Consultancy and service provider.

REFRENCES

1. Intellectual property Right By KHUSHDEEP DHARNI

E - REFRENCES

1. http://www.agrimoon.com/
2. http://www.agriinfo.in/
3. http://www.agriglance.com/
4. http://agritech.tnau.ac.in/

OPT 311 - FOOD SAFETY AND STANDARDS 3(2+1)

COURSE OBJECTIVES

1. The main objective of this subject is to know about the food safety and standards.

2. to know about the original and adulteration of food and its products.

THEORY

UNIT I INTRODUCTION

Food Safety – Definition, Importance, Scope and Factors affecting Food Safety. Hazards and Risks, Types of hazards - Biological, Chemical, Physical hazards. Management of hazards - Need. Control of parameters. Temperature control.

UNIT II FOOD STORAGE

Food storage. Product design. Hygiene and Sanitation in Food Service EstablishmentsIntroduction. Sources of contamination and their control. Waste Disposal. Pest and Rodent Control. Personnel Hygiene.

UNIT III FOOD SAFETY MEASURES

Food Safety Measures. Food Safety Management Tools- Basic concepts. PRPs, GHPs, GMPs, SSOPs etc. HACCP. ISO series. TQM - concept and need for quality, components of TQM, Kaizen. Risk Analysis. Accreditation and Auditing, Water Analysis, Surface Sanitation and Personal Hygiene.

UNIT IV FOOD LAWS

Food laws and Standards Indian Food Regulatory Regime, FSSA. Global Scenario CAC. Other laws and standards related to food. Recent concerns- New and Emerging Pathogens.

UNIT V FOOD PACKAGING

Packaging, Product labeling and Nutritional labeling. Genetically modified foods\ transgenics. Organic foods. Newer approaches to food safety. Recent Outbreaks. Indian and International Standards for food products

PRACTICAL

Estimation of CFU of water, Estimation of TDS in water.Estimation of Listeria and E. Coli/ Salmonella /Shigella/ Staphylococcus from food samples.Estimation of fungal toxins from food samples.Heavy metal detection (lead),Estimation of any one commonly used pesticide,HACCP for food industries by taking few models,Study of national and international microbial quality standards,Visit to export oriented food processing industry,

COURSE OUTCOMES (COs)

1. Understand the importance of Food Safety Management, Packaging.
2. Develop ability to identify of the sources of food contamination and Product and Nutritional labeling, Scope, Factors, Hazards and Risks of Food Safety.
3. Interprete the food laws and Standards- Indian Food Regulatory and their control.
4. Follow safe practices Surface Sanitation and Personal Hygiene and Regime, FSSA.
5. Global Scenario CAC and Other laws and standards newer approaches to food safety

REFERENCE

1. Food Microbiology. W.C. Frazier and D.C. Westhoff, 4 th Edn. Tata McGraw-Hill Publishing Company Limited, New Delhi.
2. Food Safety Handbook. Ronald H. Schmidt and Gary E. Rodrick. 2003. John Wiley & Sons, Inc., Hoboken. New Jersey, USA.
3. Food Safety and Food Quality. R.E. Hester and R.M. Harrison. 2001. Royal Society of Chemistry, Cambridge, UK.
4. The Safety of Foods (Sicherheit von Lebensmitteln). GrahamGraham, H. D. (Edit.) 2.
5. Auflage. AVI Publishing Co., Inc., Westport, Connecticut (USA)
6. Food Chemistry (New Edition).Owin R. Fenema
7. Handbook of Food Toxicology. S.S. Deshpande, CRC Press. 2002.

OPT 312 - BIOPESTICIDES & BIOFERTILIZERS 3(2+1)

COURSE OBJECTIVES

1. Main objectives of this subject is to familiarize the students about the biopesticides and biofertilizers which are free from harmful chemicals and more environment friendly and future of the crop production.
2. Analysis and interpretation of the biopesticides and biofertilizers.

THEORY

UNIT I HISTORY AND CONCEPT OF BIOPESTICIDES

History and concept of biopesticides. Importance, scope and potential of biopesticide. Definitions, concepts and classification of biopesticides viz. pathogen, botanical pesticides, and bio rationales. Botanicals and their uses.

UNIT II MASS PRODUCTION TECHNOLOGY OF BIO-PESTICIDES

Virulence, pathogenicity and symptoms of entomopathogenic pathogens and nematodes. Methods of quality control and Techniques of biopesticides. Impediments and limitation in production and use of biopesticides.

UNIT III BIO FERTILIZERS

Introduction, status and scope. Structure and characteristic features of bacterial bio fertilizers- Azospirillum, Azotobacter, Bacillus, Pseudomonas, Rhizobium and Frankia; Cynobacterial biofertilizers- Anabaena, Nostoc, Hapalosiphon and fungal biofertilizers- AM mycorrhiza and ectomycorhiza. Nitrogen fxation -Free living and symbiotic nitrogen fixation. Mechanism of phosphate solubilization and phosphate mobilization, K solubilization.

UNIT IV PRODUCTION TECHNOLOGY

Strain selection, sterilization, growth and fermentation, mass production of carrier based and liquid biofertiizers. FCO specifications and quality control of biofertilizers. Bio fertilizers -Storage, shelf life, quality control and marketing. Factors influencing the efficacy of bio fertilizers.

UNIT V METHODS OF APPLICATION

Methods of application of biopesticides. Application technology of biofertilizers for seeds, seedlings, tubers, sets etc.

PRACTICAL

Isolation and purification of important biopcsticides: Trichoderma Pseudomonas, Bacillus, Metarlozium etc. and its production. Identification of important botanicals. Visit to biopesticide laboratory in nearby

area. Field visit to explore naturally infected cadavers. Identification of entomopathogenic entities in field condition. Quality control of biopesticides. Isolation and purification of Azaspirillum , Azotobacter, Rhizobium. P-solubilizers and cyanobacteria. Mass multiplication and inoculums production of biofertilizers. Isolation of AMfungi -Wet sieving method and sucrose gradient method. Mass production of AM inoculants

COURSE OUTCOMES (COs)

1. Develop ability to Differentiate the structure and characteristic
2. Study the history, concept, quality control and application of biopesticides and bio-fertilzers, their importance, scope and potential.
3. Interpret storage, shelf life, quality control and marketing and•features of various bacterial bio-fertilizers. factors influencing the efficacy of Bio-pesticides.
4. Evaluate mechanism of Production technology of Bio-pesticides•Bio-fertilizers. & Bio-fertilizer
5. Students will be aware about bio fertilizers its status and scope. characteristic features of various bacterial bio fertilizers.

REFERENCE

1. Biofertilizers and Biopesticides Channabasava A and Lakshman, H. C. Pointers Publishers.

2. Biofertilizers and Biopesticides Shalini Suri Aph Publishing Corporation.

OPT 313 - PROTECTED CULTIVATION 3(2+1)

COURSE OBJECTIVES

1. Main objective of this subject is to let student learn about protected farming to produce cash and medicinal crops with new and advanced technology.
2. to know about the construction and their management.

THEORY

UNIT I INTRODUCTION

Protected cultivation- importance and scope, Status of protected cultivation in India and World types of protected structure based on site and climate.

UNIT-II CLADDING MATERIALS

Cladding material involved in greenhouse/ poly house. Greenhouse design, environment control, Portrays lights, Automation. Soil preparation and management, Substrate management. Types of benches and containers.

UNIT-III GREENHOUSE CULTIVATION OF FLOWER CROPS

Irrigation and fertigation management. Propagation and production of quality planting material of horticultural crops. Greenhouse cultivation of important horticultural crops – rose, carnation, chrysanthemum, gerbera, orchid, anthurium, lilium, tulip,

UNIT IV GREEN HOUSE CULTIVATION OF VEGETABLE CROPS

Irrigation and fertigation management. Propagation and production of quality planting material of horticultural crops. Greenhouse cultivation of important horticultural crops tomato, bell pepper, cucumber, strawberry, pot plants, etc.

UNIT V GREEN HOUSE CULTIVATION OF MEDICINAL AND AROMATIC PLANTS

Cultivation of economically important medicinal and aromatic plants. Off-season production of flowers and vegetables. Insect pest and disease management.

PRACTICAL

Raising of seedlings and saplings under protected conditions, use of Portrays in quality planting material production, Bed preparation and planting of crop for production, Inter cultural operations, Soil EC and pH measurement, Regulation of irrigation and fertilizers through drip, fogging ad misting.

COURSE OUTCOMES (COs)

1. Define Greenhouse technology, types of greenhouse, and design criteria of green house,

2. To gain knowledge about materials of construction for traditional and low cost green houses.
3. Understand about the irrigation systems used under greenhouse for etc.
4. Develop the skill to use of different greenhouse equipment for crop production, planting system and techniques, etc.
5. Apply the correct greenhouse equipments in the protected structure different purposes, etc. for different crops, etc

REFERENCE

1. A Sharma and V Salokhe, Greenhouse TechnologyApplications and Practices, Agro Tech publication, Udaipur.
2. S.S. Kothari, Greenhouse: Science and Technology, Himanshu publication, Udaipur.
3. Balraj Singh, Protected Cultivation of Vegetables Crops, Kalyani Publishers.
4. D K Singh and K V Peter, Protected Cultivation of Horticultural Crops, New India Publishing Agency.

OPT 314 - MICRO PROPOGATION TECHNOLOGIES 3(1+2)

COURSE OBJECTIVES

1.Main objective of this subject is to learn about the tissue culture and micro propagation technology.

2. To know about the micro propagation and establishment techniques.

THEORY

UNIT I INTRODUCTION

Introduction, History, Advantages and limitations;

UNIT II TYPES OF CULTURES

Types of cultures (seed, embryo, organ, callus, cell),

UNIT-III STAGES OF MICROPROPOGATION

Stages of micropropagation, Axillary bud proliferation (Shoot tip and meristem culture, bud culture),

UNIT-IV ORGANOGENESIS

Organogenesis (callus and direct organ formation), Somatic embryogenesis, cell suspension cultures,

UNIT-V PRODUCTION TECHNIQUES

Production of secondary metabolites, Somaclonal variation, Cryopreservation

PRACTICAL

Identification and use of equipments in tissue culture Laboratory, Nutrition media composition, sterilization techniques for media, containers and small instruments, sterilization techniques for explants, Preparation of stocks and working solution, Preparation of working medium, Culturing of explants: Seeds shoot tip and single node, Callus induction, Induction of somatic embryos regeneration of whole plants from different explants, Hardening procedures.

COURSE OUTCOMES(COs)

1. Enlist the important historical milestones, advancement and future prospects of micro propogation.

2. Study the concepts and principles of micro propagation.
3. Evaluate the concept, necessity, procedure for production of synthetic seeds
4. Evaluate the requirements for production of synthetic seeds.
5. Develop ability to recognize the plant regeneration pathways.

REFERENCE

1. S Kumar, Plant Tissue Culture, Scientific Publishers Journals Dept.
2. M K Razdan, Introduction to plant tissue culture, Science Pub In.

III YEAR SEMESTER VI				
1.	AGR310	Rainfed Agriculture & Watershed Management	2(1+1)	Skill development
2.	AEG304	Protected Cultivation and Secondary Agriculture	2(1+1)	Employability
3.	PAT304	Disease of Field and Horticultural Crops and Their Management – II	3(2+1)	Employability
4.	HOR305	Post- harvest, Management and Value Addition of Fruits and Vegetables	2(1+1)	Employability
5.	AEN303	Management of Beneficial Insects	2(1+1)	Employability
6.	PBG305	Crop Improvement – II (Rabi Crops)	2(1+1)	Employability
7.	AGR311	Practical Crop Production – II (Rabi Crops)	2(0+2)	Employability
8.	AGR312	Principles of Organic Farming	2(1+1)	Employability
9.	AEC304	Farm Management, Production & Resource Economics	2(1+1)	Skill Development
10.	AFS301	Principles of Food Science and Nutrition	2(2+0)	Skill development
11.	OPT 321-324	Elective Course**	3 (2+1)**	Employability
		TOTAL	**21(11+10)+3****	

LIST OF ELECTIVE COURSE FOR VI SEMESTER**

Sl. No	Course Code	Title of the Elective courses	Credits	
1.	OPT 321	Hi-tech. Horticulture	3(2+1)	Employability
2.	OPT 322	Weed Management	3(2+1)	Employability
3.	OPT 323	System simulation and Agro- advisory	3(2+1)	Employability
4.	OPT 324	Agricultural Journalism	3(2+1)	Employability

III YEAR VI SEMESTER

AGR310 - RAINFED AGRICULTURE AND WATERSHED MANAGEMENT 2(1+1)

COURSE OBJECTIVES

1. Main objective of this subject is familiarize the student about rainfed agriculture and watershed management.

2. To know the dry region cultivation practices and their management.

THEORY

UNIT I INTRODUCTION

Dryland farming - India and Tamil Nadu - Major crops of Dryland in India and Tamil Nadu - rainfed farming - Significance, Characteristics and constraints of dry farming in India - Distribution of Arid and semiarid regions in World, India and Tamil Nadu.

UNIT II CLIMATOLOGY

Rainfall climatology - Length of growing period - Drought - Definition - Types and effects of Drought on crop production - Mechanism of drought tolerance in plants - Drought management - Contingent crop planning - Mid season correction - Mulching - anti transpirants.

UNIT III SOIL MOISTURE APPROACHES

Soil moisture conservation approaches: agronomical, engineering and agrostological measures - In-situ water harvesting, storage and recycling - water harvesting - farm pond, percolation pond.

UNIT IV INTEGRATED DRY LAND TECHNOLOGIES

Integrated dry land technologies - Mechanization - Resource management under constraint situation - Cost reduction strategies in crop production - Non-monetary inputs and low cost technologies.

UNIT V WATERSHED MANAGEMENT

Watershed management - alternate land use system - Agro forestry systems - Role of institutions - government policies for promotion of dryland farming

PRACTICAL

Studies on climate classification, studies on rainfall pattern in rainfed areas of the country and pattern of onset and withdrawal of monsoons. Studies on cropping pattern of different rainfed areasin the country and demarcation of rainfed area on map of India. Interpretation of meteorological data and scheduling of supplemental irrigation on the basis of evapo-transpiration demand of crops. Critical analysis of rainfall and possible drought period in the country, effective rainfall and its calculation. Studies on cultural practices for mitigating moisture stress. Characterization and delineation of model watershed. Field demonstration on soil & moisture conservation measures. Field demonstration on construction of water harvesting structures. Visit to rainfed research station/watershed

COURSE OUTCOMES

1. Student can able to understand objective, principles and component of watershed management.
2. The term Rain fed agriculture is used to describe farming practices that rely on rainfall for water.
3. Rainfall water can be used for a larger area by suitable watershed management techniques.
4. Conservation of soil by adopting latest soil conservation techniques will help in obtaining higher production of Rainfed crops.
5. A major study into water uses by agriculture, known as the Comprehensive Assessment of water management in Agriculture.

REFERENCES

1. Govindan K.and V. Thirumurugan. 2003. Principles and practice of Dryland Agriculture, Kalyani Publishers, Chennai.
2. Rengasamy P. 1990.Dry farming Technology in India.Agri publishing Academy, New Delhi.
3. Reddy, G. S. , Reddy, Y. V. R. , Vittal, K. P. R. , Thyagaraj, C. R. , Ramakrishna, Y. S. and L. L Somani. 2008. Dryland Agriculture. Agrotech Publishing Academy, Udaipur
4. Jat. , Bharkar. , Sharma and Kothari. 2013. Dryland Technology. Scientific Publishers,
5. Jodhpur Pradeep, S. 2014. Dryland Agriculture. Discovery Publishing House Pvt. Ltd, NewDelhi

E- REFERENCES

1. www. tnau. ac.in
2. www. crida. org
3. www. icrisat. Org

AEG304 - PROTECTED CULTIVATION AND SECONDARY AGRICULTURE 2(1+1)

COURSE OBJECTIVES

1. Main objective of this subject is to acquaint students about new technology of protected cultivation to make the agriculture more sustainable.

2. To know about the protected cultivation crops and their managements.

THEORY

UNIT I: INTRODUCTION TO PROTECTED CULTIVATION AND GREENHOUSES

Protected cultivation – need, advantages and limitations – present status. Green house technology – Introduction – Types of green houses- Plant response to green house environment.

UNIT II :DESIGN OF GREENHOUSES

Planning and design of greenhouses - Design criteria of green house for cooling and heating purposes - Green house equipment - Materials for construction of greenhouses - Irrigation systems used in greenhouses.

UNIT III: APPLICATIONS OF GREENHOUSES

Typical applications - Passive solar greenhouse - Hot air greenhouse heating systems - Greenhouse drying - Cost estimation and economic analysis.

UNIT IV: ENGINEERING PROPERTIES OF FOOD MATERIALS, DRYING AND DEHYDRATION

Physical properties- size-shape,Aero-hydro dynamic properties, thermal properties- specific heat- thermal conductivity- thermal diffusivity, and their application in PHT equipment design and operation.Drying and dehydration, Moisture determination- direct method and indirect method of moisture determination, drying rate curves- constant rate period, CMC- Falling rate period, EMC, Drying methods- contact type dryers- convective type dryer- radiation dryer, commercial grain dryer -deep bed dryer-flat bed dryer- tray dryer- fluidized bed dryer. -Recirculatory dryer- solar dryer.

UNIT V: MATERIAL HANDLING

Introduction- selection of material handling machines, Belt conveyor- belt conveyor idlers- idler spacing- belt material- belt tension, Bucket conveyor- head section-Boot section-elevator legs- elevator belts- bucket drive mechanism. Screw conveyor- Details -various shapes screw trough- capacity – horse power, pneumatic conveyor – advantages and limitations.

PRACTICAL

Study of different type of green houses based on shape. Determine the rate of air exchange in an active summer winter cooling system. Determination of drying rate of agricultural products inside green house. Study of green house equipments. Visit to various Post Harvest Laboratories. Determination of Moisture content of various grains by oven drying & infrared moisture methods. Determination of engineering properties (shape and size, bulk density and porosity of biomaterials). Determination of Moisture content of various grains by moisture meter. Field visit to seed processing plant.

COURSE OUTCOMES(COs)

1. Students able to know about the present status, need and practical application of protected cultivation
2. Students will understand about the designing, practical application, cost and economic analysis of greenhouse technology.
3. Student gains information about designing and operation of various post-harvest equipments
4. This course also gives brief information on drying, dehydration technology and different types of dryer.
5. It also gives brief knowledge on designing aspects of various material handling equipments.

REFERENCE

1. Brennan J.G. Food engineering operations. Second edition. Published by applied science Publisher limited, London.
2. Fellows, P. 2000. Food processing technology Principles and Practice. Second Edition. Published by Woodhead Publishing Limited Abington Hall, Abington Cambridge CB1 6AH, England.
3. Kudra, T. and Mujumdar, A.S. Advanced drying technologies. Marcel Dekker, Inc.

E - REFERENCE

1. A. Chakraverty, Arun S. Mujumdar, G. S. VijayaE - BOOKS/Dr. TP/Handbook of Postharvest Technology Chakraverty.pdfRaghavan, H. S. Ramaswamy.2003. Handbook of Postharvest Technology (cereals, fruits, vegetables, tea and spices), Marcel Dekker, Inc.New York, USA.

PAT304 - DISEASES OF FIELD AND HORTICULTURAL CROPS AND THEIR MANAGEMENT – II 3(2+1)

COURSE OBJECTIVES

1. To acquire knowledge on etiology, symptoms, epidemiology, mode of spread, survival and integrated management of important diseases due to fungi, bacteria, viruses, phytoplasma, phanerogamic parasites and non-parasitic causes of the field and horticultural crops.
2. To know about the management strategies and economic threshold level.

THEORY

Symptoms, etiology, disease cycle and management of following diseases:

UNIT-I DISEASES OF CEREALS AND PULSES

Wheat: rusts, loose smut, karnal bunt, powdery mildew, *Alternaria* blight, and ear cockle**; Pulses: Gram**: wilt, grey mould and *Ascochyta* blight; and **Lentil**: rust and wilt;

UNIT- II DISEASES OF OILSEEDS AND CASH CROPS:

Oilseeds: Sunflower: *Sclerotinia* stem rot and Alternaria blight; **Mustard**: Alternaria blight, white rust, downy mildew and Sclerotinia stem rot; **Cash crops: Cotton**: anthracnose, vascular wilt, and black arm; **Sugarcane**: red rot, smut, wilt, grassy shoot, ratoon stunting and Pokkah Boeng

UNIT- III DISEASES OF FRUITS CROPS:

Fruits: Mango: anthracnose, malformation, bacterial blight and powdery mildew; **Citrus**: canker and gummosis; **Grape vine**: downy mildew, Powdery mildew and anthracnose; **Apple**: scab, powdery mildew, fire blight and crown gall; **Peach:** leaf curl. Strawberry: leaf spot

UNIT- IV DISEASES OF VEGETABLES CROPS

Vegetables: Pea: downy mildew, powdery mildew and rust**; Potato**: early and late blight, black scurf, leaf roll, and mosaic; **Cucurbits**: downy mildew, powdery mildew, wilt **; Onion and garlic**: purple blotch, and *Stemphylium* blight;

UNIT- V DISEASES OF SPICES, AND ORNAMENTAL CROPS:

Spices: **Chillies:** anthracnose and fruit rot, wilt and leaf curl; **Turmeric**: leaf spot; **Coriande**r: stem gall **Flower crops: Marigold**: Botrytis blight; **Rose:** dieback, powdery mildew and black leaf spot.

PRACTICAL

Identification and histopathological studies of selected diseases of field and horticultural crops covered in theory. Field visit for the diagnosis of field problems. Collection and preservation of plant diseased specimens for herbarium.

Note: Students should submit 50 pressed and well-mounted specimens.

COURSE OUTCOMES (COs)

1. To acquire the knowledge on about new emerging diseases of cereals.
2. Having expertise in identifying and managing diseases in pulses, oil seeds and cash crops.
3. Having expertise in identifying and managing diseases in fruits and vegetable crops.
4. Having expertise in identifying and managing diseases in spices, plantation and flower crops.
5. Having expertise in identifying and managing diseases in medicinal crops and mushroom cultivation and managing diseases of mushroom

REFERENCES

1. Arjunan.G. Karthikeyan, G, Dinakaran ,D. Raguchander,T. 1999 Diseases of Horticultural Crops, AE Publications, Coimbatore.
2. Rangasawmi ,G and Mahadevan, A. 1998. Diseases of crop Plants in India, Prentice Hall of India Pvt. Ltd., New Delhi
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2. Rangaswami, G. 2005. Diseases of Crop plants in India. Prentice Hall of India Pvt. Ltd., New Delhi
3. Thakur, B.R. 2006. Diseases of field crops and their management.

HOR305 POST - HARVEST, MANAGEMENT AND VALUE ADDITION OF FRUITS AND VEGETABLES 2(1+1)

COURSE OBJECTIVES

1. To impart wide knowledge on post-harvest management and value addition of fruits and vegetables.
2. To impart hands on training on processing of different fruits and vegetables

THEORY

UNIT I : SCOPE AND IMPORTANCE OF POST HARVEST MANAGEMENT

Scope and Importance of postharvest technology of fruits and vegetables- factors responsible for postharvest losses – constraints – preharvest factors affecting postharvest quality - postharvest operation – precooling, grading, cleaning, waxing on shelf life of fruits and vegetables.

UNIT II : PHYSIOLOGICAL AND BIOCHEMICAL CHANGES

Physiological and biochemical changes occurring during maturity and ripening- Respiration and factors affecting respiration rate - role of ethylene in regulation of ripening.

UNIT III : PACKAGING AND STORAGE

Packaging and storage of fruits and vegetables - heat, chilling and freezing injury - storage (ZECC, cold storage, CA, MA and hypobaric) - cold chain management for fruits and vegetables

UNIT IV : VALUE ADDITION IN FRUITS AND VEGETABLES

Value addition concepts, principles and methods of preservation, intermediate moisture food –Jam, jelly, marmalade, preserve, candy- concepts and standards of fermented and non fermented beverages. Tomato products – Concepts and Standards

UNIT V : DRYING, CANNING AND QUALITY STANDARDS OF FOOD PRODUCTS

Drying and dehydration of fruits and vegetables, concepts and methods, osmotic drying. Canning-concepts-processing of canned products-spoilage and prevention. Packaging of products –quality standards - GMP, HACCP, FSSAI, Codex alimentarius and ISO certification.

PRACTICAL

Pre harvest operations to improve post harvest shelf life of fruits and vegetable crops, Assessment of maturity indices and harvest criteria for fruits and vegetable crops, Methods of packaging in fruits and vegetables, Identification and causes of chilling and freezing injury in

vegetables and fruits, Estimations of ethylene evolution in fruit crops, Identification of postharvest diseases and disorders of fruits and vegetable crops, Postharvest machineries for fruits and vegetables crops, Postharvest handling of the produce (washing, fungicide treatment, grading, sorting, pre cooling, waxing and nano coating), Preparation of jam/Jelly and quality evaluation of products, Preparation of RTS, nectar, squash and quality evaluation of products, Processing of dried and dehydrated fruits and vegetables, Preparation of fruit bar and candy and quality evaluation of products, Preparation of tomato products, Processing of canned fruits and vegetables, 15 Quality evaluation of products –physio-chemical and sensory evaluation, Visit to processing unit/ industry and cold storage / packaging unit.

COURSE OUTCOMES(COs)

1. Learn about the importance of post harvest technology of fruits and vegetables
2. Acquire knowledge on the physiological and biochemical changes occur during ripening and different packaging and storage methods
3. Learn about the value addition principles and preservation methods
4. Gain knowledge on the drying, canning and food product standards
5. Acquire practical experience on post harvest handling and preparation of various processed products from fruits and vegetables

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2. Ashwani. S. and Goel. 2007. Post harvest management and value addition. Daya publishing house, New Delhi.
3. Swati Barche and K. S. Kirad. 2010. Post harvest handling of fruits, vegetables and flowers. Jain Brothers, New Delhi.
4. Sudheer,K. P. and V. Indira. 2007. Post harvest technology of horticultural crops, New India publishing agency, New Delhi.

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AEN303 - MANAGEMENT OF BENEFICIAL INSECTS 2(1+1)

COURSE OBJECTIVES

1. To impart knowledge on species, morphology, anatomy and biology of bees, silkworms and of lac insects.
2. To understand the rearing techniques of honey bees.
3. To understand the rearing techniques of silkworm.
4. To understand the rearing techniques of lac insects.
5. To impart knowledge on Insect orders bearing predators and parasitoids used in pest control and pollinators

THEORY

UNIT I: APICULTURE

Importance of beneficial Insects, Beekeeping and pollinators, bee biology, commercial methods of rearing, equipment used, seasonal management, Bee pasturage, bee foraging and communication. Insect pests and diseases of honey bee. Role of pollinators in cross pollinated plants.

UNIT II: SERICULTURE

Types of silkworm, voltinism and biology of silkworm.Mulberry cultivation, mulberry varieties and methods of harvesting and preservation of leaves. Rearing, mounting and harvesting of cocoons. Pest and diseases of silkworm, management, rearing appliances of mulberry silkworm and methods of disinfection.

UNIT III: LAC CULTURE

Species of lac insect, morphology, biology, host plant. Lac production – seed lac, button lac, shellac, lac-products.Identification of major parasitoids and predators commonly being used in biological control.

UNIT IV: PREDATORS AND PARASITOIDS

Insect orders bearing predators and parasitoids used in pest control and their mass multiplication techniques.

UNIT V: POLLINATORS

Important species of pollinator, weed killers and scavengers with their importance.

PRACTICAL

Honey bee species, castes of bees. Beekeeping appliances and seasonal management, bee enemies

and disease. Bee pasturage, bee foraging and communication. Types of silkworm, voltinism and biology of silkworm. Mulberry cultivation, mulberry varieties and methods of harvesting and preservation of leaves. Species of lac insect, host plant identification. Identification of other important pollinators, weed killers and scavengers. Visit to research and training institutions devoted to beekeeping, sericulture, lac culture and natural enemies. Identification and techniques for mass multiplication of natural enemies.

COURSE OUTCOMES

1. Students can adopt apiculture, sericulture and lac culture as an entrepreneur according to agro climatic zone.
2. To understand commercial methods of rearing, equipment, seasonal management, insectpest and disease and important species for commercial use of honey bee, silkworm and lac insect.
3. Identification of different bio control agents (Predator, Parasite and Parasitoids) and their use for sustainable pest management.
4. Learn about mass multiplication technique of biological control agents.
5. Students can establish a bio control lab in future as an entrepreneur.

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1. David, B.V. and Ramamurthy, V.V.(2011). *Elements of Economic Entomology*, Namrutha Publications, Chennai,. {ISBN: 978-81-921477-0-3} pp1-386.
2. Dhaliwal, G.S. and R.Arora. (2001). *Integrated Pest Management – Concepts and approaches*.Kalyani publishers, New Delhi. {ISBN: 81-7663-904-4} pp1-427.
3. Pedigo, L.P. and Rice, M.E. (1996). *Entomology and Pest Management.*Prentice-Hall of India Pvt Ltd, New Delhi.. {ISBN-978-8120338869} pp1-812.
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PBG305 - CROP IMPROVEMENT - II (RABI CROPS) 2(1+1)

COURSE OBJECTIVES

1. To impart knowledge to the students on the botanical description, origin, distribution
2. To gain knowledge on various breeding approaches used for the development of varieties / hybrids in various field crops (Rabi Crops)
3. To gain knowledge on various breeding approaches used for the development of varieties / hybrids in various horticultural crops (Rabi Crops).

THEORY

UNIT-I INTRODUCTION

Centers of origin, distribution of species, wild relatives in different cereals; pulses; oilseeds; fodder crops and cash crops; vegetable and horticultural crops

UNIT-II PLANT GENETIC RESOURCES

Plant genetic resources, its utilization and conservation; study of genetics of qualitative and quantitative characters**.**

UNIT-III BREEDING OBJECTIVE FOR HYBRID AND VARIETIES DEVELOPMENT

Major breeding objectives and procedures including conventional and modern innovative approaches for development of hybrids and varieties for yield, adaptability, stability.

UNIT IV BREEDING OBJECTIVE FOR DEVELOP BIOTIC AND ABIOTIC STRESS TOLERANCE

Major breeding objectives and procedures including conventional and modern innovative approaches for development of hybrids and varieties for abiotic and biotic stress tolerance and quality (physical, chemical, nutritional).

UNIT V IDEOTYPE AND CLIMATE RESILENT OF RABI CROPS

Hybrid seed production technology of rabi crops. Ideotype concept and climate resilient crop varieties for future.

PRACTICAL

Floral biology, emasculation and hybridization techniques in different crop species namely Wheat, Oat, Barley, Chickpea, Lentil, Field pea, Rajma, Horse gram, Rapeseed Mustard, Sunflower, Safflower, Potato, Berseem. Sugarcane, Tomato, Chilli, Onion; Handling of germplasm and segregating populations by different methods like pedigree, bulk and single seed decent methods; Study of field techniques for seed production and hybrid seeds production in *Rabi* crops;Estimation of heterosis, inbreeding depression and heritability; Layout of field experiments; Study of quality characters, study of donor parents for different characters; Visit to seed productionplots; Visit to AICRP plots of different field crops

COURSE OUTCOMES

1. By the end of the course, the students will be able to understand the origin, distribution and different breeding methods to be adopted for the development of varieties / hybrids in various field crops
2. By the end of the course, the students will be able to understand the origin, distribution and different breeding methods to be adopted for the development of varieties / hybrids in various horticultural crops
3. Study about the plant genetic resources, centres of diversity
4. Study about the breeding for resistance to biotic and abiotic stresses
5. Learn about the procedure of production of hybrid seed in different crops.

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1. Singh, B.D. 2007. Plant breeding - Principles and methods.
2. Phundan Singh. 2015. Essentials of Plant Breeding. Kalyani Publishers, New Delhi
3. Harihar Ram and HariGovind Singh, 1994. Crop breeding and Genetics. Kalyani Publishers, New Delhi.
4. D.N.Bharadwaj.2012. Breeding Field Crops. Agrobios (India),Jodhpur - 342002
5. HariHar Ram, 2011. Vegetable Breeding– Principles and Practice, Kalyani Publishers, New Delhi.
6. N.Kumar.2006. Breeding of horticultural crops- Principles and Practices. New India Publishing Agency. New Delhi.

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AGR311 - PRACTICAL CROP PRODUCTION – II (RABI CROPS) 2(0+2)

COURSE OBJECTIVES

1.To study the economic importance and different package of practices and yield of Rabi crops.

2. To know about the input managements of rabi crop production.

WORK PLAN

1. Each student will be allotted a minimum land area of 100/200 m2 and he / she will do all field operations in the allotted land from field preparation to harvest and processing.
2. Field preparation, seed, treatment, nursery raising, sowing, nutrient, water and weed management and management of insect-pests diseases of crops, harvesting, threshing, drying winnowing, storage and marketing of produce.
3. Any irrigated dry crop (maize / sorghum / pearl millet / finger millet / cotton / groundnut / sunflower / sesame)

PRACTICAL SCHEDULE FOR IRRIGATED DRY CROP (EG. MAIZE):

Ecosystem - Climate and weather - Seasons and varieties of Tamil Nadu- Selection of field - Main field preparation - seed treatment - Application of manures and fertilizers - Sowing - Weed management and practicing pre- emergence application of herbicides - Thinning and gap filling - Estimation of plant population - Top dressing - Weed management - Water management - Pest management - Observation on nutrient and weeds - Recording growth, yield attributes and yield.

COURSE OUTCOMES

1. To acquire skill in various agronomic practices that can bring improved crop yield.
2. To gain hands on experience on cultivation of crops individually.
3. To understand the different sowing methods for garden land crops and apply different seed treatment techniques
4. To evaluate different harvesting methods and processing
5. It will be helpful to know about basic morphological characteristics of rabi crops

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1. Ahlawat, I.P.S., Om Prakash and G.S.Saini.2010.Scientific Crop Production in India.Rama Publishing House, Meerut.
2. Crop Production Guide. 2012. Directorate of Agriculture, Chennai and Tamil Nadu Agricultural University, Coimbatore.
3. Rajendra Prasad. 2012. Text Book on Field Crop Production, Indian Council of Agrl. Research, New Delhi. Reddy,S.R. 2012. Agronomy of field crops.Kalyani publishers, New Delhi.
4. Chidda Singh.1997. Modern techniques of raising field crops. Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi. Crop Production Guide. 2012. Directorate of Agriculture, Chennai and Tamil Nadu Agricultural University, Coimbatore.

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AEC304 - FARM MANAGEMENT, PRODUCTION and RESOURCE ECONOMICS 2(1+1)

COURSE OBJECTIVE

1. To introduce principles and tools of analysis as applied to practical farm management decisions and to impart basic knowledge on economics of production and natural resource economics.

2. To know about the farm management, production and resource economics cycles.

THEORY

UNIT I PRODUCTION ECONOMICS AND FARM MANAGEMENT - NATURE AND SCOPE

Meaning and concept of farm management, objectives, and relationship with other sciences. Meaning and definition of farms, its types and characteristics, factors determining types and size of farms. Types of farming: Specialized, Diversified, and Mixed farming – Systems of farming: Peasant Farming, State Farming, Capitalistic, Collective and Co – operative Farming.

UNIT II FACTOR – PRODUCT, FACTOR – FACTOR AND PRODUCT – PRODUCT RELATIONSHIPS

Principles of farm management: concept of production function and its characteristics and its type, use of production function in decision-making on a farm. Factor-Product relationship. Meaning, Definition – Laws of Returns. Meaning and concept of cost, types of costs, cost curves - and their inter-relationship - shut down and break-even points, importance of cost in managing farm business and estimation of gross farm income, net farm income, family labor income and farm business income. Economies of Scale – Economies of Size - Determination of Optimum Input and Output – Physical and Economic Optimum. Factor – Factor relationship: Least Cost Combination of inputs; Product – Product relationship: Optimum Combination of Products – Principle of Equi – Marginal Returns – Principle of Opportunity Cost and Minimum Loss Principle. Law of Comparative Advantage.

UNIT III FARM PLANNING AND BUDGETING

Farm business analysis: meaning and concept of farm income and profitability, technical and economic efficiency measures in crop and livestock enterprises. Importance of farm records and accounts in managing a farm, various types of farm records needed to maintain on farm, farm inventory, balance sheet,

profit and loss accounts. Meaning and importance of farm planning and budgeting, partial and complete budgeting, steps in farm planning and budgeting - linear programming, appraisal of farm resources, selection of crops and livestock's enterprises.

UNIT IV RISK AND UNCERTAINTY IN AGRICULTURE PRODUCTION

Concept of risk and uncertainty occurrences in agriculture production, nature and sources of risks and their management strategies**,** Crop / livestock / machinery insurance. Weather based crop insurance - Features and determinants of compensations.

UNIT V RESOURCE ECONOMICS

Resource Economics: Concepts, Classification, differences between Natural Resource Economics (NRE) and agricultural economics, unique properties of natural resources. Natural Resources - Issues – Scarcity of resources – Factors mitigating scarcity – Property Rights: Common Property Resources (CPRs): meaning and characteristics of CPRs – Externalities: meaning and types - positive and negative externalities in agriculture, Inefficiency and welfare loss, solutions; Important issues in economics and management of common property resources of land, water, pasture, and forest resources.

PRACTICAL

Preparation of farm layout. Determination of cost of fencing of a farm. Computation of depreciation cost of farm assets. Application of equi-marginal returns / opportunity cost principle in allocation of farm resources. Determination of most profitable level of inputs use in a farm production process. Determination of least cost combination of inputs. Selection of most profitable enterprise combination. Application of cost principles including CACP concepts in the estimation of cost of crops – Estimation of costs and returns of livestock products. Preparation of farm plan and budget, farm records and accounts and profit and loss accounts. Break – even analysis- Graphical solution to Linear Programming problem. Collection and analysis of data on various resources in India.

COURSE OUTCOMES (COs)

1. To know optimum use of land, labour, and capital use in Agricultural production
2. To understand the art and principles underlying decision over: What-to-produce, Where-to - produce and How-to-produce.
3. To analyse ways for optimal resource-use for production of crops, livestock and allied enterprises and know how to manage a farm.
4. To learn about economic importance of natural resources

5. To devise plans to overcome risks and manage farm resources

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1. Debertin, D.L. 1986. Agricultural Production Economics. Macmillan. New York.
2. Heady, E.O. and H.R. Jensen. 1954. Farm Management Economics. Prentice – Hall. Englewood Cliffs.
3. Kay, Ronald D., and William M. Edwards, and Patricia Duffy. 2004. Farm Management. Fifth Edition. McGraw–Hill Inc. New York.
4. Panda, S.C. 2007. Farm Management and Agricultural Marketing. Kalyani Publishers. Ludhiana. India.

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3. https://www.tnauagritech.ac.in

AFS301 - PRINCIPLES OF FOOD SCIENCE AND NUTRITION 2(2+0)

COURSE OBJECTIVE

1. To impart knowledge about the importance, metabolism, functions and sources of all the nutrients
2. To impart hands on experience to analyze the food biochemically and identification of food adulterants.

THEORY

UNIT I: PRINCIPLES OF FOOD SCIENCE AND NUTRITION

Food Science - definition – classification of foods – functional and nutritional classification. Food groups and food pyramid. Methods of cooking - moist, dry and microwave - principles, merits and demerits. Importance and scope of nutrition – relation of nutrition to health.

UNIT II : CARBOHYDRATE, PROTEIN AND FAT

Carbohydrate – classification, functions, digestion and absorption, sources and Recommended Dietary allowance (RDA). Energy value of foods – determination. Protein – classification, functions digestion and absorption, sources and requirements. Protein quality of foods – supplementary value of protein. Fat - classification functions, digestion and absorption, sources and requirements. Rancidity – types of rancidity and prevention. Deficiency states of protein, carbohydrate and fat nutrition – signs and symptoms.

UNIT III: VITAMIN AND MINERAL NUTRITION

Fat Soluble vitamins – A, D, E and K- functions, sources, requirements and deficiency. Water soluble vitamins – thiamine , riboflavin , niacin, pyridoxine, folic acid, cyanacobalamin, biotin, pantothenic acid ascorbic acid – functions, sources, deficiency and requirements. Minerals - calcium, iron, phosphorus, iodine, magnesium, zinc, sodium, potassium, fluorine and chlorine – functions, sources, deficiency and requirements. Importance of water – maintenance of electrolyte balance. Dietary fibre - importance, health benefits, sources and requirements.

UNIT IV : FOOD PRESERVATION AND PROCESSING

Introduction – preservation by sugar - processing of jam, squash, jelly, marmalade and beverages. Preservation by using salt, chemicals, dehydration technology, canning technology, preservation by low

temperature and irradiation techniques. Processing of puffed, flaked and extruded products. Quality control of raw and processed products.

UNIT V: FOOD QUALITY AND SAFETY

Food packaging materials – requirements – methods – nutrition labeling. Food adulterants and their detection methods. Food laws and regulations and quality control standards - FSSAI, ISO, EU standards, FDA, HACCP and Codex Alimentarius Commission.

COURSE OUTCOMES (COs)

1. Learn about the importance of food science and nutrition
2. Acquire wide knowledge on metabolism and functions of carbohydrates, protein, fat, vitamins and minerals.
3. Gain knowledge on food preservation techniques and processing methods
4. Comprehend food regulatory laws and quality standards
5. Analyze foods biochemically and identify the food adulterants

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1. William C Frazier, Dennis C Westhoff and N M Vanitha. 2013. McGraw Hill education (India) Pvt. Ltd.
2. Avantina Sharma. 2017. Text book of food science and technology. 2nd edition, CBS Publishers & Distributors Pvt. Ltd, New Delhi.

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2. www.nutrition.org.uk
3. www.fnic.nal.usda.gov
4. www.myfooddiary.com

OPT 321 - HI-TECH HORTICULTURE 3(2+1)

COURSE OBJECTIVE

1. To learn about the present status of horticulture in India and abroad
2. To learn modern and innovative technologies used in horticulture field
3. Preservation and value addition in fruits and vegetables
4. To develop gardening as a hobby
5. To develop technical skills related to horticulture

THEORY

UNIT I - INTRODUCTION

Introduction & importance; Nursery management and mechanization; micro propagation of horticultural crops; Modern field preparation and planting methods.

UNIT II PROTECTED CULTIVATION

Protected cultivation: advantages, controlled conditions, method and techniques,

UNIT III MICROIRRIGATION

Micro irrigation systems and its components; EC, pH based fertilizer scheduling, canopy management, high density orcharding,

UNIT IV PRECISION FARMING

Components of precision farming: Remote sensing, Geographical Information System (GIS), Differential Geo-positioning System (DGPS), Variable Rate applicator (VRA),

UNIT V APPLICATION OF PRECISION FARMING

Application of precision farming in horticultural crops (fruits, vegetables and ornamental crops); mechanized harvesting of produce.

PRACTICAL Types of polyhouses and shade net houses, Intercultural operations, tools and equipments identification and application, Micro propagation, Nursery-protrays, micro-irrigation, EC, pH based fertilizer scheduling, canopy management, visit to hi-tech orchard/nursery.

COURSE OUTCOMES (COs)

1. Students will gather details knowledge on modern advanced technologies and their application in horticulture.
2. Students will gain detail knowledge on micro propogation in horticultural crops.
3. To Gain knowledge about precision farming.
4. To learn about the high density orchard in different horticultural crops.
5. To understand about importance and mechanism of precision farming in horticulture

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1. Hi-tech Horticulture- T.A.More, MPKV,Rahuri Balraj Singh,2005: Protected cultivation of vegetable crops.Kalyani publication
2. Patil M.T. & Patil,P.V.,2004 Commercial Protected
3. Floriculture.MPKV,Rahuri Commercial floriculture- Prasad & kumar
4. Green house operation & Management: Paul V. Nelson

OPT 322 - WEED MANAGEMENT 3(2+1)

COURSE OBJECTIVES

1. To conduct survey and surveillance of weed flora, mapping their distribution, ecology and habitat
2. To evaluate new herbicides and work out the residual effect on non-targeted organisms
3. To study long-term residual and cumulative effects of herbicides

THEORY

UNIT I INTRODUCTION

Introduction to weeds, characteristics of weeds their harmful and beneficial effects on ecosystem. Classification, reproduction and dissemination of weeds.

UNIT II HERBICIDE

Herbicide classification, concept of adjuvant, surfactant, herbicide formulation and their use. Introduction to mode of action of herbicides and selectivity.

UNIT III ALLELOPATHY

Allelopathy and its application for weed management, Bio-herbicides and their application in agriculture

UNIT IV CONCEPT OF HERBICIDE

Concept of herbicide mixture and utility in agriculture. Herbicide compatibility with agro-chemicals and their application.

UNIT V HERBICIDE RESISTANCE

Integration of herbicides with non chemical methods of weed management. Herbicide Resistance and its management.

PRACTICAL

Techniques of weed preservation. Weed identification and their losses study. Biology of important weeds. Study of herbicide formulations and mixture of herbicide. Herbicide and agro-chemicals study. Shift of

weed flora study in long term experiments. Study of methods of herbicide application, spraying equipments. Calculations of herbicide doses and weed control efficiency and weed index.

COURSE OUTCOMES (COs)

1. To know why to undertake environmental weed control and the impact of weeds
2. Planning for their control, control options, surveillance, herbicide trials
3. Understand about control methods and use of herbicides
4. Approaches to weed management
5. Planning for weed management and weed management processes

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2. Rao, V.S. 1992. Principles of weed science (2nd edition), Oxford & IBH Publishing Co.Pvt Ltd, New Delhi.
3. Ross,M.A. and Lembi,C.A. 1999. Applied Weed Science. (2nd edition), Prentice Hall of India Pvt Ltd, New Delhi
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2. http://www.agriinfo.in/ eagri.org/
3. http://www.agriglance.com/
4. http://agritech.tnau.ac.in/

OPT 323 - SYSTEM SIMULATION AND AGRO- ADVISORY 3(2+1)

COURSE OBJECTIVES

1. To introduce the students about the system simulation and agro advisory which helps the farmer about the early warning about the disease and climate and let the farmer ready reduces the losses.

2. To know about current weather and climate to recommend the farm advisory.

THEORY

UNIT I INTRODUCTION AND CROP MODELS

System Approach for representing soil-plant-atmospheric continuum, system boundaries, Crop models, concepts & techniques, types of crop models, data requirements, relational diagrams.

UNIT II WEATHER ELEMENTS

Evaluation of crop responses to weather elements; Elementary crop growth models; calibration, validation, verification and sensitivity analysis.

UNIT III MODELLING TECHNIQUES

Potential and achievable crop production- concept and odeling techniques for their estimation. Crop production in moisture and nutrients limited conditions; components of soil water and nutrients balance.

UNIT IV WEATHER FORECASTING

Weather forecasting, types, methods, tools & techniques, forecast verification; Value added weather forecast, ITK for weather forecast and its validity

UNIT V WEARTHE CALENDERS

Crop-Weather Calendars and forewarning model; Preparation of agro-advisory bulletin based on weather forecast. Use of crop simulation model for preparation of Agro-advisory and its effective dissemination.

PRACTICAL

Preparation of crop weather calendars. Preparation of agro-advisories based on weather forecast using various approaches and synoptic charts. Working with statistical and simulation models for crop growth. Potential & achievable production; yield forecasting, insect & disease forecasting models. Simulation with limitations of water and nutrient management options. Sensitivity analysis of varying weather and crop management practices. Use of statistical approaches in data analysis and preparation of historical, past and present meteorological data for medium range weather forecast. Feedback from farmers about the agroadvisory.

COURSE OUTCOMES

1. Students will able to understand the system approach for representing soil-plant-atmospheric continuum, system.
2. Students will understand crop models, concepts & techniques.
3. To gain the knowledge on types of crop models, data requirements, relational diagrams
4. Students will able to understand the weather forecasting and its types.
5. Understand the methods, tools & techniques of weather forecasting

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2. Working with Dynamic crop models, Evaluation, Analysis, Parametrization and Applications by D. Wallach, D. Makowshi, J. W. Jones, Elsevier Oxford U.K, First edition 2006.
3. Remote Sensing Techniques in Agriculture by D.D.Sahoo, R.M.Solanki, Agrobios (India), Jodhpur, 2008.
4. Compendium on Crop Moddeling,by M.C. Varshneya and S.S.Salunke. A short Term Training Programme organized by Centre of Advance Studies in Agril. Meteorology, College of Agriculture, Pune-411005 during 14 th Sep., - 12 th Oct., 1998, Published by MPKV, Rahuri MPKV/EDN./PUB No. 10(99).

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OPT 324 - AGRICULTURAL JOURNALISM 3(2+1)

COURSE OBJECTIVE

1. Main objective of this subject is to acquaint the students about the agriculture journalism.

2. To know about the journalism knowledge resources and impacts.

THEORY

UNIT I INTRODUCTION

The nature and scope of agricultural journalism characteristics and training of the agricultural journalist, how agricultural journalism is similar to and different from other types of journalism.

UNIT II COMMUNICATION MEDIA

Newspapers and magazines as communication media: Characteristics; kinds and functions of newspapers and magazines, characteristics of newspaper and magazine readers. Form and content of newspapers and magazines: Style and language of newspapers and magazines, parts of newspapers and magazines.

UNIT III AGRICULTURE STORIES

Types of agricultural stories, subject matter of the agricultural story, structure of the agricultural story. Gathering agricultural information: Sources of agricultural information, interviews, coverage of events, abstracting from research and scientific materials, wire services, other agricultural news sources.

UNIT IV WRITING AGRICULTURAL STORIES

Writing the story: Organizing the material, treatment of the story, writing the news lead and the body, readability measures.

UNIT V DEPICTED AGRICUTURAL STORIES

Illustrating agricultural stories: Use of photographs, use of artwork (graphs, charts, maps etc.), writing the captions. Editorial mechanics: Copy reading, headline and title writing, proofreading, lay outing.

PRACTICAL

Practice in interviewing. Covering agricultural events. Abstracting stories from research and scientific materials and from wire services. Writing different Types of agricultural stories. Selecting pictures and artwork for the agricultural story. Practice in editing, copy reading, headline and title writing, proofreading, lay outing. Testing copy with a readability formula. Visit to a publishing office.

COURSE OUTCOMES (COs)

1. To understand about agricultural journalism.
2. To gain knowledge about newspapers and magazines as communication media.
3. To understand writing the story: organizing the material, treatment of the story.

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1. B L Jana ,Agricultural Journalism, ATPA.
2. C Bhaskaran ,Farm Journalism and Media Management, Agrotech publishing Academy.

IV YEAR VII SEMESTER				
1.	U18AAEX401	Student READY programme (Rural Agricultural Work Experience and Agro-industrial Attachment)	0+20	Employability
2.	U18CAGR401	Project Report Preparation, presentation and Evaluation	0+1	Enterpreneurship
3.	U18AAEX402	All India Study Tour*	0+1*	Skill Development
		Total	**0+22=22**	
*Non gradial compulsory course				

STUDENT READY (RURAL ENTREPRENEURSHIP AWARENESS DEVELOPMENT YOJANA)

Student Ready Programme is conceptualized to reorient graduates of Agriculture and allied subjects for ensuring and assuring employability and to develop entrepreneurs for emerging knowledge intensive agriculture by articulating knowledge, skill, ability and experiences.

Five components of student READY are:

1. Component I : Rural Agricultural Work Experience (RAWE)
2. Component II : Internship/ In Plant Training/ Industrial attachment
3. Component III : Students Projects
4. Component IV : Experiential Learning with business mode
5. Component V : Hands-on training (HOT)/ Skill development training i.e. Experiential Learning without business mode

COMPONENT I - RURAL AGRICULTURAL WORK EXPERIENCE (RAWE)

The Rural Agricultural Work Experience (RAWE) provides exposure to agricultural students to the natural setting of the village situations, work with the farm families, identify their problems and make use of various extension tools for transferring the latest agricultural technologies. The students also get opportunity to study the various on-going schemes related to agriculture and rural development and participate in their implementation. The students were given rigorous orientation and familiarization on various issues and problems expected on farmers' field and hence gain competence and confidence for solving problems related to agriculture and allied sciences. It has been implemented in adopted villages under the supervision of scientists. Activities focused on intensive observations/ analysis of socio-economic and technological profile of the farm families in rural areas, participatory extension approach and acquaintance with farming situations, farm practices and interaction with progressive farmers. Soil testing has become the integral part of RAWE. This helps orient our agricultural graduates for participation in various rural developmental programme. The students also gained first hand information on industries during attachment with identified agro based industries.

COMPONENT II - INTERNSHIP/ IN PLANT TRAINING/ INDUSTRIAL ATTACHMENT

Technology and globalization are ushering an era of unprecedented change. The need and pressure for change and innovation is immense. To enrich the practical knowledge of the students, in-plant training is mandatory. In this training, students will have to study a problem in industrial perspective and submit

the reports to the university. Such in-plant trainings will provide an industrial exposure to the students as well as to develop their career in the high tech industrial requirements. In-Plant training is meant to correlate theory and actual practices in the industries with the following objectives:

- To expose the students to Industrial environment, this cannot be simulated in the university.
- To familiarize the students with various Materials, Machines, Processes, Products and their applications along with relevant aspects of shop management.
- To make the students understand the psychology of the workers, and approach to problems along with the practices followed at factory
- To make the students understand the scope, functions and job responsibility-ties in various departments of an organization.
- Exposure to various aspects of entrepreneurship during the program period.

COMPONENT III - STUDENTS PROJECTS

There are number of students interested for higher education and study abroad. Keeping in view their future requirement a component of Student Project is placed to understand and identify problems of his/ her interest and field, experimental set up, taking observation and writing and documentation in the form of thesis. Project work provides several opportunities to students to learn various aspects that cannot be taught in a class room or laboratory. In order to provide such opportunities to the graduates of agricultural science, Students Project is proposed as one of the components of the Student READY. It may be adopted based on the interest of student and expertise and facilities available with the College.The Students Project are proposed with the following objectives:

- To impart analytical skills and capability to work independently.
- To conceptualize, design and implement the proposed work plan.
- Learn to work as a team- sharing work amongst a group, and learn leadership
- Learn to solve a problem through all its stages by understanding and applying project management skills.
- Learn to do various implementations, fabrication, testing and trouble shooting.
- Learn communication report writing skills.

COMPONENT IV – EXPERIENTIAL LEARNING WITH BUSINESS MODE

Experiential Learning (EL) with business mode helps the student to develop competence, capability, capacity building, acquiring skills, expertise, and confidence to start their own enterprise and turn job creators instead of job seekers. This is a step forward for “Earn while Learn” concept. Experiential

Learning is an important module for high quality professional competence and practical work experience in real life situation to Graduates. The module with entrepreneurial orientation of production and production to consumption pattern is expected to facilitate producing Job Providers rather than Job Seekers. The EL provides the students an excellent opportunity to develop analytical and entrepreneurial skills, and knowledge through meaningful hands on experience, confidence in their ability to design and execute project work. The main objectives of EL are:

- To promote professional skills and knowledge through meaningful hands on experience.
- To build confidence and to work in project mode.
- To acquire enterprise management capabilities.

AEX405 - STUDENT READY PROGRAMME (RURAL AGRICULTURAL WORK EXPERIENCE AND AGRO-INDUSTRIAL ATTACHMENT) 20(0+20)

COURSE OBJECTIVES

To help students primarily to understand the rural situations, status of Agricultural technologies adopted by farmers, prioritize the farmer's problems and to develop skills and attitude of working with farm families for overall development in rural area.

WORK PLAN

UNIT I : VILLAGE RESOURCE INVENTORY AND PLANNING (using PRA tools, Rich pictures, GIS maps, secondary data, interview, etc.)

- Describe the Natural Resources - Village boundaries, topography, historical background, water resources (river, canal, tank, etc.), soil resources, vegetation (trees, crops, etc.), fodder, animal husbandry (milch cattle, poultry, goatery, fishery, etc.), wild animals, climate, land utilization pattern, etc.
- Describe the Agricultural scenario - Cropping pattern, cropping systems, farming systems, area, production and productivity of crops, adoption pattern of recommended varieties / hybrids,
- Technologies and machinery / implements, organic farming, contract farming, etc.
- Explain the Demographic details – population, literacy, land holdings, farmers, farm women, youth, caste, labour, etc.
- Analyze the Social factors – social structure, social stratification, social change, social groups, culture, social control, leadership, social processes, migration, social customs, social issues, etc.
- Study the Socio-psychological factors – group processes / dynamics, attitude towards innovations, etc.
- Assess the Village Infrastructure - Educational institutions, Government institutes / offices, private firms / offices, NGOs, Societies, Banks, Panchayat Union / Grama Panchayat, Clubs, SHGs, FPOs,
- Associations, Communication facilities, transport facilities, railway station, police station, hospitals, clinics, veterinary hospital, post office, markets, community centers, religious places of worship, etc.

- Analyze the Problems / Constraints – Problem / Constraints related to farming, marketing, processing, transport, communication, access to extension and other services, etc.
- Prepare village development plans in consultation with different stakeholders.

UNIT II: FARM RESOURCE INVENTORY AND PLANNING (using maps, Rich pictures, far system modeling, family tree charts, flow diagrams, interview, etc.)

- Describe the Farm boundaries, topography, water resources, soil resources, vegetation, animal enterprises, etc.
- Describe the cropping pattern, cropping system, farming system, agri-business, etc.
- Explore Farmers Practices – Indigenous Technical Knowledge (ITK).
- Identify the constraints of the system environment (natural, economic, social, political, legal).
- Assess the linkages with Extension agencies, Markets, Input agencies, Media, Development departments, etc.
- Identify and describe all the people involved in the farm, their work, roles, visions, needs, values, interests and relationships.
- Analyze the system in terms of satisfying current needs. What are the critical factors that need to be managed to sustain the system? Are there opportunities for growth and development to satisfy the
- Future needs of the system? Are there threats that also need to be managed?
- Describe the different sub-systems viz., production sub-system, management sub-system, marketing sub-system, human activity sub-system, landscape and natural sub-system, etc., and their relationships.
- Identify the linkages with the Supra System viz., economic, political, legal and social.
- Find out the adoption pattern of recommended varieties / hybrids, technologies, machinery / implements, etc.
- Analyze the financial status and performance of the system - Economics of production (area, production, productivity, yield gaps, net returns, cost benefit ratio, etc).
- Prepare farm development plans for different types of farmers, by involving them so as to improve their systems.

UNIT III: STUDYING ACTIVITIES OF STATE DEPARTMENT OF AGRICULTURE

Visit to Office of Assistant Director of Agriculture to study the organizational structure, functions, duties and responsibilities of extension personnel, ATMA, schemes implemented, extension activities conducted,

etc. Involve in different extension activities such as village meetings, demonstrations, campaigns, exhibition, radio / TV programmes and record observations and lessons learnt.

UNIT IV: STUDYING ACTIVITIES OF AN NGO

Visit to an NGO to study the organizational pattern, functions, projects, duties and responsibilities of staff, extension activities, schemes implemented, funding sources, etc.

UNIT V: STUDYING ACTIVITIES OF AN AGRI BUSINESS FIRM

Visit to an Agri-business firm to study the business activities, projects, managerial functions viz., planning, supervision, delegation, communication, budgeting, and related aspects.

COURSE OUTCOMES (COs)

1. To understand rural situation, institutions and organizations
2. To understand customs and value systems of the villagers.
3. To familiarize with cropping pattern and of adoption of agricultural practices
4. To undertake field visits, trainings, trails, research activities and agricultural demonstrations in rural area.
5. To disseminate Agricultural technologies to the rural public.

AGR414 - PROJECT REPORT PREPARATION, PRESENTATION AND EVALUATION 1(0+1)

COURSE OBJECTIVES

1 .Students will gain expertise for identification of research problem, planning and setting up experiments and writing of reports, etc.

2. To know about the research and project preparation, submission on agricultural sciences.

WORK PLAN

Student Project is placed to understand and identify problems of his/ her interest and field, experimental set up, taking observation and writing and documentation in the form of thesis.

COURSE OUTCOMES

1. Learn and differentiate the priority area of the project work
2. Develop the spirit of Team Work by a part of the team to complete any projects within stipulated time period
3. Learn the different statistical techniques to conduct scientific research precisely
4. Make them capable to analyze, apply and appreciate contemporary project management tools and methodologies in Indian context.
5. Demonstrate to synopsis preparation, presentation and submission

AEX404 - ALL INDIA STUDY TOUR (0+1)*

COURSE OBJECTIVES

1. The course will provide an opportunity to the students to study the functioning of important national institutes related to agriculture and allied fields.

2. To know the all India level agricultural institutions, their activities and extensions works.

WORK PLAN

Visit to important National and International institutes related to agriculture, horticulture, forestry and allied fields in various regions of the country. Exposure to varied agro-climatic zones, crops grown, cultivation practices, socio-economic and cultural features of the farming community in different parts of the country.

COURSE OUTCOMES

1. To understand the functioning of important national institutes related to Agriculture
2. To understand the functioning of important national institutes related to allied fields.
3. To get exposure on various agro climatic zones and their features.
4. To know about the functions of various research organizations running for Agriculture
5. To understand the cultivation of various Agricultural crops in different zones of the country and scope available for employment in National level institutes

IV YEAR VIII SEMESTER				
1.	AEL401	Module I - Experiential Learning Programme	10(0+10)	Enterpreneurship
2.	AHT104	Module II - Hands on training (HOT)	10(0+10)	Enterpreneurship
		Total	**0+20 = 20**	
*** List of Experiential learning courses has been attached below				

LIST OF EXPERIENTIAL LEARNING COURSES FOR SEMESTER VIII**

Sl. No	**Course Code**	**Title of the Module**	**Credits**	
1.	AEL 401	Production Technology for Bioagents and Biofertilizers	10(0+10)	Enterpreneurship
2.	AEL 402	Seed Production and Technology	10(0+10)	Enterpreneurship
3.	AEL 403	Mushroom Cultivation Technology	10(0+10)	Enterpreneurship
4.	AEL 404	Soil, Plant, Water and seed Testing	10(0+10)	Enterpreneurship
5.	AEL 405	Commercial Beekeeping	10(0+10)	Enterpreneurship
6.	AEL 406	Poultry Production Technology	10(0+10)	Enterpreneurship
7.	AHT 401	Commercial Horticulture	10(0+10)	Enterpreneurship
8.	AHT 402	Floriculture and Landscaping	10(0+10)	Enterpreneurship
9.	AHT 403	Food Processing	10(0+10)	Enterpreneurship
10.	AHT 404	Agriculture Waste Mangement	10(0+10)	Enterpreneurship
11.	AHT 405	Organic Production Technology	10(0+10)	Enterpreneurship
12.	AHT 406	Commercial Sericulture	10(0+10)	Enterpreneurship
Note: In addition to above ELP modules other important modules may be given to the students by SAUs.				

IV YEAR VIII SEMESTER

AEL 401- PRODUCTION TECHNOLOGY FOR BIOAGENTS AND BIOFERTILIZERS 10(0+10)

COURSE OBJECTIVES

1. To study in detail about the bio-control agents in Agriculture viz., Isolation, purification of bacterial and fungal bio-control agents and their mass production.
2. To study in details about the biofertilizer in Agriculture viz, isolation, purification of biofertilizers and their mass production.
3. The students will learn about the Quality standards and methods of bio-control agents and biofertilizer application.

PRACTICAL WORK PLAN

Isolation and pure culture establishment of fertilisers and bio-pesticides. Culture methods and substrates. Scale of methods for bio-fertilizers and bio-pesticides. Substrate preparation and mixing techniques. Quality analysis of bio-fertilizers and bio-pesticides. Testing the final product in small scale level. Storage, marketing and cost analysis of bio-fertilizers and pesticides.

COURSE OUTCOMES

1. To understand about the different group of Bio- control agents and biofertilizers.
2. To impart knowledge about isolation of different group of Bio - control agents and biofertilizers.
3. To understand about the purification and confirmation techniques of different bio-control agents and biofertilizers.
4. Enhancing the skills on development of mass production on bio-control agents and biofertilizers.
5. To determine the Quality standards and do Hands on exposure on method of application of different of Bio – control agents and biofertilizers

REFERENCES

1. Kennedy, J.S and Zadda Kavitha. 2006. Manual on commercial Production of biocontrol agents. Department of Agricultural Entomology, TNAU, Coimbatore. 156p

AEL 402 - SEED PRODUCTION AND TECHNOLOGY 10(0+10)

COURSE OBJECTIVES

1. To give practical exposure to the students in various techniques in seed production of agriculture and horticulture crops.

2. To know about the seed production and rules, regulations of field inspections.

PRACTICAL WORK PLAN

Scope and importance of seed industry and seed production - principles and practices of seed production - generation system of seed multiplication, Pollination behaviour - tools employed in hybrid seed production - study of morphological characters of varieties, parental line and hybrids, Designing of planting ratio and border rows - physical and genetic contaminants - isolation distance, Planning of seed production - season and land selection - assessment of seed source and seed selection. Pre sowing seed invigouration treatments - dormancy breaking treatments - seed priming - pelleting - polymer coating, Practicing nursery and main field preparation - practicing the sowing of seeds in the nursery - protray nursery - sowing - nursery management, Main field preparation - layout - formation of beds - transplanting - fertilizer and nutrient management, Weed management - irrigation management - special cultural practices - pest and disease management, Identification and removal of off-types and volunteer plants - practicing hybridization techniques (emasculation and pollination and detasseling) - identification of physiological disorders and management, Exposure visit to seed certification department - seed certification procedures - registration and sowing report - field inspection - field counting - visit to seed production plots - project preparation, Pre-harvest sanitation spray - identification of physiological and harvestable maturity indices- harvesting methods - project preparation, Post harvest verification - kapas sorting, cob sorting and pod verification - threshing / extraction of seeds - processing sequence - seed drying - seed cleaning - grading - pre-storage seed treatment - seed packing - seed storage, Visit to seed processing unit and seed storage godown and learning sanitation measures - project preparation, Economics of variety and hybrid seed production (cost benefit ratio) - visit to private seed industry, Seed sampling procedure and submission of samples - project preparation, Seed testing procedure - estimation of seed moisture - physical purity analysis - germination test - visit to grow out test field and DNA finger printing laboratory for genetic purity assessment, Visit to seed retail shop - seed marketing - project preparation and submission.

COURSE OUTCOMES (COs)

1. Ability to produce agriculture and horticulture seeds.
2. Improve the skills on the use latest techniques in seed production.
3. Improve the post harvest technologies and seed quality enhancement techniques
4. Learnt about seed certification and their procedures
5. Develop the skills on the problems in seed testing and seed storage

REFERENCES

1. Agrawal, R.L. 1996. Seed Technology, Oxford & IBH Publishing Co., New Delhi.
2. Bhaskaran, M. A.Bharathi, K.Vanangamudi, N.Natarajan, P.Natesan, R.Jerlin and K.Prabakar. 2003. Principles of seed production. Kaisher Graphics, Coimbatore.
3. Copeland LO & McDonald MB. 2001. Principles of Seed Science and Technology. 4th Ed. Chapman & Hall.
4. Singhal NC. 2003. Hybrid Seed Production in Field Crops. Kalyani Publishers, New Delhi.
5. Vanangamudi, K. 2014. Seed Science and Technology. An Illustrated Text Book. New India Publishing Agency, New Delhi.

E - REFERENCES

1. Seednet.gov.in
2. www.iar.org.in/Directorate1.htm
3. www.apsa.org
4. www.seedassociationofindia.com
5. www.apaseed.com
6. www.apaseed.org

AEL 403 - MUSHROOM CULTIVATION TECHNOLOGY 10(0+10)

COURSE OBJECTIVES

1.To study in detail about the types of mushroom production in Agriculture *viz.,* Isolation, purification of mushroom and their mass production.

2.The students will learn about the production technology and economics of mushroom.

PRACTICAL WORK PLAN

Construction cultivation room/structure and Disinfection. Compost preparation & pasteurization. Procurement of mother culture and spawn preparation. Procurement of casing soil and preparation for production. Mushroom seeding, Casing with soil and maintenance, Harvesting, processing, Grading, packing, marketing and Cost economics of mushroom culture.

COURSE OUTCOMES (COs)

1. Understand about the different types of mushroom viz., Edible and poisonous type - edible mushrooms-*Pleurotus*, *Agaricus*, *Volvariella* and *Calocybe*
2. Impart knowledge about isolation of different types of mushrooms.
3. Understand about the isolation, purification and confirmation techniques of different mushroom.
4. Enhancing the skills on development of mass production on types of mushrooms.
5. To do Hands on exposure on production technology of different types of mushroom..

REFERENCE

1. Agarwal, R.K. and C.L.Jandaik.1986. Mushroom cultivation in India. Indian Mushroom Growers Association, Solan, Himachal Pradesh.p-83.
2. Bahl, N.1988. Hand book of Mushroom II Edn. Oxford & IBM Publishing Co. New Delhi. Reference books- further reading
3. Marimuthu, T., A.S Krishnamoorthy, K.Sivaprakasam and R.Jeyarajan, 1989. OysterMushroom Production. The Vijay Books. Sivakasi, India.P.57.
4. A.S Krishnamoorthy, Marimuthu, T., and S. Nakkeran . 2005 . Mushroom Biotechnology ,The Vijay Books. Sivakasi, India., Pub.ODL, TNAU, Cbe-3

5. Pathak,V.N. Nagendra Yadav and Maneeskas Gaur.2000.Mushroom production and processing Technology. Agribios (India) Ltd., New Delhi

E-REFERENCE

1. www.mushroomcouncil.com/grow /grow.html
2. www.krishiworld.com/html/mushroom.html

AEL404 - SOIL, PLANT, WATER AND SEED TESTING 10(0+10)

COURSE OBJECTIVES

1. To study in detail about the soil, plant, water and seed testing methods.

2. To know about the analysis results and interpretations.

PRACTICAL WORK PLAN

Estimation of available soil potassium by flame photometer method, estimation of CEC of soil, estimation of microbial biomass carbon, Estimation of nitrogen in plant samples, estimation of EC an pH of irrigation water, estimation of chlorides in irrigation water, computation of quality parameters in irrigation water, description of seed structures composition and economic importance of seed testing, physical purity test, genetic purity test of seeds ODV test, growout test for hybrid seeds, determination of seed moisture, seed health test, normal seedlings and abnormal seedlings, washing and cleaning of laboratory glassware, grades of chemicals, equivqlent weights and molecular weights of some important chemicals, unit measurements and conversions, cholour changes due to pH change in then presence of pH indicators, plant tissue sample guidelines for different crops.

COURSE OUTCOMES (COs)

1. To know the basic principles involved in seed, and seed testing.
2. To gain the knowledge about soil and their testing methods.
3. To learnt about the water analysis methods..
4. To know the basic principles of plant sample testing.
5. To understand the basic knowledge on the sample guidelines of different crops.

REFERENCE

1. Soil Sampling, Preparation and analysis, Marcell Dekker, Inc, New York.
2. Soil Sampling and methods of analysis, carter M.R. and E.G.Gregorich, 2007, 2nd Ed..
3. Methods of soil analysis, Part, American society of Agronomy Inc., Kuete, A.Et.at., 1986
4. Piper, C.S 1942. Soil and plant analysis: Inter science *Publishers,* New York

AEL 405 - COMMERCIAL BEEKEEPING 10(0+10)

COURSE OBJECTIVES

1.To inculcate importance of Bee keeping and honey processing in relation with entrepreneurship development.

2. To know about the Beekeeping importants and ecosystem managemnts.

PRACTICAL WORK PLAN

Honey bee species, castes, social biology and communication in honey bees – Bee pasturage and preparation of bee floral calendar - Honey bees for crop pollination and seed production. - Stingless bees, little bees, rock bees conservation and honey harvest - Beehives, beekeeping equipments specification and uses, visit to manufacturing unit - Hiving feral Indian bee colony, site selection for apiary, visit to migratory bee keeping sites, visit to commercial cerana bee farm, - Honey extraction, processing, purity testing and value addition, visit to honey processing unit - Hive inspection, maintenance of hive records, management in ectar flow season, dearth period, management of swarming, absconding and laying workers - Dividing, uniting bee colonies, artificial feeding, protecting bees from pesticides - Insect, mite and bird enemies of honeybees, brood and adult diseases - Mass queen rearing and production of mating nucleus, visit to beekeeping society - Methods of collection of bees wax, bee pollen, propolis, bee venom, royal jelly - Visit to commercial mellifera bee farm - Marketing and economics of honey and bee products, preparation of bee keeping projects for bank funding.

COURSE OUTCOMES(COs)

1. Knowledge about Honey bee species, castes, social biology and communication in bee bees
2. Understand about the Beehives,beekeepingequipment specification and uses, vist to manufacturing unit
3. Analyze the Methods of collection of bees wax, bee pollen, Propolis, bee venom, royal jelly
4. Analyze the hive inspection maintenance of hive records, management in nectar flow season, dearth period, management of swarming, absconding and laying workers.
5. Knowledge about various techniques of Bee keeping and honey processing and its marketing to make them self-sustainable after graduation.

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1. Atwal, A.S. 2013.Mellifera Bee Keeping and Pollination. *Kalyani Publishers, Ludhiana*. 394 p.
2. TedHooper,1991.Guide to Bees and Honey (Thrid Edition), *BAS printers ltd. Over Wallop, Hampshire* 271 p.
3. Roger A. Morse, 1994. The new complete guide to beekeeping. *The Countryman Press,Woodstock, Vermont*.207p.
4. ThomasD.Seeley.1995.TheWisdomoftheHive,HarvardUniversityPress,Cambridge,295p

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2. html http://agdev.anr.udel.edu/maarec/
3. http://www.aragriculture.org/insects/beekeeping.htm
4. http://tiwanabeefarm.com/
5. http://beekeeping.com/
6. http://www.apimondia.com/en

AEL 406 - POULTRY PRODUCTION TECHNOLOGY 10(0+10)

COURSE OBJECTIVES

1. To provide a comprehensive knowledge about the scientific rearing of the broiler.
2. To enable the students to acquire practical knowledge to manage a profitable small-scale commercial broiler farm.

PRACTICAL WORK PLAN

Current status of broiler and layer industry -Scope of broiler and layer production in India -Commercial strains of broilers and layers- Location and layout of commercial broiler and layer farm Preparation of poultry house, Equipments used in broiler and layer farm- Different system of Management - Deep litter system - Cage system of

management, Raised housing - Litter management, Preparation of brooder house- Brooder Management, Grower management and Layer management- Summer management of broiler and layer- Winter management of broiler and layer- Lighting management, Common procedures followed in broiler and layer farm.-Water – Requirement-Quality analysis and its maintenance-Feeding Management of broilers and layers- Types of feed, Feed ingredients-Quality assessment of feed ingredients and feed-Additive and supplementation of additives-Storage of feed-Feeding Methods-Nutrient requirement of different stages of broilers and layers, Various standards for broilers and layers-Feed formulation-Least cost formulation-Preparation of compound feed-Components in feed mill, Feed mill operations-Hatchery Management-Hatchery layout and design-Hatcher and Setter, Collection and handling of egg, Setting and hatching of eggs and chicks quality assessment-Common disease of broilers and layers-Control and Prevention-Medication and Vaccination in broilers and layers-Different vaccination methods, Cold chain for vaccine-Vaccination schedule for broilers and layers-Postmortem inspection-Disposal of waste -dead birds and manure, Biosecurity measures, Processing of broilers-Slaughtering of broilers and cut up parts of broilers, Evaluation of egg for its quality Record maintenance-Marketing Channels in broilers and layers, Export of egg and poultry meat -Integration method of broilers marketing, Team teaching along with Department of Economics on Economics of broiler and layers farming and Project preparation for broiler and layer farm unit for bank loan, Role of NECC and BCC in marketing of poultry and its products, Visit to commercial broiler farm, layer farm, feed plant, hatchery unit and processing plant.

COURSE OUTCOMES (COs)

1. Practicing various techniques of scientific rearing of the broiler
2. Develop management of brood, litter and feeding etc.
3. Understand the farm economics of broiler.
4. Understand the farm marketing of broiler.
5. Practicing how to prepare an project preparation for broiler and layer farm unit for bank loan.

REFRENCES

1. Bose T.K.S.K. Mitra, M.K. Sadhu, B. Mitra., 2001 Propagation of tropical and subtropical horticultural crops, NayaPrakash 206, BidhanSarani, Calcutta, Six.india.

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1. http://www.horticulture/propagation.com
2. http://www.fruitcrops.propagation.com

AHT 401 - COMMERCIAL HORTICULTURE 10(0+10)

COURSE OBJECTIVES

1. To impart skill oriented practical knowledge on commercial nursery techniques of fruit, vegetable, flower and ornamental crops through experiential learning.
2. To know about the needy hour of greenness of commercial horticulture.

PRACTICAL WORK PLAN

Nursery production of fruit crops: Raising of rootstocks, grafting and budding of rootstocks, management of grafted plants, plant certification, packaging and marketing, quality control. Nursery production of ornamentals: Production of plantlets, production of potted plants, management and maintenance, sale and marketing. Protected cultivation of vegetables and flowers: Nursery raising/procurement and transplanting, management and maintenance of the crop, postharvest handling, quality control and marketing

COURSE OUTCOMES (COs)

1. Students who complete this course will gain practical knowledge and hands on experience in the all the aspects of nursery production fruit crops.
2. Students who complete this course will gain practical knowledge and hands on experience in the all the aspects of nursery production and micro-propagation of vegetable crops.
3. Students who complete this course will gain practical knowledge and hands on experience in the all the aspects of nursery production and micro-propagation of flower crops.
4. Students who complete this course will gain practical knowledge and hands on experience in the all the aspects of nursery production and micro-propagation of ornamental crops.

REFRENCES

1. Hartmann, H.T., D.E. Kester, F.T. Davies and R.L. Greneve. 2006 Plant Propagation. Principles and Practices. Prentice Hall of India Private Ltd., NewDelhi.
2. Bose T.K.S.K. Mitra, M.K. Sadhu, B. Mitra., 2001 Propagation of tropical and subtropical horticultural crops, NayaPrakash 206, BidhanSarani, Calcutta, Six.india.
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2. http://www.fruitcrops.propagation.com
3. http://www.micropropagation/propagationtechniques.com
4. http://www.biotech/tissue culture techniques.com

AHT 402 - FLORICULTURE AND LANDSCAPING 10(0+10)

COURSE OBJECTIVES

1. To strengthen the research farm and nursery activities for under graduate students for practical teaching works in floriculture & landscaping.
2. To initiate the teaching-research in basic and advanced concepts of landscaping and on various flower crops.

PRACTICAL WORK PLAN

Preparation of project report, soil and water analysis, preparation of land and layout. Production and Management of commercial flowers. Harvesting and post harvest handling of produce. Marketing of produce, Cost Analysis, Institutional Management, Visit to Flower growing areas and Export House, Attachment with private landscape agencies. Planning and designing, site analysis, selection and use of plant material for landscaping. Formal and informal garden, features, styles, principles and elements of landscaping. Preparation of landscape plans of home gardens, farm complexes, public parks, institutions, high ways, dams and avenues. Making of lawns, use of software in landscape. Making of bouquets, button hole, wreath, veni and gazaras, car and marriage palaces. Dry flower Technology (identification of suitable species, drying, packaging and forwarding techniques).

COURSE OUTCOME(COs)

1. To Gain the knowledge on Production and Management of commercial flowers.
2. To understand about marketing practices for harvested and post harvested produce.
3. To learn about design and planning of landscaping.
4. To gain knowledge on usage of software in landscape designing.
5. Students will be able to develop their own industries and also attend landscaping jobs with zeal and enthusiasm and confidence independently.

REFERENCES

1. Alex Laurie and Victor H.Ries, 2004. Floriculture Fundamentals and Practices, Agrobios, India
2. Auto CAD. 2004. A problem solving approach, Tickoo, ISBN 1-4018-51339
3. Chadha,K.L, 2001. Handbook of horticulture. ICAR, New Delhi

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2. www.centralfloridagarden.blogspot.com
3. www.intuxford.tripod.com
4. www.lawngrasses.com

AHT403 - FOOD PROCESSING 10(0+10)

COURSE OBJECTIVES

1. To impart knowledge of various areas related to food processing and packaging.
2. To enable the students to understand food composition and its physic chemical, nutritional, microbiological and sensory aspects.
3. To familiarize the students about the processing and preservation techniques of variety of foods.
4. To emphasize the importance of food safety, food quality, food laws and regulations

PRACTICAL WORKPLAN

Planning and execution of a market survey, preparation of processing schedule, preparation of project module based on market information, calculation of capital costs, source of finance, assessment of working capital requirements and other financial aspects, identification of sources for procurement of raw material, production and quality analysis of fruits and vegetables products at commercial scale, packaging, labelling, pricing and marketing of product.

COURSE OUTCOMES (COs)

1. The student should able to define food preservation, understand principle of preservation & learn classification of preservatives.
2. The student should able to learn how to operate different instruments used for microbiology (Incubator, oven, autoclave, water bath etc.).
3. The student should able to understand differences between sun drying and dehydration & learn methods of dehydration
4. The student should able to understand packaging rules, labeling, packaging techniques, bar coding and marketing.

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1. Manual of method of analysis of food(microbial testing) –Food Safety and Standard Authority of India, Ministry of family welfare, Government of India, New Delhi-2012
2. B. Srilakshmi, Food science, New Age Publishers,2002
3. Meyer, Food Chemistry, New Age,2004 .

AHT 404 - AGRICULTURE WASTE MANGEMENT 10(0+10)

COURSE OBJECTIVES

1. To study the nature of different types of wastes and different techniques of preparing enriched composts
2. To know the role of microorganism in composting techniques and study quality standards of compost.

PRACTICAL WORK PLAN

Collection and characterization of solid-wastes – analyzing physical and chemical properties – site selection for composting – infrastructure required for compost making – processing of solid waste for composting – carbon : nitrogen ratio maintenance – selection of microbial inoculum for composting - compost bed formation – windrow method – heap method – application of microbial inoculum – recording compost heap temperature- thermophilic phase and mesophilic phase – turning of compost pile for uniform composting – moisture maintenance in compost pile – assessing reduction in carbon and nitrogen ratio – compost maturity assessment – curing of compost material – value addition through beneficial microbes - Assessing nutritive value of compost – national and international standards for compost quality parameters – project preparation for compost making facility – Marketing of compost products – working out cost benefit ratio for compost production – Record maintenance in compost making.

COURSE OUTCOMES (COs)

1. Understand the Aerobic method of composting
2. Understand the Anaerobic method of composting
3. Enhancing the skills on estimation assessment of maturity of compost by physical and chemical tests.
4. Enhancing the skills on estimation of microbial load of compost by physical and chemical tests.
5. Acquire skills on value addition of compost.

REFERENCES

1. Kelly Smith. 2012. How to build, maintain and use a compost system. Atlantic publishers, Florida.
2. Augustine Afuilio, 2014. Integrated solid waste management. Hand book for Beginners, Planners, Environmentalists, Students and policy makers. Warmra Twechoprise, Nairobi, Kenya.

E- REFERENCES:

1. http.//www.eartheasy.com
2. http.//www.composting council.org
3. http.//www.Epa.gov/compost

AHT 405 - ORGANIC PRODUCTION TECHNOLOGY 10(0+10)

COURSE OBJECTIVE

1. To impart incurring knowledge on various aspects of organic agriculture and its importance in present world scenario and its impact on environment and soil health.
2. To know about the organic agriculture, importance and their productions.

PRACTICAL WORK PLAN

Quantification of cow dung and cow urine recovery per animal and analysis their nutrients constituent. - Methods of storing of cow dung and analysis of temperature, nutrients and microbial load in different layer, Quantification of yield and nutrient content of fodder crops grown organically.- Quantification of biomass for different green manures and green leaf manures grown organically, Experiencing mulching techniques in weed management, Introduction to biofertilizers, equipments and Good Laboratory practices- Preparation of culture media for biofertilizers - Isolation of Rhizobium from root nodules of leguminous plants- Isolation of Azospirillum from roots of cereal crops/ grasses- Isolation of phosphobacteria from soil- Microscopic observation of biofertilizer cultures, Population assessment of bacterial biofertilizers- Method of application of bacterial biofertilizers- Mass production of Arbuscular Mycorrhizal Fungi- Identification of AM propagules in roots and soil- Mass production of Azolla and method of application PPFM and Liquid bioinoculants, Collection, segregation, shredding and quantification of biological wastes/ farm wastes for biocompost and vermicompost preparation and initiating the pre digestion process (15 days), Procuring inputs for preparing the formulations of Panchagavya, Jeevamruth and Effective Microorganisms (EM) -EM to be prepared from mother culture obtained from progressive organic farmers for multiplication- Formation of beds and digging of compost pit of required size based on the availability of the farm wastes. Filling the pit and bed for biocompost, Vermicompost process respectively. Release of earthworms onto the compost bed- Monitoring the composting process for moisture and temperature for efficient composting. Sampling of partially decomposed material for determining the nutritive value especially carbon build up, Harvest of matured composts, quantification and assessment of compost maturity indices and comparing with FAO standards for marketability. Characterization of Panchagavya, Jeevamruth and EM formulations - Preparation of enriched biocompost, vermicompost and FYM using Azospirillum and - Azotobacter or Azophos, Establishment of model pest repellants cafeteria. - Preparation and application of herbal leaf extracts in pest management, Monitoring of insect pests through traps and lures. -Fruit fly trapping survey in horticultural crops, Case study on Agro-Eco System Analysis (AESA).-

Push and Pull Strategies in organic crop protection, Preparation of a bankable project on Establishment of a pilot scale organic manure production unit for obtaining bank loans- Diagnosis of disease symptoms and pathogens and cultural methods of disease management- Disease assessment and scoring, Removal of pathogens like ergot by mechanical methods.- Preparation and foliar spraying of Arappu butter milk extract and foliar spraying of pseudomonas butter milk extract- Preparation and foliar spraying of garlic vasambu extracts- Preparation and foliar spraying of cowdung 20% extract for BLB management, Organic certification – Importance and scope- Procedure for obtaining certification- Post harvest management and value addition, Supply chain management in Organic Farming- Exposure visit to Tamil Nadu Organic Certification Directorate and organic outlets, Preparation of bankable projects- Evaluation of individual and group assignments and report submission- Visit to Nationalized Banks to learn about funding for projects.

COURSE OUTCOME (COs)

1. To understand interaction between different farm enterprises and to gain the information about the impact of organic farming and indigenous practices.
2. Knowledge about Recycle wastes of plant and animal origin in order to return nutrients to the soil, thus minimizing the use of non-renewable resources.
3. Analyze the careful processing methods agricultural products in order to maintain the organic integrity and vital qualities of the product at all stages.
4. Students learn government schemes and the role of NGOs in producing organic products.
5. To understand the procedure followed for organic certification as per NPOP guidelines and to evaluate different resource management techniques in conservation agriculture.

REFERENCE

1. A K Dharma. Organic Farming for Sustainable Agriculture (2nd edition) Agrobios (India), Jodhpur
2. U Thapa and P. Tripathy , Organic Farming in India, Problems and Prospects , Agertech Publishing Academy , Udaipur
3. Arun K.Sharma, A Handbook of Organic Farming Agrobios (India),Jodhpur.

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1. https://www.fao.org/organicag/oa-faq/oa-faq1/en/
2. https://agritech.tnau.ac.in/org_farm/orgfarm_index.html

AHT 406 - COMMERCIAL SERICULTURE 10(0+10)

COURSE OBJECTIVES

1. To inculcate importance of Mulberry production, Silkworm rearing and their Management in relation with entrepreneurship development.

2. To know about the cocoon and silk separation and important things.

PRACTICAL WORK PLAN

Area and distribution of mulberry – Popular Varieties – climatic requirements and soils .Propagation of nursery - Selection of planting material - Nursery bed Preparation -planting - management – Economics. Main field preparation - manuring – planting -Irrigation –Weeding- fertilizers – Intercropping – Training and pruning. Shoot harvest -Transporting - preservation – Economics - project preparation. Pruning methods –farm machinery implements. Insect pests and diseases of mulberry –management. Authorized Silkworm Races – crossbreed and bivoltine. Rearing houses – plan and maintenance. Rearing appliances - disinfection. Agencies involved in egg production - procurement - transportation - preservation– incubation - black boxing – hatching. Brushing of eggs – rearing of chawki worms – leaf selection – feeding – moulting - bed cleaning – bed disinfectants. Chawki Garden – maintenance and management. Estimation of population of chawki - establishing Chawki Rearing Centres - Record maintenance – Transport Fixation of rate. Visit to Chawki Rearing Centre. Late age rearing – tray and shoot rearing methods - leaf selection – feeding - spacing - bed cleaning . Moulting care – bed disinfectants. Mounting and mountages. Spinning care and Harvesting. Calculation of Effective rate of rearing - Transporting and marketing of cocoons- Economics of rearing silkworms. Project preparation for establishing Late age rearing centres. Large scale sericulture farming and contract farming. Physical and commercial properties of cocoons and silk. Cocoon sorting - defective cocoons - cocoon drying - stifling – cooking - brushing - reeling machines - parts and their functions. Study of silk reeling - re-reeling - Skein preparation – packing. Eri silk spinning – spinning - methods. Sampling and testing procedure for winding, size, strength test, condition cohesion and seriplane test. Standards for grading raw silk. Economics of establishing reeling units. Visit to silk reeling unit's automatic silk reeling units.

COURSE OUTCOMES (COs)

1. Knowledge about basic technique in Mulberry production
2. Analyze the Insect pest and disease in Mulberry and their management

3. Knowledge about silkworm rearing methods and their regular maintenance, silk reeling, re-reeling, preparation, packing and management.
4. Understand the Economics of rearing silkworms and maintenance of rearing records
5. Analyze Standards for grading raw silk and Economics of establishing reeling units.

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1. Dandin S.B. Jayant Jayswal and K. Giridhar. 2003. Hand book of Sericulture Technologies. Central Silk Board, Bangalore.
2. Krishnaswami,S., M.N. Narasimhanna, S.K Suryanarayan and S.Kumararaj. 1978. Sericulture Manual 2 – Silkworm Rearing . FAO Agricultural Services Bulletin 15/2. Food and Agriculture Organisation of the United Nations, Rome, 131 p.
3. Somashekar, T.H. and K. Kawakami. 2003. Manual on Bivoltine Silk Reeling Technology. Central Silk Board, Bangalore. 122 p.

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