NEW AND RESTUCTURED
UNDERGRADUATE CURRICULA AND SYLLABUS
for
Agriculture
V.B.S. Purvanchal University, Jaunpur (U.P.)
(B.Sc. (Hons.)-Agriculture

(Semester System as per ICAR 5th Dean CommitteeRecommendations)

w.e.f. 2019- 2020

Submitted by:
Dean &Conveners, Board of studies
Faculty of Agriculture
V.B.S. Purvanchal University, Jaunpur (U.P.)

Resolution

We the undersigned conveners, Board of Studies, faculty of Agriculture, V.B.S. Purvanchal University, Jaunpur (U.P.) have restructured the respective courses as per ICAR 5th Dean Committee Report-2017. The meeting held on 02/08/2019 along with Dr Vashistha Yati, Dean Faculty of Agriculture , V.B.S. Purvanchal University, Jaunpur (U.P.).

Departments Faculty of Agriculture:

1. **Agronomy**
2. **Horticulture**
3. **Genetics and Plant Breeding**
4. **Agricultural Chemistry and Soil Science**
5. **Agricultural Entomology**
6. **Plant Pathology**
7. **Agricultural Engineering and Soil & Water Conservation**
8. **Agricultural Economics**
9. **Agricultural Extension**
10. **Animal Husbandry and Dairying**

The restructured syllabus and curricula of above courses are submitted for your kind approval w.e.f. 2019-20.

Dr. Santosh Kumar Singh (Agronomy)

Dr. Rajaneesh Singh (Horticulture)

Dr.Manoj Kumar Singh (Genetics and Plant Breeding)

Dr. Awadhesh Kumar Singh (Agril. Chemistry & soil Science)

Dr. Indrajeet (Agril. Entomology)

Dr. Yogesh Kumar (Plant Pathology)

Er. Bipin Kumar Jha (Agril. Engineering)

Dr. Arun Kumar Yadav (Agril, Economics)

Dr.Nalinj Kumar Mishra (Agril. Extension)

Dr. Rajesh Kumar Pal (Animal Husbandry and Daiyrying)

Dr. Vashistha Yati (Dean Faculty of Agriculture0

V.B.S..Purvanchal University, Jaunpur (U.P.)

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SUMMARY

It is a well known fact that the Indian Council of Agricultural Research (ICAR) is the apex body for coordinating, guiding and managing the agricultural education and research in the whole country with association of the Education Division. The ICAR, which is an autonomous organization of the country, functions under the Ministry of Agriculture and Famers' Welfare, Govt. of India. Besides agricultural education, ICAR has responsibility for national agricultural system in the entire country.

ICAR is the apex body for quality assurance in higher agricultural education in the country and, thus, strives for maintaining and upgrading quality assurance in higher agricultural education, research and transfer of agricultural technology to farmers. All the Central Agricultural Universities, State Agricultural Universities, Institutions and Deemed to be Universities of the country have been maintaining their standard of quality education in agriculture through ICAR guidelines and recommendations. The most important step for quality improvement of education, the Indian Council of Agricultural Research has been periodically appointing Deans Committees for revision of course curriculum. In the series, Fifth Deans Committee was constituted and given terms of reference considering contemporary challenges for employability of passing out graduates and to adopt a holistic approach for quality assurance in agricultural education.

Considering the fact that the report of the committee needs to be widely accepted, a bottom up approach in respect of curriculum development has been undertaken. To achieve this, inputs from different stakeholders of agricultural education have been obtained at different levels. The Committee has tried to make sure that the report represents a national consensus in respect of various issues that have been flagged to the Committee. The course curricula have been restructured develop much needed skills and entrepreneurial mind-set among the graduates to take up self employment, contribute to enhanced rural livelihood and food security, sustainability of agriculture and be propeller for agriculture transformation. The major recommendations are as listed below:

NEW INITIATIVES PROPOSED BY FIFTH DEANS' COMMITTEE

I. Student READY (Rural and Entrepreneurship Awareness Development Yojana)

In compliance with the Student READY programme launched by the Hon'ble Prime Minister of India on 25th July, 2015, the five components are proposed for conducting one year program in all the UG disciplines.

To reorient graduates of Agriculture and allied subjects for ensuring by assuring employability and develop entrepreneurs for emerging knowledge intensive agriculture the component envisages the introduction of the program in all the Agricultural Universities.

Agricultural colleges as an essential prerequisite for the award of degree to ensure hands on experience and practical training. Considering the variation in different streams of agricultural education and feasibility, the Committee proposes to include following components, which are interactive and are conceptualized for building skills in project development and execution, decision-making, individual and team coordination, approach to problem solving, accounting, quality control, marketing and resolving conflicts, etc. with end to end approach in Student READY program.

i.	Experiential Learning/Hands on Training	-24 weeks
ii.	Skill Development Training	-24 weeks
iii.	Rural Agriculture work Experience	-10 weeks
iv.	In Plant Training/Industrial attachment	-10 weeks
v.	Student Projects	-10 weeks

The students will be required to have any three of the five components listed above depending on the requirement of their graduate education but it should be implemented for the complete year, so that their education upto level of III year may get right information in IV year and finally they should attend right stage of entrepreneurship.

II. Introduction of common courses in all agriculture disciplines

The Fifth deans Committee is of the opinion that some of the courses like Environmental Studies and Disaster Management, Communication Skills and Personality Development, Information and Communication Technology, Entrepreneurship Development and Business Management, Agri-Informatics and Economics and Marketing need to be taught in all the undergraduate programmes of agricultural sciences, as these are must for personality development and to deal with the unforeseen circumstances.

III. Introduction of new degree programs

Since Biotechnology has become an important subject in the field of agricultural sciences, the Committee has recommended introduction of B.Tech. (Biotechnology) course in SAUs. Similarly, Sericulture being an important traditional subject the Committee endorses its inclusion as one of the disciplines in agricultural sciences.

It has been observed that the degree in Home Sciences has been losing its importance in the recent past particularly in terms of limited employability. The Committee has recommended to rechristen the discipline of Home Science to Community Science and introduce one more new course in Food Nutrition and Dietetics under the umbrella of Home Sciences along with B.Sc. in Community Science.

IV. Development of DPRs for establishment of colleges

The Deans Committees have been some minimum standards/requirements of the colleges. Fifth Deans Committee has developed a comprehensive Detailed Project Report (DPR) for establishing a college for each discipline.

V. Holistic distribution of courses

The Committee has distributed the courses in a systematic way so as to teach basic courses first followed by principles and finally skill development it is planned to keep courses related to basic fundamentals in first year. theory/practical's and principles with present state of Art of Technology in second year, modem and frontier area of education in third year and Student READY programme of one year in final year.

VI. Declaring degrees in Agricultural Sciences as professional

Indian council of Agricultural Research constituted a Committee to Review Essential Qualifications and Degree Nomenclature of various programmes running in Agricultural Universities under the chairmanship of Dr RB Lal. This Committee has recommended considering degree in agriculture as professional. The Fifth Deans Committee endorses this view and recommends declaring all degrees in agricultural sciences as professional, like veterinary and Animal Science which include undergraduate in:

1. Agriculture
2. Agriculture Engineering
3. Biotechnology
4. Dairy Technology
5. Fisheries
6. Food Technology
7. Forestry
8. Home Science (Community Science)
9. Horticulture
10. Sericulture

At present, V.B.S.Purvachal University, Jaunpur concerned for the course Agriculture only.

VII. Making implementation of recommendations of Deans Committee mandatory

A lot of efforts are made to improve the quality of agricultural education to make it internationally competitive. Implementations of the recommendations of the Fifth Deans Committee to be made mandatory for accreditation of academic programmes and academic institutions by the National Agricultural Education Accreditation Board (NAEB).

ACADAMIC REGULATIONS

UNDER-GRADUATE PROGRAMME (According to recommendation of Fifth (V) Deans' Committee report)

1. **Degree Nomenclature:** B.Sc. (Hons.) Agriculture, B.Sc. (Hons.) Forestry and B.Sc. (Hons.) Horticulture
2. **System of Education:** Formal education with semester system
3. **Programme Duration**
   - Minimum: 8 Semesters (4 academic years)
   - Maximum: 14 Semesters (7 academic years)

4. Minimum eligibility requirement for admission: Pass in 10+2 examination (Agriculture or Science-Mathematics/Biology group)

4. **Mode of Admission:** Entrance examination at 10+2
5. **Reservation of seats:** Reservation of seats shall be governed by the rules of State government. 25% ICAR seats to be filled through ICAR entrance examination, if ICAR provides students otherwise the seats are filled as per state govt. rule.
6. **Semester Duration:** The minimum duration of 110 working days, consisting of 95 instructional day and 15 examination days.
7. **Credit Definition:** The University adopted the semester based course work and evaluation in the year 1976. One credit is defined as the lecture of 50 minutes (one period) duration or minimum of two-periods (100 minutes) practical/tutorial work per credit are required. However, for many courses where field work is required, one credit requires 3 periods of field work per week.
8. **Medium of Instruction:** English and Hindi both.
9. **Attendance:** 80 per cent. (Relaxation in minimum attendance requirement should be given only in the case of indoor hospitalization).

***Record of class attendance*:** Each Instructor shall maintain a record of the student's attendance in each course taught by him in each semester.

***Minimum class attendance*:** Each student shall be regular in attending classes and shall be required to have a minimum of 80% attendance in each course in each semester, failing which he/she shall not be awarded grade in that course, unless withdrawal from the course is permitted.

The percentage of attendance of a student in course in a semester shall be computed on the basis of the total number of lectures, practical's and tutorials attended by him/her and those actually held between the date of commencement of instruction and the date of closing instruction, irrespective of the date of his/her registration and/or the duration of leave duly granted to him/her.

The Deanmay on the recommendation of the instructor/advisor concerned, though the Head of the Department, condone shortage in attendance up to 5% in a course(s) in exceptional circumstances and allow students with an attendance of 75% or more to appear at the final examination. However, on the recommendation of the Dean, the Vice Chancellor may grant a condonation to the extent of 5% and allow students with an attendance of 70% or more to appear at the final examination. In a very exceptional case, if a student fails to secure even 70% attendance, his case can be referred to the Academic Council through Dean for condonation to the extent of further 5% and allow students with an attendance of 65% or more.

Notes

1:- *In computation of percentage of attendance, fractions of 0.5 or above shall be counted as 1.*

2:- *If student is called upon to repeat a course but/she has already put in required attendance in that course on a previous occasion, above requirements of attendance will not apply in his/her case.*

3:- *Whenever students resort to mass absence from classes, a fine of Rs. 15.00/ student/day may be levied from all such students. All such students will have to pay this fine before the final examination of the next semester and failure to do so shall render them liable to be debarred from appearing in the examination.*

10. **Course Curriculum and minimum credits requirement:**The ICAR Model Course Curriculum and Syllabus has been followed to meet regional requirements. The minimum credit requirement for the graduate degree should be **183 credits** for Math/Bio and **184 credit** for Agriculture including non-gradial and remedial courses.
11. **Advisement:**
    (a) Student freshly admitted as well as continuing students shall present themselves in the beginning of each semester on dates notified by the Registrar for advisement and shall be assigned in groups to staff. Advisors/course instructors are nominated by the Dean Agriculture/Principal.
    (b) The advisor shall help the UG student in planning the programme of their studies and the choice of courses. He shall also guide the student in determining the credit load, which he can safely and conveniently carry in each semester and shall advise him regarding adding of or withdrawal from the course during a semester. Each Advisor shall maintain a close contact with his student and keep himself informed of their progress. Problem cases needing special measures shall bring to the notice of the Dean by the Advisor.
12. **Registration:**Following advisement as prescribed above, registration of candidates selected for admission and also of continuing students shall be completed on schedule date(s) notified earlier by Registrar for each semester.

    Mode of Registration: Registration shall consist of the following steps:

    1. Payment of the University fee and other dues.
    2. Enrolment of the students in various courses with individual instructors at particular place, date and time.

       I, Registration of fresh students: Registration for the first Semester of the year of a degree programme is part of admission procedure and shall be governed by the admission rules. Admission of new students so fallen vacant shall be offered to the candidates in the waiting list.

II.Registration of continuing students: Registration of continuing students in the subsequent semesters shall be held in a similar way on the date time notified by the Register/Principal

II. Late registration: A continuing student, who does not register on the day of registration, shall be required to pay a prescribed the registration fee for the first day and further prescribed fee for subsequent two days.

Note: *If under special circumstances, a student is unable to present him/self herself for registration, he/she may, with the prior permission of the Principal permitted to deposit his/her fee by the prescribed date through his/her representative. However, he/she should present himself/herself for registration within a period of 10 days from the initial date of the registration on payment of a prescribed late fee failing which he/she will not be allowed registration in that semester.*

(i) Registration necessary for award of degree: In case, a student studies a course without registration in the prescribed manner, he/she will liable to be summarily dropped from the University.

13. Examination and Evaluation System

Examination

- External theory (50%)(Internal or external examiner)
- Internal Theory+Practical (50%)

➢ **Courses with Theory and Practical**
Mid-term Examination (20%) + Assignment (5%) in practical oriented courses + Practical(25%). (Practical examination will be conducted by internal and external examiner as per the instruction of University). Mid-term examination will be conducted by the University/College as per rules/schedule and instruction given by Registrar of the University.

➢ **Courses with only Theory**
Mid-term Exam (40%) + Assignment (10%)

➢ **Courses with only Practical:**(100%) Examination will be conducted by Internal and / or external examiner as per the instruction of the University.

- Paper to be set by external/Internal: Incharge of the department shall ensure the coverage of syllabus. If needed moderation can be done.
- Evaluation to be done external/internal examiner. Syllabus of the concerned course shall be sent to the external examiner, who shall prepare the question papers. For practical, it is recommended that examination shall be conducted by course instructor(s) nominated by University/ Principal of the College.

Evaluation of Experiential Learning Programme/HOT (Hand on Training)

S.No.	Parameters	Max. Marks
1.	Project Planning and writing	10
2.	Presentation	10
3.	Regularity	10
4.	Monthly Assessment	10
5.	Output delivery	10
6.	Technical Skill Development	10
7.	Entrepreneurship Skills	10
8.	Business networking skills	10
9.	Report Writing Skills	10
10.	Final Presentation	10
	Total	**100**

Evaluation and Grading

Percentage of Marks Obtained	Conversion into Points
100	10 Points
90 to <100	9 to <10
80 to <90	8 to <9
70 to <80	7 to <8
60 to <70	6 to <7
50 to <60	5 to <6
<50 (Fail)	<5
VIZ. 80.76	8.076
43.60	4.360
72.50 (but shortage in attendance)	Fail (1 point)

OGPA	Division
5.000-5.999	Pass
6.000-6.999	II division
7.000-7.999	I division
8.000 and above	I division with distinction

GPA = Total points scored/Total credits (for 1 semester)

CGPA = ∑Total Points Scored / Course credits

OGPA = ∑Total Points Scored (after excluding failure points/ Course credits

% of Marks= ∑OGPA x 100/10

FINAL EXAMINATION: Final examinations shall be held on the dates, which shall be notified by the Registrar either in the University calendar or at the beginning of each academic year or otherwise. If a student fails to appear in the final examination of semester, he will not be allowed for registration in the next semester. Such student will repeat the semester when it runs. However, this rule is not applicable for that student who has been permitted for makeup examination by the competent authority.

PREPARATION OF EXAMINATION SCHEDULE: The Mid-term and Final examination schedule shall be prepared and notified by the Registrar ten days before the commencement of the examination.

SEATING ARRANGEMENT: The Dean/Principal of the college shall conduct the examination and the respective centre superintendents shall make the seating arrangements.

SUPPLY OF EXAMINATION MATERIAL

(1) Examination materials such as answer books twine, drawing papers, log tables, graph papers etc. will be supplied by the Registrar/Centre Superintendent.
(2) Every student shall be required to bring examination materials such as set squares, scales, pen, pencils, high liters etc. as he shall not be permitted to borrow any of these materials from fellow students in the examination hall.

APPEARING IN THE FINAL EXAMINATION: Candidates coming late by more than 30 minutes in the Final Semester examination shall not be allowed to appear in that examination and no examinee shall be allowed to go out of the examination hall for the first 30 minutes.

MAKE-UP EXAMINATION: In case a student is seriously ill either in the campus and produces a medical certificate from CMO of district has or is hospitalized elsewhere and is unable to attend his examinations, the Registrar may permit him to appear in more than one make-up examination but not more than two make-up examinations during any one Semester.

MID TERM AND FINAL EXAMINATION: Normally no make-up examination shall be permissible in lieu of the missed mid-term or final examination except as permitted by Dean/Registrar of the university.

(i) If a student fails to appear in any mid-term examination for reasons beyond his/her control, he/she must file an application on the day on which the examination is missed.
(ii) As far as possible, make-up examination shall be discouraged, Only in extremely genuine cases like hospitalization, a student can be permitted by the Dean/Registrar to appear at the make-up examination in the mid-term examinations.
(iii) Dean/Registrar is empowered to allow a student for make-up only in mid-term examination, if he/she fulfills the requirements.

Note: The Student can be permitted to appear at the make-up examination only in extremely genuine cases, on the following grounds:

(a) If he/she is seriously ill.
(b) If he/she has taken leave on account of the death of his mother, brother, sister, spouse, child or grandparent.
(c) Any other genuine cause with which the Dean/Registrar is satisfied. Such cases should be reported to the Registrar.

(d) Only one make-up examination will be permissible during a semester but not more than two.

1. The application for make-up examination must be supported by medical certificate either from the CMO or from the hospital concerned and should be routed through/advisor/Principal.
2. No application for make-up examination shall be considered if received after one week from the expiry of the last date of mid-term examination.
3. Make-up examination must be completed within one week from the date of grant of permission by the Dean. It will be the responsibility of the student to get in touch with his/her teacher and have a date fixed for the make-up examination after necessary permission is granted.
4. Result of make-up examination will count along with the previous performance of the student during the term for awarding the final grade in course concerned.

Restriction for students going out on educational tours and extra-curricular activities: The educational tours and extra curricula activities may be organized in such a way not to disturb the academic programme particularly the final examination. As far as possible such programmes should be organized during semester break.

14. SCRUTINY:

1. Scrutiny means totaling of marks and evaluation of questions left unmarked.
2. If any student desires scrutiny in any course, he shall be permitted to do so with a prescribed scrutiny fee per course.
3. He/she shall have to file an application on the prescribed form which can be obtained from the office of the Registrar within a period of 7 days from the date of registration in the semester, failing which no such applications shall be entertained.
4. After having the approval of the Registrar, he/she will present the form to the instructor concerned.
5. The answer book shall be scrutinized by the instructor concerned in collaboration with Head of the Department/Dean, Agriculture.
6. The result of scrutiny shall be intimated to the Registrar as soon as possible but in no case later those three weeks from the date of registration.
7. The result of the scrutiny shall be final.

CHANGE OF GRADE AS A RESULT OF SCRUTINY: After the grade has been revised as a result of scrutiny, the instructor will send the grade through his/her Incharge of the Department to the Registrar/the Dean.

15. USE OF UNFAIR MEANS (UFM):

(1) The terms “use of unfair means in the examination” or “attempt to use unfair means in the examination” shall denote the items prescribed by the Academic Council, through its resolution, from time to time. The following items are included in this category-

(a) Possession of any books, notes, chits, or such other material and also any notes or signs written on any part of the body, furniture or any other material pertaining to the subject matter of the examination in the examination hall during the examination hours.

(b) Talking, whispering or signaling in any form in the examination hall or outside the examination hall during the examination hours.

(c) Copying or allowing to copy.

(d) Any other activity which may give undue advantage in the examination to any student.

(e) Any attempt to use any other means, which in the opinion of the Superintendent of examination may be considered to be unfair.

(2) **Unfair means in examination:** The Dean/Principal of the college in which the student is registered shall be responsible for dealing with all the cases of use of unfair means in the semester test and examinations. In this matter, a Committee consisting of the Dean and two professors/Instructors of the College shall assist the Dean. This Committee shall be constituted by Vice Chancellor every year. The committee shall take appropriate action after effecting full opportunity to the student for his defense and the penalty will be as indicated below.

(a) A student if found using unfair during mid-term examination, he will be awarded zero in mid-term examination.

(b) A student found unfair means during the final examination shall be punished as under-

(i) If the material found with the student is related with the course and the student has not used it, he would be awarded 'F' grade in that course.

(ii) If the student has used the material found with the student he will be awarded 'F' grade in all the courses in the semester.

(iii) A student found to appear in the examination in place of another student would be treated under unfair means. Such student will be summarily expelled from the University.

(c) If a student repeats the offence more than twice, during a particular degree programme, he will be disqualified for being a student in this University and shall be immediately removed from College.

(3) The instructor/invigilators concerned shall report to the Dean/Principal through the Head of the Department/Principal/Superintendent of Examinations on the day of occurrence of cases of unfair means with full details of the evidence and/ or exhibits. An explanation of the student concerned, if possible, shall also be submitted.

16. REPETITIONS OF COURSES:

A- If a student secures 'F' grade, he shall be repeat the course whenever the university offers it.

B- In case a student obtains 'F' grade in a course and repeats it, the grade secured by the student on repeating the course shall be reflected in the grade report.

C- If a student secures 'F' grade a course and fulfills attendance requirement, he may be permitted by Dean to take re-examination of that course after six month in the semester in which the said course is being offered. However, the student shall submit his application for permission within a month from the date of registration with prescribed fee.

Just after announcement of results, the Register will communicate the list of students, who have obtained 'F' the University is offering grade in the course. The Dean will notify that such students have to appear in first offered opportunity by the University. Even after notification of a student fails to appear in the first offered opportunity he/she will lose one chance of repeat

STUDENTS' DESCIPLINE and HOSTEL REGULATIONS

(A) REGULATIONS FOR STUDENTS' DISCIPLINE:

1. Every student shall assume a sense of responsibility to the ordinary rules of good conduct, to protect private and public property and to make most effective use of his/her time in securing education at the University.
2. No custom or regulation which restricts or creates hindrance in making best use of students' time and talent towards University education, will be allowed to prevail.
3. The students are required to be regular and punctual at lectures and practical in each subject and will be granted leave at their own risk, as they are themselves responsible for completing the prescribed attendance in order to qualify for the University examinations. However, if no leave application in received and the student remains absent for ten days or more continuously from class/admission/registration may be cancelled. The Head/In-charge of Department shall report such cases to Dean/Principal and registrar of the University.
4. Student shall not be eligible for appearing at the University examinations unless he/she paid all the outstanding dues.
5. Person(s) cannot be invited to address or participating in any meetings within the University or hostel premises without the written permission of the Dean/DSW/Principal of the college.
6. If any collection of money for any fund or function shall be made without permission. The organizing committee concerned shall maintain proper account of money collected and the same shall be submitted to the Dean of Faculty/Principal 15 days after the function is over.
7. No student(s) shall be allowed to associate with or to attend any type of illegal activity and/or unauthorized meeting or society outside the campus or for collection of money for any such fund or functions without obtaining permission from Dean of Faculty/D.S.W./Principal.
8. Students are strictly forbidden to resort to or instigate a strike, hunger strike, picketing, demonstrations including political demonstration, unlawful assemblies' unauthorized processions, shouting of objectionable slogans, carrying of placards within the campus, hostels or at residences of officers/staffs.
9. Sticking of posters, distribution of handbills either within or outside the University/College campus is forbidden unless the competent authority has granted permission for students' union election.
10. It is compulsory for every student to obtain his identity card in the manner prescribed by the University/College All students shall get their residential address recorded in the office

of the Dean/College and shall notify any change of address, which may take place subsequent to the registration.

11. When a student has been found guilty of grave misconduct of persistent idleness or of habitual breach of discipline within or outside the premises of the University, the Vice-chancellor on the advice of discipline committee may, according to the nature and gravity of the offence, summarily cancel the registration of a student during a semester/session and may not permit the student to register for any number of subsequent semesters/sessions.
12. Punishment awarded to students shall invariably be recorded in their personnel record for future reference and will be taken into consideration, if necessary, while awarding certificate of conduct on leaving the University.
13. Students are expected to maintain a high standard of discipline on the campus.

The following are the detailed outlines of student's indiscipline:

- Disregard of college/hostel rules, orders & notices.
- Disregard of orders and instructions of the member of college staff.
- Noisy, boisterous, disorderly and obnoxious behavior with fellow students and staffs.
- Ragging of junior students, which are strictly banned.
- Irregular attendance and unauthorized absence from classes and hostels.
- Lack of punctuality in attendance and in payment of college dues.
- Recourse to unfair means in tests and examinations.
- Recourse to false or fraudulent statements or acts.
- Keeping, carrying and supplying of any fire arms, lethal weapons, knife with a blade of more than 4" in the room or outside.
- Keeping, using, or supplying intoxicants in any form.
- Gambling in any form.
- Demonstration in any form including processions and meeting, except student union election.
- Strike or hunger strike.
- Boycotting of a University function, programme or activity.
- Abusing.
- Recourse to violence, intimidation, riots.
- Any breach of law of the Country of the State, Act, Statues, Regulations or Rules of the University or orders of a competent authority.
- Disturbing other students in their studies.
- Damaging any University property/College property.
- Failure to produce identify card on demand by a member of staff, warden etc. in and outside the campus at any time and place within the college, hostel and town.
- Gainful paid employment adversely affecting the studies.
- Un-sportsman like behavior in indoors and outdoors games.

- Any act specifically forbidden by the wardens, Dean, D.S.W. or any officer of the University.

14. Students(s) who has/have committed any cat or indiscipline is liable to any one or more of the following punishments.

- Warning.
- Reduction/Cancellation of scholarship/stipend/fellowship.
- Fine.
- Recovery in part of full of losses or damages to the college property or property of others caused by the students.
- Suspension from availing any of the college amenities and services or from class.
- Removal, rustication or expulsion from the college, hostel or university.

15. Any student who violates any regulation or otherwise indulges in any act of indiscipline as defined may be fined up to Rs. 100/- by the warden of the hostel if the warden is satisfied that the fine is adequate, punishment for the act fo indiscipline.
16. Cases of indiscipline, which in the opinion of the proctors of college/principal of the college are so serious that a fine of Rs.100/-or less would not be sufficient, punishment shall be referred by the wardens to Dean/D.S.W. principal for taking disciplinary action against the students. board or a committee proctors consisting of all wardens proctors of the college may fine up to Rs.1500/-and this shall be noted on the students' permanent record card but shall not go necessarily on the character certificate. In addition, the student may also be placed on conduct probation. This will include and official warning to student that one more incident of indiscipline might lead to the dismissal of the student from the University. Any student during this period when he/she is on conduct probation will not be entitled for any financial aid and shall not represent university/college or anywhere.
17. On the basis of complaint(s) received against any student, if the Dean/principal is convinced, pending enquiry and final orders, the alleged/involved student(S) may also be placed on conduct probation.
18. Cases of more serious indiscipline shall be forwarded to the Vice-chancellor who on the recommendation of the disciplinary committee shall award adequate punishment.(s).
19. Students found directly or indirectly involved in ragging of newly admitted students inside or outside the campus will summarily by expelled from the college/university.
20. For indiscipline on playground, games president may fine students(s)up to Rs.100/-each and/ or debar a student from game (s) for up to two semesters/one session. For debarring, approval of Dean Students Welfare/ Principal will have to be obtained.

(B) READMISSION BY SUSPENSION OF PUNISHMENT SHALL INVARIABLY BE SUBJECT TO THE FOLLOWING CONDITIONS:

1. The student concerned will be re-admitted not as a matter of right but only on compassionate ground, on the submission of an unconditional apology
2. He/she will remain on conduct probation during the remaining period of his/her stay in the University.

3. He/she will furnish a bond of good behavior as prescribed, duly countersigned by his/her parent/guardian, which should remain operative for the entire period of his stay in the college or university.
4. He/she will not apply nor will be entitled to admission to any new degree proramme in the University/College.
5. If the student concerned has been permanently dismissed, he/she will be entitled to apply for relief under this regulation only after the expiry of two semester/one session from the date of orders of punishment, but in no case will be entitled to readmission before the expiry of less than four semesters/two sessions from the effective date of punishment.
6. No Student shall be eligible for seeking relief under this regulation unless he has completed at least two semesters/one session satisfactorily in college/University prior to being awarded the punishment of permanent dismissal.
7. No student shall be eligible to seek or be granted relief under the regulation if he/she commits any act of indiscipline in the college/university campus or misbehaves with any officer or teacher of the College/University within campus or outside during the period laid down in clause(5) above:

(C) HOSTEL RULES:

1. Allotment of hostel rooms to the students will be entirely the discretion of the wardens. The warden may change the allotment as and when they think necessary to do so. No change from one room to another or the partnership shall be allowed except under special circumstances by prior written approval of the warden.
2. After a student is admitted to the College/University, it is compulsory for him to reside in the hostel maintained or recognized by the University except those living either with their parents or guardians within or outside University campus. Such students who do not want to reside in the hostel from the D.S.W./Dean must obtain written permission. On being admitted to the University, a student has to deposit a sum of Rs. 200/- payable in two installments or Rs. 100/- each to be paid at the time of registration of first two semester besides other dues, which shall be refundable to him/her when he/she vacates the hostel after clearing the dues.
3. The Dean/D.S.W./Warden of the hostels reserve the right to refuse admission in the hostels without assigning any reason to a student who's living in the hostel is considered pre judicial to the general discipline in the hostels.
4. The warden or any other official of the University competent or deputed shall open all the rooms in the hostel for inspection for the purpose at any time.
5. When required by the wardens for specific reasons, the student residents shall vacate the room temporarily or otherwise. In case of refusal, the wardens shall have power break open the room and get the room vacated.
6. The students must be present in their rooms at the time of roll call, which be taken every night between 9.30 and 10.00 P.M. by the prefects who will be appointed by the wardens. Any student found absent without permission is liable to fine up to 5/- per night of absence and/or disciplinary action. The cashier would realize the fine as fees on the report of the

warden. Guardians of the students or the respective State Governments, as the case may be, will be informed. If unauthorized absence exceeded 15 days, the allotment of the room will be cancelled and hostel room rend will be forfeited.

7. When the warden finds a student frequently out during night without permission, he/she will, apart from imposing the usual fines, issue a warning to him/her if the warning has no effect on the students, Dean/D.S.W. on the recommendation of the warden may expel the student from the hostel or may take such other disciplinary action as he deems proper.
8. Before leaving the hostel for the night or for the holidays excluding semester breaks and summer vacations, the student must obtain prior permission of the warden on prescribed hostel permit slips.
9. No student shall quarrel or misbehave with any fellow student or employee of the hostel including dhobi, barber, chowkidar, sweeper, servant, maintenance staff, mess worker and cook etc. Any misbehavior on the part of the employees or fellow students shall be brought to the notice of the warden and the concerned student is liable to disciplinary action.
10. No meeting shall be held within the premises of the hostel without the prior permission of the warden. Disciplinary action will be taken against students who organize or attend such unauthorized meetings, except student's union election, outside of hostel.
11. If a student defaces or causes damage to the building, furniture of fitting, the cost or repair or replacement shall be recovered from him.
12. Friends and relatives of the students may visit them in the hostels during the daytime only. Non-authorized person is allowed to stay at night in the hostel after 10pm. If, however,parents/guardians or other guests of the students have to stay, the students must take permission from D.S.W./Dean on the recommendation of the wardens. This facility will be available in Teacher's/ Farmer's guesthouse University/ College accommodation. If any for a period of maximum of three days only.
13. No guests of opposite sex are allowed to stay or visit the hostel at any time under any circumstances.
14. Students shall not shift fittings assigned to the rooms. When leaving for vacation, these must be handed over to the storekeeper or his/her representative. During the period of allotment of room, the student will be responsible for all property in the room.
15. No fire combustible articles,arms or lethal weapons are allowed to be kept in the hostel.
16. No resident student shall keep in his possession or use intoxicating drugs or liquor of any kind. Gambling or playing cards in any form in the hostel in strictly prohibited.
17. Students are not allowed to have their own recreational appliances viz. radio, transistor, tape recorder/ player, T.V. etc.
18. Students felling sick should inform the Medical Officer/any officer of the university/college under intimation to the warden.
19. Resident students would observe cleanliness around their surroundings and should keep their rooms neat and tidy.

20. Watchman/securityguard of hostels watch and wards of the University/College property. No student in any circumstances should ask the Watchman/securityguard to do any other work.
21. Students shall have to take care of their belongings themselves and are advised not keep any costly items with them in the hostel./ any officer of the university/college.
22. No electric point should be left on while locking the room at any time.
23. Students are not permitted to have electric heaters in their rooms. In case any student found in using electric heaters, a penalty of Rs. 1000/-is fined from the concerned student.
24. Cooking in any form is not allowed in the hostel room.

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B.Sc. (Hons.)-Agriculture

Restructuring of UG programmes

Examination and Evaluation System

1. Marks Distribution Pattern

The total marks of each course will be divided as:-

(1) Courses with theory and practical: the marks of courses with both theory and practical will be distributed in mid-term, theory and practical examination in 20, 50 and 30 percent respectively.

(2) Courses with theory only: mid-term and theory examination in 40 and 60 percent respectively.

(3) Courses with practical only: 100 percent marks for practical examination

2. Examination

(i) Mid-term examination-Conducted by internal

(ii) Theory (semester) examination-The paper setting and evaluation of answer book will be comprised 80 % from internal University examiner and 20% from outside of University examiner.

(iii) Practical examination-The practical examination will be followed similar pattern of theory examination.

3. **Repetition of courses**

If a student fails in any course he/she will get two opportunities to pass the course in consecutive years.

If a student fails in more than four papers in a semester he/she will not be promoted in the next semester.

If a student fails more than eight course he will have to repeat the courses by taking admission again .

To attain the final degree a student has to pass all the course of each semester.

If a student is promoted in all the semesters and is failed in one course he/she will gets three (3)grace marks.

Discipline-wise Courses

Discipline	Course No.	Course title	Credit Hours
Agronomy			
1	**Ag- 106**	Fundamentals of Agronomy	4(3+1)
2	**Ag- 210**	Agricultural Heritage	1(1+0)
3	**Ag- 301**	Crop Production Technology – I (*Kharif*crops)	2(1+1)
4	**Ag- 401**	Crop Production Technology – II (*Rabi* crops)	2(1+1)
5	**Ag- 502**	Farming System & Sustainable Agriculture	1(1+0)
6	**Ag- 507**	Practical Crop Production - I *(Kharif*crops*)*	2(0+2)
7	**Ag-508**	Rainfed Agriculture & Watershed Management	2(1+1)
8	**Ag- 605**	Practical Crop Production - II *(Rabi* crops*)*	2(0+2)
9	**Ag- 607**	Principles of Organic Farming and Precision Farming	2(1+1)
10	**Ag- 411**	Weed Management (Elective Course)	2(1+1)
			20

Genetics and Plant Breeding			
1	**Ag-102**	Fundamentals of Crop Physiology and Taxonomy	3(2+1)
2	**Ag-201**	Fundamentals of Genetics	3(2+1)
3	**Ag- 206**	Principles of Seed Technology	3(2+1)
4	**Ag- 302**	Fundamentals of Plant Breeding	3(2+1)
5	**Ag- 405**	Biotechnology	2(1+1)
6	**Ag- 504**	Crop Improvement-I (*Kharif*crops)	2(1+1)
7	**Ag-604**	Crop Improvement-II (*Rabi* crops)	2(1+1)
8	**Ag- 606**	Environmental Studies and Disaster Management**	3(2+1)
9	**Ag- 610**	Intellectual Property Rights	1(1+0)
10	**Ag- 612**	Commercial Plant Breeding (Elective)	3(1+2)
			25
Soil Science and Agricultural Chemistry			
1	**Ag-103**	Fundamentals of Soil Science	3(2+1)
2	**Ag-203**	Manures, Fertilizers and Soil Fertility Management	3(2+1)
3	**Ag- 305**	Fundamentals of Plant Biochemistry	3(2+1)
4	**Ag- 404**	Problematic soils and their Management	2(1+1)
5	**Ag- 408**	Agricultural Microbiology	2(1+1)
6	**Ag- 506**	Geo-informatics and Nanotechnology	2(1+1)
7	**Ag- 512**	Agrochemicals(Elective)	3(2+1)
8	**Ag- 411**	Biopesticides and Biofertilizers(Elective)	3(2+1)
			21
Agricultural Economics and Statistics			
1	**Ag-108**	Fundamentals of Agricultural Economics	2(1+1)
2	**Ag-209**	Agri- Informatics and Computer Application	3(2+1)
3	**Ag- 303**	Statistical Methods	2(1+1)
4	**Ag- 306**	Agricultural Finance and Co-Operation	3(2+1)
5	**Ag- 406**	Agricultural Marketing Trade & Prices	3(2+1)
6	**Ag- 511**	Farm Management, Production & Resource Economics	3(2+1)
7	**Ag-611**	Agribusiness Management	3(2+1)
8		Elementary Mathematics (Elective)	2(2+0)
			19
Plant Pathology			
1	**Ag- 204**	Fundamentals of Plant Pathology	4(3+1)
2	**Ag-309**	Diseases of Field and Horticultural Crops and their Management-I	3(2+1)
3	**Ag- 410**	Diseases of Field and Horticultural Crops and their Management-II	3(2+1)
4	**Ag- 501**	Principles of Integrated Pest and Disease Management	3(2+1)
			13
Entomology			
1	**Ag- 101**	Fundamentals of Entomology	3(2+1)
2	**Ag-310**	Insect Systematic and IPM	2(1+1)
3	**Ag- 503**	Pests of Crops and Stored Grain and their Management	3(2+1)
4	**Ag- 603**	Management of Beneficial Insects	2(1+1)
			10

Horticulture			
1	**Ag- 205**	Fundamentals of Horticulture	3(2+1)
2	**Ag- 304**	Production Technology for Fruit and Plantation Crops	2(1+1)
3	**Ag-402**	Production Technology for Vegetables and Spices	2(1+1)
4	**Ag- 412**	Hi-tech Horticulture & Micro Propagation	3(2+1)
5	**Ag- 510**	Production Technology for Ornamental Crops, MAP and Landscaping	2(1+1)
6	**Ag- 608**	Post-harvest Management and Value Addition of Fruits and Vegetables	3(2+1)
7	**Ag- 612**	Landscaping	3(2+1)
8	**Ag-512**	Micro propagation Technology	3(2+1)
			21
Agricultural Engineering& Soil Conservation			
1	**Ag- 109**	Farm Machinery and Power	3(2+1)
2	**Ag- 403**	Renewable Energy and Green Technology	2(1+1)
3	**Ag-602**	Protected Cultivation and Secondary Agriculture	2(1+1)
4	**Ag-104**	Introductory Agro-meteorology & Climate Change	2(1+1)
5	**Ag-202**	Introductory Soil and Water Conservation	3(2+1)
6	**Ag-601**	Introduction to Forestry	3(2+1)
7	**Ag- 512**	System Simulation and Agro advisory (Elective Course)	3(2+1)
			18
Agricultural Extension and Communication			
1	**Ag- 105**	Comprehension & Communication Skills in English	2(2+0)
2	**Ag-207**	Fundamentals of Agricultural Extension Education	3(2+1)
3	**Ag- 307**	Communication Skills and Personality Development	2(1+1)
4	**Ag- 407**	Rural Sociology & Educational Psychology	2(2+0)
5	**Ag- 505**	Entrepreneurship Development and Business Communication	2(1+1)
6	**Ag- 612**	Agricultural Journalism (Elective)	3(2+1)
			14
Animal Husbandry and Dairying			
1	**Ag- 107**	Introductory Animal Husbandry	2(1+1)
2	**Ag- 208**	Livestock , Production and Management	3(2+1)
3	**Ag- 308**	Dairy Technology	3 (2+1)
4	**Ag- 409**	Principles of Food Science and Nutrition	3(2+1)
5	**Ag- 509**	Poultry Production and Management	3(2+1)
6	**Ag-609**	Food Safety and Standards (Elective)	3(2+1)
			17

Some Courses will be Conducted by the participation	
Environmental Studies & Disaster Management** 1- Department of Agricultural Chemistry and Soil Science 2- Department of Genetics and Plant Breeding	3(2+1)
Agricultural Microbiology**	2(1+1)
NSS/NCC/Rovers & Rangers/Physical Education & Yoga Practices 1-N.S.S./N.C.C./ Rovers & Rangers 2-Department of Physical Education / Games	2(0+2)
Comprehension & Communication Skills in English 1-Department of English 2-Department of Agriculture Extension	2(1+1)
Educational Tour Faculty of Agriculture	2(0+2)

Educational tour will be conducted in break between IV & V Semester or VI & VII Semester

B.Sc (Hons.)-Agriculture
As per ICAR Vth Dean Committee Recommendation
Semester-wise distribution of courses

I- Semester

S.N.	Course Code	Title of the Course	Credit
1	Ag -101	Fundamentals of Entomology	3(2+1)
2	Ag -102	Fundamentals of Crop Physiology and Taxonomy	3(2+1)
3	Ag -103	Fundamentals of Soil Science	3(2+1)
4	Ag -104	Introductory Agro-meteorology & Climate Change	2(1+1)
5	Ag -105	Comprehension & Communication Skills in English	2(2+0)
6	Ag -106	Fundamentals of Agronomy	4(3+1)
7	Ag -107	Introductory Animal Husbandry	2(1+1)
8	Ag -108	Fundamentals of Agricultural Economics	2(1+1)
9	Ag -109	Farm Machinery and Power	3(2+1)
10	Ag -110	Human Values & Ethics (non-gradial) **	1(1+0) **
11	Ag -111	NSS/NCC/Rovers & rangers/Physical Education & Yoga Practices**	2(0+2) **

Non-gradial course **TOTAL- 24 +3= 27

II Semester

S.N.	Course Code	Title of the Course	Credit
1	Ag -201	Fundamentals of Genetics	3(2+1)
2	Ag -202	Soil and Water Conservation	3(2+1)
3	Ag -203	Manures, Fertilizers and Soil Fertility Management	3(2+1)
4	Ag -204	Fundamentals of Plant Pathology	4(3+1)
5	Ag -205	Fundamentals of Horticulture	3(2+1)
6	Ag -206	Principles of Seed Technology	3(2+1)
7	Ag -207	Fundamentals of Agricultural Extension Education	3(2+1)
8	Ag -208	Livestock Production and Management	3(2+1)
9	Ag -209	Agri-informatics and Computer Application	3(2+1)
10	Ag -210	Agricultural Heritage	1(1+0) **

TOTAL28+1=29

III Semester

S.N.	Course Code	Title of the Course	Credit
1	Ag -301	Crop Production technology-I (Karif crops)	2(1+1)
2	Ag -302	Fundamentals of Plant Breeding	3(2+1)
3	Ag -303	Statistical Methods	2(1+1)
4	Ag -304	Production Technology Fruits and Plantation Crops	2(1+1)
5	Ag -305	Fundamentals of Plant Biochemistry	3(2+1)
6	Ag -306	Agricultural Finance and Cooperation	3(2+1)
7	Ag -307	Communication Skills and Personality Development	2(1+1)
8	Ag -308	Dairy Technology	3(2+1)
9	Ag -309	Diseases of Field and Horticultural Crops and their Management-I	3(2+1)
10	Ag -310	Insect Systematics and IPM	2(1+1)
			TOTAL 25

IV Semester

S.N.	Course Code	Title of the Course	Credit
1	Ag -401	Crop Production Technology –II *(Rabi Crops)*	2(1+1)
2	Ag -402	Production Technology of Vegetables and Spices	2(1+1)
3	Ag -403	Renewable Energy and Green Technology	2(1+1)
4	Ag -404	Problematic Soils and their Management	2(1+1)
5	Ag -405	Biotechnology	2(1+1)
6	Ag -406	Agricultural Marketing Trade and Prices	3(2+1)
7	Ag -407	Rural Sociology and Educational Psychology	2(1+1)
8	Ag -408	Agricultural Microbiology	2(1+1)
9	Ag -409	Principles of Food Science and Nutrition	2(2+0)
10	Ag -410	Diseases of Field & Horticultural Crops and their Management–II	3(2+1)
	Ag- 412	Highi-tech-horticulture& Micro Propagation	4(3+1)
11	Ag – 411	Elective Course-/Biopesticides and Bifertilizers/Weed Management	3(2+1)
12	Ag - 413	Educational Tour (Compulsory)	2(0+2)
			TOTAL 31

V Semester

S.N.	Course Code	Title of the Course	Credit
1	Ag -501	Principles of Integrated Pest and Disease Management	3(2+1)
2	Ag -502	Farming System & Sustainable Agriculture	1(1+0)
3	Ag -503	Pests of Crops and Stored Grain and their Management	3(2+1)
4	Ag -504	Crop Improvement-I *(Kharif Crops)*	2(1+1)
5	Ag -505	Entrepreneurship Development and Business Communication	2(1+1)
6	Ag -506	Geoinformatics and Nano-technology	2(1+1)
7	Ag -507	Practical Crop Production – I (*Kharif*crops)	2(0+2)
8	Ag -508	Rainfed Agriculture & Watershed Management	2(1+1)
9	Ag -509	Poultry Production and Management	3(2+1)
10	Ag -510	Production Technology for Ornamental Crops, MAP and Landscaping	2(1+1)
11	Ag -511	Farm Management, Production and Resource Economics	3(2+1)
12	Ag -512	Elective Course-Agrochemicals/System Simulation and Agro-advisory	3(2+1)
			TOTAL 28

VI Semester

S.N.	Course Code	Title of the Course	Credit
1	Ag -601	Introduction to Forestry	3(2+1)
2	Ag -602	Protected Cultivation and Secondary Agriculture	2(1+1)
3	Ag -603	Management of Beneficial Insects	2(1+1)
4	Ag -604	Crop Improvement-II *(Rabi crops)*	2(1+1)
5	Ag -605	Practical Crop Production –II (*Rabi* crops)	2(0+2)
6	Ag -606	Environmental Studies and Disaster Management	3(2+1)
7	Ag -607	Principles of Organic Farming and Precision farming	2(1+1)
8	Ag -608	Post-harvest Management & Value Addition of Fruits & Vegetables	2(1+1)
9	Ag -609	Food Safety and Standard	3(2+1)
10	Ag -610	Intellectual Property Rights	1(1+0)
11	Ag -611	Agribusiness Management	3(2+1)
	Ag -612	Elective Course-Agriculture Journalism/Commercial Plant Breeding/Landscaping	3(2+1)

Total 28

Educational tour will be conducted in break between IV & V Semester or VI & VII Semester

VII Semester

Rural Agricultural Work Experience and Agro-industrial Attachment (RAWE &AIA)			
S.NO	**Activities**	**Number of weeks**	**Credit Hours**
1	General orientation & On campus training by different faculties	**01**	**14**
2	Village attachment	**08**	
	Unit attachment in Univ./ College. KVK/ Research StationAttachment	**05**	
3	Plant clinic	**0**	**02**
	Agro-Industrial Attachment	**03**	**04**
4	Project Report Preparation, Presentation and Evaluation	**01**	
	Total week of RAWE and AIA	**20**	**20**

Agro- Industrial Attachment:

The students would be attached with the agro-industries for aperiod of **3 weeks** to get an experience of the industrial environment and working**.**

RAWE Component-I

Village Attachment Training Programme

S.No.	Activity	Duration
1	Orientation and Survey of Village	1 week
2	Agronomical Interventions	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

- Students shall be placed in Agro-and Cottage industries and Commodities Boards for 03 weeks
- Industries include Seed/Sapling production, Pesticides-insecticides, Postharvest-processingvalueaddition, Agri-finance institutions, etc.

Activities and Tasks during Agro-Industrial Attachment Programme

- Acquaintance with industry and staff
- Study of structure, functioning, objective and mandates of the industry
- Study of various processing units and hands-on trainings under supervision of industry staff
- Ethics of industry
- Employment generated by the industry
- Contribution of the industry promoting environment
- Learning business network including outlets of the industry
- Skill development in all crucial tasks of the industry
- Documentation of the activities and task performed by the students
- Performance evaluation, appraisal and ranking of students

Modules for Skill Development and Entrepreneurship: A student has to register 20 credits opting for two modules of (0+10) credits each (total 20 credits) from the package of modules in the **VIII semester.**

Sl. No.	Title of the module	Credits
1	Production Technology for Bioagents and Biofertilizer	0+10
2	Seed Production and Technology	0+10
3	Mushroom Cultivation Technology	0+10
4	Soil, Plant, Water and Seed Testing	0+10
5	Commercial Beekeeping	0+10
6	Poultry Production Technology	0+10
7	Commercial Horticulture	0+10
8	Floriculture and Landscaping	0+10
9	Food Processing	0+10
10	Agriculture Waste Management	0+10
11	Organic Production Technology	0+10
12	Commercial Sericulture	0+10

Note: In addition to above ELP modules other important modules may be given to the students by SAUs/University/College

Evaluation of Experiential Learning Programme/ HOT

S.No.	Parameters	Maximum Marks
1	Project Planning and Writing	10
2	Presentation	10
3	Regularity	10
4	Monthly Assessment	10
5	Output delivery	10

6	Technical Skill Development	10
7	Entrepreneurship Skills	10
8	Business networking skills	10
9	Report Writing Skills	10
10	Final Presentation	10
	Total	**100**

Discipline-wise summary of credit hours

S.N.	**Group**	**Credits**
1	Agronomy	20
2	Genetics & Plant Breeding	25
3	Soil Science & Agricultural Chemistry	21
4	Entomology	10
5	Agricultural Economics and Statistics	19
6	Agricultural Engineering and Soil & Water conservation	18
7	Plant Pathology	13
8	Horticulture	21
9	Food Science	*
10	Agricultural Extension	14
11	Environmental Sciences 3	
12	Statistics, Computer Application and I.P.R.	*
13	Animal Production-Animal Husbandry and Dairying	17

S.N.	**Group**	**Credits**
14	English	
15	Remedial Courses (Elementary Biology or Mathematics)	
16	NSS/NCC/Rovers & Rangers/Physical Education & Yoga Practices	
17	Human Values and Ethics	
18	Educational Tour	

Total 178 credit selective

RAWE **20 +20**

ELP

Grand Total 178+20+20=218

NEW COURSES

Sl. No. Course Title

1. Geo-informatics andNanotechnology
2. Rainfed Agriculture and Watershed Management
3. Problematic Soils and their Management
4. Renewable Energy and Green Technology
5. Management of Beneficial Insects
6. Fundamentals of Horticulture
7. Introduction to Forestry

8. Agri- Informatics
9. Intellectual Property Rights
10. Principles of Food Science & Technology
11. Communication Skills and Personality Development
12. Principles of Integrated Pest & Diseases Management
13. Agricultural Heritage
14. Introductory Biology
15. Elementary Mathematics
16. Human Values & Ethics (NG) *

* Non-gradial courses

Elective Courses: A student can select three elective courses out of the following and offer during 4th, 5th and 6th semesters.

S.N.	Courses	Credit Hours
1.	Agrochemicals	3(2+1)
2.	Commercial Plant Breeding	3(1+2)
3.	Landscaping	3(2+1)
4.	Biopesticides and Biofertilizers	3(2+1)
5.	Weed Management	3(2+1)
6.	System Simulation and Agro-advisory	3(2+1)
7.	Agricultural Journalism	3(2+1)

B.Sc.(Hons.)-Agriculture

Four year course as per ICAR Vth Dean Committee recommendation

SYLLABUS

I. AGRONOMY

1. Fundamentals of Agronomy 4(3+1)

Theory

Agronomy and its scope, seeds and sowing, tillage and tilth, crop density and geometry,Crop nutrition, manures and fertilizers, nutrient use efficiency, water resources, soil-plant-waterrelationship, crop water requirement, water use efficiency, irrigation- scheduling criteria andmethods, quality of irrigation waterlogging.

Weeds-importance, classification, crop weed competition, concepts of weed managementprinciplesand methods, herbicides- classification, selectivity and resistance, allelopathy.

Growthand development of crops, factors affecting growth and development, plant ideotypes, croprotation and its principles, adaptation and distribution of crops, crop management technologiesin problematic areas, harvesting and threshing of crops.

Practical

Identification of crops, seeds, fertilizers, pesticides and tillage implements, study of agroclimatic zones of India, Identification of weeds in crops, Methods of herbicide and fertilizerapplication, Study of yield contributing characters and yield estimation, Seed germination andviability test, Numerical exercises on fertilizer requirement, plant population, herbicides andwater requirement, Use of tillage implements-reversible plough, one way plough, harrow, leveler,seed drill.

2. Agricultural Heritage 1(1+0)

Theory

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; Journey of Indian agriculture and its development from past to modern era; Plant production and protection through indigenous traditional knowledge; Crop voyage in India and world; Agriculture scope; Importance of agriculture and agricultural resources available in India; Crop significance and classifications; National agriculture setup in India; Current scenario of Indian agriculture; Indian agricultural concerns and future prospects.

3. Crop Production Technology-I (Kharif Crops) 2(1+1)

Theory

Origin, geographical distribution, economic importance, soil and climatic requirements,varieties, cultural practices and yield of *Kharif*crops. Cereals – rice, maize, sorghum, pearl milletand finger millet, pulses-pigeonpea, mungbean and urdbean; oilseeds- groundnut, and soybean;fibre crops-cotton & jute; forage crops-sorghum, cowpea, cluster bean and napier.

Practical

Rice nursery preparation, transplanting of rice, sowing of soybean, pigeonpea and mungbean.maize, groundnut and cotton, effect of seed size on germination and seedling vigour of kharifseason crops, effect of sowing depth on germination of kharif crops, identification of weedsin kharif season crops, top dressing and foliar feeding of nutrients, study of yield contributingcharacters and yield calculation of kharif season crops, study of crop varieties and importantagronomic experiments at experimental farm. Study of forage experiments, morphologicaldescription of kharif season crops, visit to research centres of related crops.

4. Crop Production Technology-II (Rabi crops) 2(1+1)

Theory

Origin, geographical distribution, economic importance, soil and climatic requirements,varieties, cultural practices and yield of *Rabi* crops; cereals –wheat and barley, pulses-chickpea,lentil, peas, oilseeds-rapeseed, mustard and sunflower; sugar crops-sugarcane; medicinal andaromatic crops-mentha, lemon grass and citronella, Forage crops-berseem, lucerne and oat.

Practical

Sowing methods of wheat and sugarcane, identification of weeds in *rabi*season crops, studyof 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.

5. Farming System and Sustainable Agriculture 1(1+0)

Theory

Farming System-scope, importance, and concept, Types and systems of farming systemand factors affecting types of farming, Farming system components and their maintenance,Cropping system and pattern, multiple cropping system, Efficient cropping system and theirevaluation, Allied enterprises and their importance, Tools for determining production andefficiencies in cropping and farming system; Sustainable agriculture-problems and its impacton agriculture, indicators of sustainability, adaptation and mitigation, conservation agriculturestrategies in agriculture, HEIA, LEIA and LEISA and its techniques for sustainability, Integratedfarming system-historical background, objectives and characteristics, components of IFS and itsadvantages, Site specific development of IFS model for different agro-climatic zones, resource useefficiency and optimization techniques, Resource cycling and flow of energy in different farmingsystem, farming system and environment, Visit of IFS model in different agro-climatic zones ofnearby states University/ institutes and farmers field.

6. Practical Crop Production-I *(Kharif Crops)* **2(0+2)**

Practical

Crop planning, raising field crops in multiple cropping systems: Field preparation, seed,treatment, nursery raising, sowing, nutrient, water and weed management and management ofinsect-pests diseases of crops, harvesting, threshing, drying winnowing, storage and marketingof produce. The emphasis will be given to seed production, mechanization, resource conservationand integrated nutrient, insect-pest and disease management technologies. Preparation of balancesheet including cost of cultivation, net returns per student as well as per team of 8-10 students.

7. Rainfed Agriculture and Watershed Management – **2(1+1)**

Theory

Rainfed agriculture: Introduction, types, History of rainfed agriculture and watershedin India; Problems and prospects of rainfed agriculture in India ; Soil and climatic conditionsprevalent in rainfed areas; Soil and water conservation techniques, Drought: types, effect of waterdeficit on physio-morphological characteristics of the plants, Crop adaptation and mitigation todrought; Water harvesting: importance, its techniques, Efficient utilization of water through soiland crop management practices,Management of crops in rainfed areas, Contingent crop planningfor aberrant weather conditions, Concept, objective, principles and components of watershedmanagement, factors affecting watershed management.

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 meteorologicaldata and scheduling of supplemental irrigation on the basis of evapo-transpiration demand ofcrops. Critical analysis of rainfall and possible drought period in the country, effective rainfall andits calculation. Studies on cultural practices for mitigating moisture stress. Characterization anddelineation of model watershed. Field demonstration on soil & moisture conservation measures.Field demonstration on construction of water harvesting structures. Visit to rainfedresearchstation/watershed**.**

8. Practical Crop Production-II *(Rabi Crops)* **2(0+2)**

Practical

Crop planning, raising field crops in multiple cropping systems: Field preparation, seed,treatment, nursery raising, sowing, nutrient, water and weed management and management ofinsect-pests diseases of crops, harvesting, threshing, drying winnowing, storage and marketingof produce. The emphasis will be given to seed production, mechanization, resource conservationand integrated nutrient, insect-pest and disease management technologies. Preparation of balancesheet including cost of cultivation, net returns per student as well as per team of 8-10 students.

9. Principles of Organic Farming and Precision Farming 2(1+1)

Theory

Organic farming, principles and its scope in India; Initiatives taken by Government (central/state), NGOs and other organizations for promotion of organic agriculture; Organic ecosystem mand their concepts; Organic nutrient resources and its fortification; Restrictions to nutrient usein organic farming; Choice of crops and varieties in organic farming; Fundamentals of insect,pest, disease and weed management under organic mode of production; Operational structureof NPOP; Certification process and standards of organic farming; Processing, leveling, economicconsiderations and viability, marketing and export potential of organic products.Precision agriculture: concepts and techniques; their issues and concerns for Indian agriculture.

Practical

Visit of organic farms to study the various components and their utilization; Preparationof enrich compost, vermicompost, bio-fertilizers/bio-inoculants and their quality analysis;Indigenous technology knowledge (ITK) for nutrient, insect, pest disease and weed management;

Cost of organic production system; Post harvest management; Quality aspect, grading, packaging and handling.

10. Weed Management 3(2+1) (Elective Course)

Theory

Introduction to weeds, characteristics of weeds their harmful and beneficial effects on ecosystem. Classification, reproduction and dissemination of weeds. Herbicide classification, concept of adjuvant, surfactant, herbicide formulation and their use. Introduction to mode of action of herbicides and selectivity. Allelopathy and its application for weed management. Bio-herbicides and their application in agriculture. Concept of herbicide mixture and utility in agriculture. Herbicide compatibility with agro-chemicals and their application. 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 ofimportant weeds. Study of herbicide formulations and mixture of herbicide. Herbicide and agrochemicalsstudy. Shift of weed flora study in long term experiments. Study of methods of herbicideapplication, spraying equipments. Calculations of herbicide doses and weed control efficiency andweed index.

II. GENETICS AND PLANT BREEDING

1. Fundamentals of Crop Physiology and Taxonomy 3(2+1)

Theory

Introduction to crop physiology and its importance in Agriculture; Plant cell: an Overview; Diffusion and osmosis; Absorption of water, transpiration and Stomatal physiology; mineral nutrition of Plants: Functions and deficiency symptoms of nutrients, nutrient uptake mechanisms; Photosynthesis: Light and Dark reactions, C3, C4 and CAM plants; Respiration: Glycolysis, TCAcycle and electron transport chain; Plantgrowth regulators: Physiological roles and agricultural uses, Physiological aspects of growth anddevelopment of major crops: Growth analysis, Role of Physiological growth parameters in cropproductivity. Study of family monocot-(i)Araceae-Colocasia.(ii)Graminae-Triticam, Hardeum, Oryza, Zea, Pennisetum, Sorghum and family dicot-(i)Leguminosae-Pisum, Cicer, Crotolaria, Cajanus, Arachis,(ii)Cucurbitaceae-Luffa, Lagenaria.(iii) Cruciferea- Brassica(iv)Solanceae-Solanum, Nicotiana.(v)Euphorbiaceae-Ricinus.(vi)Linaceae-Linum(vii)Pedaliaceae-Sesamum.(viii) Compositae-Carthamus.(ix)Tiliaceae-Carchorus (x) Malvaceae- Hibiscus, Gossypium

Practical

Study of plant cells, structure and distribution of stomata, imbibitions, osmosis, plasmolysis, Measurement of root pressure, rate of transpiration, Separation of photosynthetic pigments through paper chromatography, Rate of transpiration, photosynthesis, respiration, tissue test for mineral nutrients, estimation of relative water content.Plants and flowers description and identification

2. Fundamentals of Genetics 3(2+1)

Theory

Pre and Post Mendelian concepts of heredity, Mendelian principles of heredity.Architecture of chromosome; chromonemata, chromosome matrix, chromomeres, centromere,secondary constriction and telomere; special types of chromosomes. Chromosomal theory ofinheritance-cell cycle and cell division- mitosis and meiosis. Probability and Chi-square.Dominance relationships, Epistatic interactions with example.Multiple alleles, pleiotropism and pseudoalleles, Sex determination and sex linkage, sexlimited and sex influenced traits, Blood group genetics, Linkage and its estimation, crossing overmechanisms, chromosome mapping. Structural and numerical variations in chromosome andtheir implications, Use of haploids, dihaploids and doubled haploids in Genetics. Mutation,classification, Methods of inducing mutations & CIB technique, mutagenic agents and induction ofmutation. Qualitative & Quantitative traits, Polygenes and continuous variations, multiple factorhypothesis, Cytoplasmic inheritance. Genetic disorders. Nature, structure & replication of geneticmaterial. Protein synthesis, Transcription and translational mechanism of genetic material, Geneconcept: Gene structure, function and regulation, Lac and Trp operons.

Practical

Study of microscope. Study of cell structure. Mitosis and Meiosis cell division. Experiments on monohybrid, dihybrid, trihybrid, test cross and back cross, Experiments on epistatic interactions including test cross and back cross, Practice on mitotic and meiotic cell division, Experiments on probability and Chi-square test. Determination of linkage and cross-over analysis (through two point test cross and three point test cross data). Study on sex linked inheritance in Drosophila. Study of models on DNA and RNA structures.

3. Principles of Seed Technology 3(1+2)

Theory

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. Foundation and certified seed production of important cereals, pulses, oilseeds, fodder and vegetables. Seedcertification, phases of certification, procedure for seed certification, field inspection. Seed Act andSeed Act enforcement. Duty and powers of seed inspector, offences and penalties. Seeds ControlOrder 1983, Varietal Identification through Grow Out Test and Electrophoresis, Molecular andBiochemical test. Detection of genetically modified crops, Transgene contamination in non-GMcrops, GM crops and organic seed production.Seed drying, processing and their steps, Duster, vcu test seed testing for quality assessment, seed treatment,its importance, method of application and seed packing. Seed storage; general principles, stagesand factors affecting seed longevity during storage. Measures for pest and disease control duringstorage. Seed marketing: structure and organization, sales generation activities, promotionalmedia. Factors affecting seed marketing, Role of WTO and OECD in seed marketing. Private andpublic 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 productionin major oilseeds: Soybean, Sunflower, Rapeseed, Groundnut and Mustard. Seed production inimportant vegetable crops. Seed sampling and testing: Physical purity, germination, viability,etc. Seed and seedling vigour test. Genetic purity test: Grow out test and electrophoresis. Seedcertification: Procedure, Field inspection, Preparation of field inspection report. Visit to seedproduction farms, seed testing laboratories and seed processing plant.

4. Fundamentals of Plant Breeding 3(2+1)

Theory

Historical development, concept, nature and role of plant breeding, majorachievements and future prospects; Genetics in relation to plant breeding, modes ofreproduction and apomixes, self-incompatibility and male sterility- genetic consequences,cultivar options. Domestication, Acclimatization and Introduction; Centres of origin/diversity, components of Genetic variation;

Heritability and genetic advance; Geneticbasis and breeding methods in self- pollinated crops - mass and pure line selection,hybridization techniques and handling of segregating population; Multiline concept.Concepts of population genetics and Hardy-Weinberg Law, Genetic basis and methodsof breeding cross pollinated crops, modes of selection; Population improvement Schemes-Ear to row method, Modified Ear to Row, recurrent selection schemes; Heterosis and inbreedingdepression, development of inbred lines and hybrids, composite and synthetic varieties;Breeding methods in asexually propagated crops, clonal selection and hybridization; Maintenance of breeding records and data collection; Wide hybridization and prebreeding; Polyploidy in relation to plant breeding, mutation breeding-methods anduses; Breeding for important biotic and abiotic stresses; Biotechnological tools-DNAmarkers and marker assisted selection. Participatory plant breeding; IntellectualProperty Rights, Patenting, Plant Breeders and & Farmer's Rights.

Practical

Plant Breeder's kit, Study of germplasm of various crops. Study of floral structure ofself-pollinated and cross pollinated crops. Emasculation and hybridization techniquesin self & cross pollinated crops. Consequences of inbreeding on genetic structure ofresulting populations. Study of male sterility system. Handling of segregation populations.Methods of calculating mean, range, variance, standard deviation, heritability. Designsused in plant breeding experiments, analysis of Randomized Block Design. To work outthe mode of pollination in a given crop and extent of natural out-crossing. Prediction ofperformance of double cross hybrids.

5. Fundamentals of Biotechnology 2(1+1)

Theory

Concepts and applications of plant biotechnology: Scope, organ culture, embryo culture,cell suspension culture, callus culture, anther culture, pollen culture and ovule culture andtheir applications; Micro-propagation methods; organogenesis and embryogenesis, Syntheticseeds and their significance; Embryo rescue and its significance; somatic hybridization andcybrids; Somaclonal variation and its use in crop improvement; cryo-preservation; Introductionto recombinant DNA methods: physical (Gene gun method), chemical (PEG mediated) andAgrobacterium mediated gene transfer methods; Transgenics and its importance in cropimprovement; PCR techniques and its applications; RFLP, RAPD, SSR; Marker Assisted Breedingin crop improvement; Biotechnology regulations.

Practical

Composition of various tissue culture media and preparation of stocksolutions for MS nutrient medium. Callus induction from various explants. Micro-propagation,hardening and acclimatization. Demonstration on isolation of DNA. Demonstration of gelelectrophoresis techniques and DNA finger printing.

6. Crop Improvement – I (*Kharif*) 2(1+1)

Theory

Centers of origin, distribution of species, wild relatives in different cereals; pulses; oilseeds; fibres; fodders and cash crops; vegetable and horticultural crops; Plant genetic resources, its utilization and conservation, study of genetics of qualitative and quantitative characters; Importantconcepts of breeding self pollinated, cross pollinated and vegetatively propagated crops; Majorbreeding objectives and procedures including conventional and modern innovative approachesfor development of hybrids and varieties for yield, adaptability, stability, abiotic and biotic stresstolerance and quality (physical, chemical, nutritional); Hybrid seed production technology inMaize, Rice, Sorghum, Pearl millet and Pigeonpea, etc. Ideotype concept and climate resilientcrop varieties for future.

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. Maintenancebreeding 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 seedproduction and hybrid seeds production in *Kharif*crops; Estimation of heterosis, inbreedingdepression and heritability; Layout of field experiments; Study of quality characters, donor parentsfor different characters; Visit to seed production plots; Visit to AICRP plots of different field crops.

7. Crop Improvement – II (*Rabi*) 2(1+1)

Theory

Centers of origin, distribution of species, wild relatives in different cereals; pulses; oilseeds; fodder crops and cash crops; vegetable and horticultural crops; Plant genetic resources, its utilization and conservation; study of genetics of qualitative and quantitative characters; Major breeding objectives and procedures including conventional and modern innovative approaches for development of hybrids and varieties for yield, adaptability, stability, abiotic and biotic stress tolerance and quality (physical, chemical, nutritional); 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 germplasmand segregating populations by different methods like pedigree, bulk and single seed decentmethods; 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; Studyof quality characters, study of donor parents for different characters; Visit to seed productionplots; Visit to AICRP plots of different field crops

8. Environmental Studies and Disaster Management ** 3 (2+1)**

Theory

Multidisciplinary nature of environmental studies Definition, scope and importance.

Natural Resources: Renewable and non-renewable resources, Natural resources and associatedproblems.

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 andover-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefitsand problems.

c) **Mineral resources**: Use and exploitation, environmental effects of extracting andusing 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 nonrenewableenergy sources, use of alternate energy sources. Case studies.

f) **Land resources:** Landas a resource, land degradation, man induced landslides, soil erosion and desertification. Roleof an individual in conservation of natural resources. Equitable use of resources for sustainablelifestyles.

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. 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 biogeographical 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 andindustrial wastes. Role of an individual in prevention of pollution.Social Issues and the Environment: From Unsustainable to Sustainable development, Urbanproblems related to energy, Water conservation, rain water harvesting, watershed management.

Environmental ethics: Issues and possible solutions, climate change, global warming, acid rain,

ozone layer depletion, nuclear accidents and holocaust. dies. Wasteland reclamation. Consumerismand waste products. Environment Protection Act. Air (Prevention and Control of Pollution) Act.Water (Prevention and control of Pollution) Act. Wildlife Protection Act. Forest ConservationAct. Issues involved in enforcement of environmental legislation. Public awareness.Human Population and the Environment: population growth, variation among nations,population explosion, Family Welfare Programme. Environment and human health: HumanRights, Value Education, HIV/AIDS. Women and Child Welfare. Role of Information Technologyin Environment and human health.

Disaster Management

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.

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 organizationsand 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, birds and study of simple ecosystems-pond, river, hill slopes, etc. Study of pollutants and contaminants

9.Intellectual Property Rights 1(1+0)

Theory

Introduction and meaning of intellectual property, brief introduction to GATT, WTO, TRIPs and WIPO, Treaties for IPR protection: Madrid protocol, Berne Convention, Budapest treaty, etc.Types of Intellectual Property and legislations covering IPR in India:-Patents, Copyrights, 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.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.Convention on Biological Diversity, International treaty on plant genetic resources for foodand agriculture (ITPGRFA). Indian Biological Diversity Act, 2002 and its salient features, accessand benefit sharing.

10.Commercial Plant Breeding 3(1+2) (Elective Course)

Theory

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. Genetic purity test of commercial hybrids. Advances in hybrid seed production of maize, rice, sorghum, pearl millet, castor, sunflower, cotton pigeon pea, Brassica etc. 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 andbiotechnological tools. IPR issues in commercial plant breeding: DUS testing and registration ofvarieties under PPV & FR Act. Variety testing, release and notification systems in India. Principlesand techniques of seed production, types of seeds, quality testing in self and cross pollinated crops.

Practical

Floral biology in self and cross pollinated species, selfing 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 field crops. Understandingthe 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 seedproduction techniques in sorghum, pearl millet, maize, rice, rapeseed-mustard, sunflower, castor,pigeon pea, cotton and vegetable crops. Sampling and analytical procedures for purity testingand 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 privateseed production and processing plants.

III. AGRICULTURAL CHEMISTRY AND SOIL SCIENCE

1. Fundamentals of Soil Science 3(2+1)

Theory

Soil as a natural body, Pedological and edaphological concepts of soil; Soil genesis: soil forming rocks and minerals; weathering, processes and factors of soil formation; Soil Profile, components of soil; Soil physical properties: soil-texture, structure, density and porosity, soil colour, consistenceand plasticity; Elementary knowledge of soil taxonomy classification and soils of India; Soil waterretention, movement and availability; Soil air, composition, gaseous exchange, problem and plantgrowth, Soil temperature; source, amount and flow of heat in soil; effect on plant growth, Soilreaction-pH, soil acidity and alkalinity, buffering, effect of pH on nutrient availability; soil colloids- inorganic and organic; silicate clays: constitution and properties; sources of charge; ion exchange,cation exchange capacity, base saturation; soil organic matter: composition, properties and itsinfluence on soil properties; humic substances - nature and properties; soil organisms: macro andmicro organisms, their beneficial and harmful effects; Soil

pollution - behaviour of pesticides andinorganic contaminants, prevention and mitigation of soil pollution.

Practical

Study of soil profile in field. Study of soil sampling tools, collection of representative soil sample, its processing and storage. Study of soil forming rocks and minerals. Determination of soil density, moisture content and porosity. Determination of soil texture by feel and Bouyoucos Methods. Studies of capillary rise phenomenon of water in soil column and water movement in soil. Determination of soil pH and electrical conductivity. Determination of cation exchange capacity of soil. Study of soil map. Determination of soil colour. Demonstration of heat transfer insoil. Estimation of organic matter content of soil.Study of soil moisture measuring devices, Measurement of field capacity, infiltration rate.

2. Manures, Fertilizers and Soil Fertility Management 3(2+1)

Theory

Introduction and importance of organic manures, properties and methods of preparation of bulky and concentrated manures. Green/leaf manuring. Fertilizer recommendation approaches. Integrated nutrient management.Chemical fertilizers: classification, composition and properties of major nitrogenous,phosphatic, potassic fertilizers, secondary & micronutrient fertilizers, Complex fertilizers, nanofertilizers Soil amendments, Fertilizer Storage, Fertilizer Control Order.History of soil fertility and plant nutrition. criteria of essentiality. role, deficiency and toxicitysymptoms 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. Soil fertility evaluation, Soil testing. Critical levels of different nutrients in soil. Forms of nutrients in soil, plant analysis, rapid plant tissue tests. Indicator plants. Methods of fertilizer recommendations to crops. Factor influencingnutrient 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 alkalinehydrolysable 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 insoils. Estimation of N in plants. Estimation of P in plants. Estimation of K in plants. Estimationof S in plants.

3. Fundamentals of Plant Biochemistry 3(2+1)

Theory

Importance of Biochemistry. Properties of Water, pH and Buffer. Carbohydrate: Importance and classification. Structures of Monosaccharides, Reducing and oxidizing properties ofMonosaccharides, Mutarotation; Structure of Disaccharides and Polysaccharides.

Lipid:Importance and classification; Structures and properties of fatty acids; storage lipids and membranelipids. Proteins: Importance of proteins and classification; Structures, titration and zwitterionsnature of amino acids; Structural organization of proteins. 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 ofcarbohydrates: Glycolysis, TCA cycle, Glyoxylate cycle, Electron transport chain. Metabolism oflipids: Beta oxidation, Biosynthesis of fatty acids.

Practical

Preparation of solution, pH & buffers, Qualitative tests of carbohydrates and amino acids. Quantitative estimation of glucose/ proteins. Titration methods for estimation of aminoacids/lipids, Effect of pH, temperature and substrate concentration on enzyme action, Paperchromatography/ 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 gelelectrophoresis techniques and DNA finger printing.

4. Problematic Soils and their Management 2(1+1)

Theory

Soil quality and health, Distribution of Waste land and problem soils in India. Theircategorization based on properties. Reclamation and management of Saline and sodic soils, Acidsoils, Acid sulphate soils, Eroded and Compacted soils, Flooded soils, Polluted soils.Irrigation water – quality and standards, utilization of saline water in agriculture. Remotesensing and GIS in diagnosis and management of problem soils.Multipurpose tree species, bio remediation through MPTs of soils, land capability andclassification, land suitability classification. Problematic soils under different Agro-ecosystems.

Practical

Analysis for soil health, Measurement of Soil salinity, alkalanity, acidity, lime requirement, ESP, SAR, Gypsum requirement, analysis of quality of irrigation water. Identification of tree, crops and grasses for problematic soil.

5. Agricultural Microbiology 2(1+1)

Theory

Introduction. Microbial world: Prokaryotic and eukaryotic microbes. Bacteria: cell structure, chemoautotrophy, photo autotrophy, growth. Bacterial genetics: Genetic recombinationtransformation,conjugation and transduction, plasmids, transposon.

Role of microbes in soil fertility and crop production: Carbon, Nitrogen, Phosphorus andSulphur cycles. Biological nitrogen fixation- symbiotic, associative and asymbiotic. Azolla, bluegreen algae and mycorrhiza. Rhizosphere and phyllosphere. Microbes in human welfare: silageproduction, biofertilizers, biopesticides, biofuel production and biodegradation of agro-waste.

Practical

Introduction to microbiology laboratory and its equipments; Microscope- parts, principles of microscopy, resolving power and numerical aperture. Methods of sterilization. Nutritional media and their preparations. Enumeration of microbial population in soil- bacteria, fungi, actinomycetes. Methods of isolation and purification of microbial cultures. Isolation of *Rhizobium*from legume root nodule. Isolation of *Azotobacter*from soil. Isolation of *Azospirillum*from roots.Isolation of BGA. Staining and microscopic examination of microbes.

6. Geo-informatics and Nano-technology 2(1+1)

Theory

Geo-informatics- definition, concepts, tool and techniques; their use in PrecisionAgriculture. Crop discrimination and Yield monitoring, soil mapping; fertilizer recommendationusing geospatial technologies; Spatial data and their management in GIS; Remote sensing conceptsand application in agriculture; Image processing and interpretation; Global positioning system(GPS), components and its functions; Introduction to crop Simulation Models and their uses foroptimization of Agricultural Inputs; STCR approach for precision agriculture; Nanotechnology,definition, concepts and techniques, brief introduction about nano-scale 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 VRTand STCR techniques. Crop stress (biotic/abiotic) monitoring using geospatial technology. Use ofGPS for agricultural survey. Formulation, characterization and applications of nanoparticles inagriculture. Projects formulation and execution related to precision farming.

7. Agrochemicals 3 (2+1) (Elective Course)

Theory

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.

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. **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.
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 potassiumchloride, 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. 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 variousformulations of insecticide available kin market. Estimation of nitrogen in Urea. Estimation ofwater soluble P_2O_5 and citrate soluble P_2O_5 in single super phosphate. Estimation of potassium inMuraite of Potash/ Sulphate of Potash by flame photometer. Determination of copper content incopper oxychloride. Determination of sulphur content in sulphur fungicide. Determinationof thiram. Determination of ziram content.

8.Biopesticides and Biofertilizers 3(2+1) (Elective Course)
Theory
History and concept of biopesticides. Importance, scope and potential of biopesticide.
Definitions, concepts and classification of biopesticides viz. pathogen, botanical pesticides, and biorationales. Botanicals and their uses. Mass production technology of bio-pesticides. Virulence,pathogenicity and symptoms of entomopathogenic pathogens and nematodes. Methods ofapplication of biopesticides. Methods of quality control and Techniques of biopesticides.Impediments and limitation in production and use of biopesticide.
Biofertilizers - Introduction, status and scope. Structure and characteristic features of bacterial biofertilizers- *Azospirillum, Azotobacter, Bacillus, Pseudomonas, Rhizobium* and *Frankia*;Cynobacterialbiofertilizers- *Anabaena*, *Nostoc*, Hapalosiphon and fungal biofertilizers- AMmycorrhiza and ectomycorhiza. Nitrogen fixation -Free living and symbiotic nitrogen

fixation.Mechanism of phosphate solubilization and phosphate mobilization, K solubilization. Productiontechnology: Strain selection, sterilization, growth and fermentation, mass production of carrierbased and liquid biofertiizers. FCO specifications and quality control of biofertilizers. Applicationtechnology for seeds, seedlings, tubers, sets etc. Biofertilizers -Storage, shelf life, quality controland marketing. Factors influencing the efficacy of biofertilizers.

Practical

Isolation and purification of important biopesticides: *Trichoderma Pseudomonas, Bacillus, Metarhyzium*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 *Azospirillum , Azotobacter, Rhizobium*, P-solubilizers andcyanobacteria. Mass multiplication and inoculums production of biofertilizers. Isolation of AMfungi -Wet sieving method and sucrose gradient method. Mass production of AM inoculants.

IV. AGRICULTURAL ECONOMICS AND STATISTICS

1. Fundamentals of Agricultural Economics 2(1+1)

Theory

Economics: Meaning, scope and subject matter, definitions, activities, approaches to economic analysis; micro and macro economics, 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, desire, want, demand, utility, cost and price,wealth, capital, income and welfare. **Agricultural economics:** meaning, definition, characteristicsof agriculture, importance and its role in economic development. Agricultural planning anddevelopment in the country. **Demand:**meaning, law of demand, schedule and demand curve,determinants, utility theory; law of diminishing marginal utility, equi-marginal utility principle.Consumer's equilibrium and derivation of demand curve, concept of consumer surplus. Elasticity of demand: concept and measurement of price elasticity, income elasticity and cross elasticity.

Production: process, creation of utility, factors of production, input output relationship. *Laws of returns*: Law of variable proportions and law of returns to scale. *Cost:* concepts, short run and long run cost curves. **Supply:** Stock v/s supply, law of supply, schedule, supply curve, determinantsof supply, elasticity of supply. **Market structure:** meaning and types of market, basic features ofperfectly 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 ofrent, wage, interest and profit. **National income:**Meaning and importance, circular flow, conceptsof national income accounting and approaches to measurement, difficulties in measurement.**Population:** Importance, Malthusian and Optimum population theories, natural and socioeconomicdeterminants, current policies and programmes on population control. **Money:** Bartersystem of exchange and its problems, evolution, meaning and functions of money, classificationof 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. Agriculturaland public finance: meaning, micro v/s macro finance, need for agricultural finance, publicrevenue and public expenditure. *Tax:* meaning, direct and indirect taxes, agricultural taxation,VAT. **Economic systems:**Concepts of economy and its functions, important features of capitalistic,socialistic and mixed economies, elements of economic planning.

Practical

Evaluate the elasticity of demand and supply, Law of diminishing marginal utility study of deferent types of bank and banking, Survey of at list two farmers in the view of economic, calculate cost of cultivation.

2. Agri-Informatics and Computer Application 3(2+1)

Theory

Introduction to Computers, Operating Systems, definition and types, Applications of MSOffice for document creation & Editing, Data presentation, interpretation and graph creation, statistical analysis, mathematical expressions, Database, concepts and types, uses of DBMS in Agriculture, World Wide Web (WWW): Concepts and components. Introduction to computer programming languages, concepts and standard input/output operations.e-Agriculture, concepts and applications, Use of ICT in Agriculture. Computer Models forunderstanding plant processes. IT application for computation of water and nutrient requirementof crops, Computer-controlled devices (automated systems) for Agri-input management,Smartphone Apps in Agriculture for farm advises, market price, postharvest management etc;Geospatial technology for generating valuable agri-information. Decision support systems,concepts, components and applications in Agriculture, Agriculture Expert System, Information Systems etc. for supporting Farm decisions. Preparation of contingent crop-planningusing IT tools.

Practical

Study of Computer Components, accessories, practice of important DOS Commands. Introduction of different operating systems such as windows, Unix/ Linux, Creating, Files & Folders, File Management. Use of MS-WORD and MS Power-point for creating, editing and presenting a scientific Document. MS-EXCEL - Creating a spreadsheet, use of statistical tools, writing expressions, creating graphs, analysis of scientific data. MS-ACCESS: Creating Database,preparing queries and reports, demonstration of Agri-information system. Introduction toWorld Wide Web (www). Introduction of programming languages. Hands on Crop SimulationModels (CSM) such as DSSAT/Crop-Info/CropSyst/ Wofost; Computation of water and nutrientrequirements of crop using CSM and IT tools. Introduction of Geospatial Technology forgenerating valuable information for Agriculture. Hands on Decision Support System. Preparationof contingent crop planning.

3. Statistical Methods 2(1+1)

Theory

Introduction to Statistics and its Applications in Agriculture, Graphical Representation of Data, Measures of Central Tendency & Dispersion, Definition of Probability, Addition and Multiplication Theorem (without proof). Simple Problems Based on Probability. Binomial & Poisson Distributions, Definition of Correlation, Scatter Diagram. Karl Pearson's Coefficient of Correlation. Linear Regression Equations. 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. 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.

Practical

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 (UngroupedData). Moments, Measures of Skewness& Kurtosis (Grouped Data). Correlation &RegressionAnalysis. Application of One Sample t-test. Application of Two Sample Fisher's t-test. Chi-Squaretest of Goodness of Fit. Chi-Square test of Independence of Attributes for 2 ×2 contingencytable. Analysis of Variance One Way Classification. Analysis of Variance Two Way Classification.Selection of random sample using Simple Random Sampling.

4. Agricultural Finance and Co-Operation 3(2+1)

Theory

Agricultural Finance- meaning, scope and significance, credit needs and its role in Indian agriculture. Agricultural credit: meaning, definition, need, classification. Credit analysis: 4 R's, and 3C's of credits. Sources of agricultural finance: institutional and non-institutional sources, commercial banks, social control and nationalization of commercial banks, Micro financing including KCC. Lead bank scheme, RRBs, Scale of finance and unit cost. An introduction to higherfinancing institutions – RBI, NABARD, ADB, IMF, world bank, Insurance and Credit GuaranteeCorporation of India. Cost of credit. Recent development in agricultural credit. Preparationand analysis of financial statements – Balance Sheet and Income Statement. Basic guidelines forpreparation of project reports- Bank norms – SWOT analysis.

Agricultural Cooperation – Meaning, brief history of cooperative development in India, objectives, principles of cooperation, significance of cooperatives in Indian agriculture. Agricultural Cooperation in India- credit, marketing, consumer and multi-purpose cooperatives, farmers' service cooperative societies, processing cooperatives, farming cooperatives, cooperativewarehousing; role of ICA, NCUI, NCDC, NAFED.

Practicals

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 and cooperative society to acquire firsthand knowledge of their management, schemes and procedures. Estimation of credit requirement of farm business – A case study. Preparation and analysis of balance sheet – A case

study. Preparation and analysis of income statement – A case study. Appraisal of a loan proposal – A case study. Techno-economic parameters for preparation of projects. Preparation of Bankableprojects for various agricultural products and its value added products. Seminar on selectedtopics.

5. Agricultural Marketing, Trade and Prices 3(2+1)

Theory

Agricultural Marketing: Concepts and definitions of market, marketing, agricultural marketing,market structure, marketing mix and market segmentation, classification and characteristics ofagricultural markets**;** demand, supply and producer's surplus of agri-commodities: nature anddeterminants 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;product life cycle (PLC) and competitive strategies: Meaning and stages in PLC; characteristics ofPLC; strategies in different stages of PLC; pricing and promotion strategies: pricing considerationsand approaches – cost based and competition based pricing; market promotion – advertising,personal selling, sales promotion and publicity – their meaning and merits & demerits; marketingprocess and functions: Marketing process-concentration, dispersion and equalization; exchangefunctions – buying and selling; physical functions – storage, transport and processing; facilitatingfunctions – packaging, branding, grading, quality control and labeling (Agmark); Marketfunctionaries and marketing channels: Types and importance of agencies involved in agriculturalmarketing; meaning and definition of marketing channel;number of channel levels; marketingchannels for different farm products; Integration, efficiency, costs and price spread: Meaning,definition and types of market integration; marketing efficiency; marketing costs, margins andprice spread; factors affecting cost of marketing; reasons for higher marketing costs of farmcommodities; ways of reducing marketing costs; Role of Govt. in agricultural marketing: Publicsector institutions- CWC, SWC, FCI, CACP & DMI – their objectives and functions; cooperativemarketing in India; Risk in marketing: Types of risk in marketing; speculation & hedging; anoverview of futures trading; Agricultural prices and policy: Meaning and functions of price;administered prices; need for agricultural price policy; Trade: Concept of International Tradeand its need, theories of absolute and comparative advantage. Present status and prospects ofinternational trade in agri-commodities; GATT and WTO; Agreement on Agriculture (AoA) andits implications on Indian agriculture; IPR.

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 ofprinciples of comparative advantage of international trade.

6. Farm Management, Production and Resource Economics 3(2+1)

Theory

Meaning and concept of farm management, objectives and relationship with other sciences. Meaning and definition of farms, its types and characteristics, factor determining types and size of farms. Principles of farm management: concept of production function and its type, use of production function in decision-making on a farm, factor-product, factor-factor and productproductrelationship, law of equi-marginal/or principles of opportunity cost and law of comparativeadvantage. Meaning and concept of cost, types of costs and their interrelationship, importance ofcost in managing farm business and estimation of gross farm income, net farm income, familylabour income and farm business income. Farm business analysis: meaning and concept offarm income and profitability, technical and economic efficiency measures in crop and livestockenterprises. Importance of farm records and accounts in managing a farm, various types of farmrecords 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, stepsin farm planning and budgeting-linear programming, appraisal of farm resources, selection ofcrops and livestock's enterprises. Concept of risk and uncertainty occurs in agriculture production,nature and sources of risks and its management strategies**,** Crop/livestock/machinery insurance– weather based crop insurance, features, determinants of compensation. Concepts of resourceeconomics, differences between NRE and agricultural economics, unique properties of naturalresources. 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 etc.

Practical

Preparation of farm layout. Determination of cost of fencing of a farm. Computation ofdepreciation cost of farm assets. Application of equi-marginal returns/opportunity cost principlein allocation of farm resources. Determination of most profitable level of inputs use in a farmproduction process. Determination of least cost combination of inputs. Selection of most profitableenterprise combination. Application of cost principles including CACP concepts in the estimationof cost of crop and livestock enterprises. Preparation of farm plan and budget, farm records andaccounts and profit & loss accounts. Collection and analysis of data on various resources in India.

7.Agri-business Management 3 (2+1)

Theory

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.Agri-value chain: Understanding primary and support activities and their linkages. Businessenvironment: PEST & SWOT analysis. Management functions: Roles & activities, Organizationculture. Planning, meaning, definition, types of plans. Purpose or mission, goals or objectives,Strategies, polices procedures, rules, programs and budget. Components of a business plan, Stepsin planning and implementation. Organization staffing, directing and motivation. Ordering,leading, supervision, communications, control. Capital Management and Financial management ofAgribusiness. Financial statements and their importance. Marketing Management: Segmentation,targeting & positioning. Marketing mix and marketing strategies. Consumer behaviour analysis,Product Life Cycle (PLC). Sales & Distribution Management. Pricing policy, various pricingmethods. 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.

8. Elementary Mathematics (Elective Course) 2(2+0)

Theory

Straight lines : Distance formula, section formula (internal and external division), Change of axes (only origin changed), 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, Normal form of equation of line, General form of equation of line, Point of intersection of two st. lines, Angles between two st. lines, Parallellines, Perpendicular lines, Angle of bisectors between two lines, Area of triangle and quadrilateral.Circle: Equation of circle whose centre and radius is known, General equation of a circle, Equationof circle passing through three given points, Equation of circle whose diameters is line joining twopoints (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 x2 + y2 = a2. Differential Calculus: Definition of function, limit and continuity, Simple problems on limit, Simple problemson continuity, Differentiation of xn , ex , sin x &cos x from first principle, Derivatives of sum,difference, product and quotient of two functions, Differentiation of functions of functions (Simpleproblem based on it), Logarithmic differentiation (Simple problem based on it), Differentiation bysubstitution method and simple problems based on it, Differentiation of Inverse Trigonometricfunctions. Maxima and Minima of the functions of the form y=f (x) (Simple problems based onit).Integral Calculus : Integration of simple functions, Integration of

Product of two functions,Integration by substitution method, Definite Integral (simple problems based on it), Area undersimple well-known curves (simple problems based on it).Matrices and Determinants: Definition of Matrices, Addition, Subtraction, Multiplication,Transpose and Inverse up to 3rd order, Properties of determinants up to 3rd order and theirevaluation**.**

V. PLANT PATHOLOGY

1. Fundamentals of Plant Pathology 4(3+1)

Theory

Introduction: Importance of plant diseases, scope and objectives of Plant Pathology. Historyof Plant Pathology with special reference to Indian work. Terms and concepts in Plant Pathology.

Causes / factors affecting disease development: disease triangle and tetrahedron andclassification of plant diseases. Important plant pathogenic organisms, different groups**:** fungi,bacteria, fastidious vesicular bacteria, phytoplasmas, spiroplasmas, viruses, viroids, algae, protozoa, phanerogamic parasites and nematodes.Life cycle of *Phytophthora, Albugo, Erysiphae, Puccinia ,Mucor, Alternaria, collectrotrichum, ustilago,andFusarium.*

***Fungi*:** general characters, definition of fungus, somatic structures, types of fungal thalli,fungal tissues, modifications of thallus, reproduction (asexual and sexual). Nomenclature,Binomial system of nomenclature, rules of nomenclature, classification of fungi. Key to divisions,sub-divisions, orders and classes.

Bacteria and mollicutes: general morphological characters. Basic methods of classification and reproduction.

Viruses: nature, structure, replication and transmission. Study of phanerogamic plantparasites.

Nematodes: General morphological characters and importance of plant nematodes (*Heterodera, Meloidogyne, Anguina*)

Practical

Acquaintance with various laboratory equipments and microscopy. Collection and preservation of disease specimen. Preparation of media, isolation and Koch's postulates. General study of different structures of fungi. Study of symptoms of various plant diseases. Study of representativefungal genera. Staining and identification of plant pathogenic bacteria. Transmission of plantviruses. Study of phanerogamic plant parasites.Study of morphological features and identification of plant parasitic nematodes. Samplingand 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**.**

2. Diseases of Field & Horticultural Crops & their Management-I 3(2+1)

Theory

Symptoms, etiology, disease cycle and management of major diseases of following crops:

Field Crops: Rice: blast, brown spot, bacterial blight, sheath blight, false smut, khaira andtungro;Maize: smut, downy mildew, leaf spots; Sorghum: anthracnose,Bajra :downy mildew

and ergot; Groundnut: early and late leaf spots, wiltPigeonpea:Phytophthora blight, wilt and sterility mosaic; black & greengram: Cercospora leaf spot and anthracnose, web blight and yellow mosaic;Tobacco: mosaic. Horticultural Crops: Guava: wilt andanthracnose; Banana: Panama wilt, bacterial wilt, Sigatoka and bunchy top;Papaya: foot rot, leafcurl and mosaic, Pomegranate: bacterial blight; Cruciferous vegetables: Alternaria leaf spot andblack rot; Brinjal: Phomopsis blight and fruit rot and Sclerotinia blight; Tomato: damping off,wilt, early and late blight, leaf curl; Okra: Yellow Vein Mosaic; Beans:anthracnose ; Ginger: soft rot; Colocasia: Phytophthora blight; Coconut: wiltand bud rot; Tea: blister blight; Coffee: rust

Practical

Identification and histopathological studies of selected diseases of field and horticulturalcrops covered in theory. Field visit for the diagnosis of field problems. Collection and preservationof plant diseased specimens for Herbarium; Note: Students should submit 50 pressed and wellmountedspecimens.

3. Diseases of Field and Horticultural Crops & their Management-II 3(2+1)

Theory

Symptoms, etiology, disease cycle and management of following diseases:

Field Crops:

Wheat: rusts, loose smut, karnal bunt, powdery mildew, and ear cockle;Sugarcane: red rot, smut, wilt, grassy shoot, ratoon stunting;Sunflower: Sclerotinia stem rot and Alternaria blight; Mustard: Alternaria blight, white rust,downy mildew and Sclerotinia stem rot; Gram: wilt, grey mould and Ascochyta blight; Lentil: rustand wilt; Cotton: anthracnose, vascular wilt, and black arm; Pea: downy mildew, powdery mildewand rust.

Horticultural Crops:

Mango: anthracnose, malformation, bacterial blight and powdery mildew; Citrus: canker andgummosis; Grape vine: downy mildew, Powdery mildew and anthracnose; Apple: scab, powderymildew, fire blight and crown gall; Peach: leaf curl.Potato: early and late blight, black scurf, and mosaic;Cucurbits: downy mildew, powdery mildew, wilt; Onion and garlic: purple blotch, andStemphylium blight; Chillies: anthracnose and fruit rot, wilt and leaf curl; Turmeric: leaf spot

Coriander: stem gall Marigold: Botrytis blight; Rose: dieback, powdery mildew and black leaf spot.

Practical

Identification and histopathological studies of selected diseases of field and horticulturalcrops covered in theory. Field visit for the diagnosis of field problems. Collection and preservationof plant diseased specimens for herbarium.

Note: Students should submit 50 pressed and well-mounted specimens.

4. Principles of Integrated Pest and Disease Management 3(2+1)

Theory

Entomology

Categories of insect pestsIPM: Introduction, history, importance, concepts,principles and tools of IPM. Economic importance of insect pests and pest risk analysis.Methods of detection and diagnosis of insect pest. Calculation and dynamics ofeconomic injury level and importance of Economic threshold level. Ecologicalmanagement of crop environment. Introduction to conventional pesticides for the insect pests management. Survey surveillance and forecasting of Insect pests. Developmentand validation of IPM module. Implementation and impact of IPM module for Insect pest. Safety issues in pesticide uses. Political, social and legal implication of IPM. Casehistories of important IPM programmes. Case histories of important IPM programmes.

Plant Pathology

Type and economic importance of diseases. Principle and Method of Plant Disease Management. Methods of detection of diseases. Methods of control: Host plantresistance, cultural, mechanical, physical, legislative, biological and chemical control. Introduction to conventional fungicides for the disease management. Survey surveillance and forecasting of diseases. Impact of IPM on diseases. Mode of action and formulations of fungicides and antibiotics.

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 andnature of damage of important insect pests and diseases and their management. Crop (agroecosystem)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.

VI. ENTOMOLOGY

1. Fundamentals of Entomology 3(2+1)

Part – I

History of Entomology in India. Major points related to dominance of Insecta in Animal kingdom. Classification of phylum Arthropodaupto classes. Relationship of class Insecta with other classes of Arthropoda. Morphology: Structure and functions of insect cuticle and molting. 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. Majorsensory organs like simple and compound eyes, chemoreceptor.

Part-II

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.

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).

2.Insect Systematics and IPM 2(1+1)

Part I

Categories of pests. Concept of IPM, Practices, scope and limitations of IPM. Classification of insecticides, toxicity of insecticides and formulations of insecticides. Chemical controlimportance,hazards and limitations. Recent methods of pest control, repellents, anti feed ants,hormones, attractants, gamma radiation. Insecticides Act 1968- Important provisions. Applicationtechniques of spray fluids. Symptoms of poisoning, first aid and antidotes.

Part – II

Systematics: Taxonomy –importance, history and development and binomial nomenclature. Definitions of Biotype, Sub-species, Species, Genus, Family and Order. Classification of class Insectaupto Orders, basic groups of present day insects with special emphasis to orders and families of Agricultural importance like Orthoptera: Acrididae, Tettigonidae, Gryllidae, Gryllotalpidae; Dictyoptera: Mantidae, Blattidae; Odonata; Isoptera: Termitidae; Thysanoptera: Thripidae; Hemiptera: Pentatomidae, Coreidae, Cimicidae, Pyrrhocoridae, Lygaeidae, Cicadellidae, Delphacidae, Aphididae, Coccidae, Lophophidae, Aleurodidae, Pseudococcidae; Neuroptera: Chrysopidae; Lepidoptera: Pieridae, Papiloinidae, Noctuidae, Sphingidae, Pyralidae, Gelechiidae, Arctiidae, Saturnidae, Bombycidae; Coleoptera: Coccinellidae, Chrysomelidae, Cerambycidae, Curculionidae, Bruchidae, Scarabaeidae; Hymenoptera: Tenthridinidae, Apidae. Trichogrammatidae, lchneumonidae, Braconidae, Chalcididae; Diptera: Cecidomyiidae, Tachinidae, Agromyziidae, Culicidae,Muscidae, Tephritidae.

Practical

Study of characters of orders Orthoptera, Dictyoptera, Odonata, Isoptera,Thysanoptera, Hemiptera, Lepidoptera, Neuroptera, Coleoptera, Hymenoptera, Diptera and theirfamilies of agricultural importance. Insecticides and their formulations. Pesticide appliances andtheir maintenance. Sampling techniques for estimation of insect population and damage.

3. Pests of Crops and Stored Grains and their Management 3(2+1)

Theory

General account on nature and type of damage by different arthropods pests. Scientificname, order, family, host range, distribution, biology and bionomics, nature of damage, andmanagement of major pests and scientific name, order, family, host range, distribution, nature ofdamage and control practice other important arthropod pests of various field crop, vegetable crop,fruit crop, plantation crops, ornamental crops, spices and condiments. Factors affecting losses ofstored grain and role of physical, biological, mechanical and chemical factors in deterioration ofgrain. Insect pests, mites, rodents, birds and microorganisms associated with stored grain andtheir management. Storage structure and methods of grain storage and fundamental principles ofgrain store management.

Practical

Identification of different types of damage. Identification and study of life cycle and seasonal 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 Indian Storage Management and Research Institute, Hapur and Quality Laboratory, Department of Food., Delhi. Visit to nearest FCI godowns.

4. Management of Beneficial Insects 2(1+1)

Theory

Importance of beneficial Insects, Beekeeping and pollinators, bee biology, commercial methods of rearing, equipment used, seasonal management, bee enemies and disease. Bee pasturage, bee foraging and communication. Insect pests and diseases of honey bee. Role of pollinators in cross pollinated plants.Types of silkworm, voltinism and biology of silkworm. Mulberry cultivation, mulberryvarieties and methods of harvesting and preservation of leaves. Rearing, mounting and harvestingof cocoons. Pest and diseases of silkworm, management, rearing appliances of mulberry silkwormand methods of disinfection.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 inbiological control.

Insect orders bearing predators and parasitoids used in pest control and their mass multiplication techniques. 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, voltinismand biology of silkworm. Mulberry cultivation, mulberry varieties and methods of harvestingand preservation of leaves. Species of lac insect, host plant identification. Identification of otherimportant pollinators, weed killers and scavengers. Visit to research and training institutionsdevoted to beekeeping, sericulture, lac culture and natural enemies. Identification and techniquesfor mass multiplication of natural enemies.

6. Introductory Biology 2(1+1) (Elective Course)

Theory

Introduction to the living world, diversity and characteristics of life, origin of life, Evolution and Eugenics. Binomial nomenclature and classification Cell and cell division. Morphology of flowing plants. Seed and seed germination. Plant systematic- viz; Brassicaceae, Fabaceae and Poaceae. Role of animals in agriculture.

Practical

Morphology of flowering plants – root, stem and leaf and their modifications. Inflorence, flower and fruits. Cell, tissues & cell division. Internal structure of root, stem and leaf. Study of specimens and slides. Description of plants - Brassicaceae, Fabaceae and Poaceae.

VII. HORTICULTURE

1. Fundamentals of Horticulture (NEW) 3(2+1)

Theory

Horticulture - Its definition and branches, importance and scope; horticultural and botanical classification; climate and soil for horticultural crops; Plant propagation-methods and propagating structures; Seed dormancy, Seed germination, principles of orchard establishment; Principles and methods of training and pruning, juvenility and flower bud differentiation; unfruitfulness; pollination, pollinizers and pollinators; fertilization and parthenocarpy; medicinal and aromatic plants; importance of plant bio-regulators in horticulture. Irrigation – methods, Fertilizer application in horticultural crops.

Practical

Identification of garden tools. Identification of horticultural crops. 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. Preparation of potting mixture.Fertilizer application in different crops. Visits to commercial nurseries/orchard.

2. Production Technology for Fruit and Plantation Crops 2(1+1)

Theory

Importance and scope of fruit and plantation crop industry in India; Importance of rootstocks;

Production technologies for the cultivation of major fruits-mango, banana, citrus, grape, guava, litchi, papaya, sapota, apple, pear, peach, walnut, almond and; minor fruits- date, ber, pineapple, pomegranate, jackfruit, strawberry, plantation crops-coconut, areca nut, cashew, tea, coffee & 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.

3. Production Technology for Vegetable and Spices 2 (1+1)

Theory

Importance of vegetables & spices in human nutrition and national economy, kitchen gardening, brief about origin, area, climate, soil, improved varieties and cultivation practices suchas time of sowing, transplanting techniques, planting distance, fertilizer requirements, irrigation,weed management, harvesting and yield, physiological disorders, of important vegetable andspices (Tomato, Brinjal, Chilli, Capsicum, Cucumber, Melons, Gourds, Pumpkin, French bean,Peas; Cole crops such as Cabbage, Cauliflower, Knol-khol; Bulb crops such as Onion, Garlic; Rootcrops such as Carrot, Raddish, Beetroot; Tuber crops such as Potato; Leafy vegetables such asAmaranth, Palak. Perennial vegetables).

Practical

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.

4. Hi-tech. Horticulture 3(2+1)

Theory

Introduction & importance; Nursery management and mechanization; micro propagation of horticultural crops; Modern field preparation and planting methods, Protected cultivation: advantages, controlled conditions, method and techniques, Micro irrigation systems and its components; EC, pH based fertilizer scheduling, canopy management, high density orcharding, Components of precision farming, Variable Rate applicator (VRA), 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.

5. Production Technology for Ornamental Crops, MAPs and Landscaping 2 (1+1)

Theory

Importance and scope of ornamental crops, medicinal and aromatic plants and landscaping. Principles of landscaping. Landscape uses of trees, shrubs and climbers. Production technology ofimportant cut flowers like rose, gerbera, carnation, lilium and orchids under protected conditionsand gladiolus, tuberose, chrysanthemum under open conditions. Package of practices for looseflowers like marigold and jasmine under open conditions. Production technology of importantmedicinal plants like ashwagandha, asparagus, aloe, costus, Cinnamomum, periwinkle, isabgoland aromatic plants like mint, lemongrass, citronella, palmarosa, ocimum, rose, geranium, vetiver.Processing and value addition in ornamental crops and MAPs produce.

Practical

Identification of Ornamental plants. Identification of Medicinal and Aromatic Plants. Nursery bed preparation and seed sowing. Training and pruning of Ornamental plants. Planning and layoutof garden. Bed preparation and planting of MAP. Protected structures – care and maintenance.Intercultural operations in flowers and MAP. Harvesting and post harvest handling of cut andloose flowers. Processing of MAP. Visit to commercial flower/MAP unit.

6. Post-harvest Management and Value Addition of Fruits and Vegetables 2(1+1)

Theory

Importance of post-harvest processing of fruits and vegetables, extent and possible causesof post harvest losses; Pre-harvest factors affecting postharvest quality, maturity, ripening and changes occurring during ripening; Respiration and factors affecting respiration rate; Harvesting and field handling; Storage (ZECC, cold storage, CA, MA, and hypobaric); Value addition concept;Principles and methods of preservation; Intermediate moisture food- Jam, jelly, marmalade,preserve, candy – Concepts and Standards; Fermented and non-fermented beverages. Tomatoproducts- Concepts and Standards; Drying/ Dehydration of fruits and vegetables – Concept andmethods, osmotic drying. Canning -– Concepts and Standards, packaging of products.

Practical

Applications of different types of packaging, containers for shelf life extension. Effect of temperature on shelf life and quality of produce. Demonstration of chilling and freezing injury in vegetables and fruits. Extraction and preservation of pulps and juices. Preparation of jam, jelly, RTS, nectar, squash, osmotically dried products, fruit bar and candy and tomato products, canned products. Quality evaluation of products -- physico-chemical and sensory. Visit to processing unit/ industry.

7. Landscaping 3(2+1)

Theory

Importance and scope of landscaping. Principles of landscaping, garden styles and types, terrace gardening, vertical gardening, garden components, adornments, lawn making, rockery, water garden, walk-paths, bridges, other constructed features etc. gardens for special purposes. Trees: selection, propagation, planting schemes, canopy management, shrubs and herbaceous

perennials: selection, propagation, planting schemes, architecture. Climber and creepers: importance, selection, propagation, planting, Annuals: selection, propagation, planting scheme, Other garden plants: palms, ferns, grasses and cacti succulents. Pot plants: selection, arrangement,management. Bio-aesthetic planning: definition, need, planning; landscaping of urban and ruralareas, Peri-urban landscaping, Landscaping of schools, public places like bus station, railwaystation, townships, river banks, hospitals, play grounds, airports, industries, institutions. Bonsai:principles and management, lawn: establishment and maintenance. CAD application.

Practical

Identification of trees, shrubs, annuals, pot plants; Propagation of trees, shrubs and annuals, care and maintenance of plants, potting and repotting, identification of tools and implements usedin landscape design, training and pruning of plants for special effects, lawn establishment andmaintenance, layout of formal gardens, informal gardens, special type of gardens (sunken garden,terrace garden, rock garden) and designing of conservatory and lathe house. Use of computersoftware, visit to important gardens/ parks/ institutes.

VIII. Micro propagation Technologies

Theory

Introduction, History, Advantages and limitations; Types of cultures (seed, embryo, organ, callus, cell), Stages of micropropagation, Axillary bud proliferation (Shoot tip and meristem culture, bud culture),Organogenesis (callus and direct organ formation), Somatic embryogenesis, cell suspension cultures, 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.

VIII. AGRICULTURAL ENGINEERING AND SOIL WATER CONSERVATION

1. Farm Machinery and Power 3(2+1)

Theory

Status of Farm Power in India, Sources of Farm Power, I.C. engines, working principles of I C engines, comparison of two stroke and four stroke cycle engines , Study of different components ofI.C. engine, I.C. engine terminology and solved problems, Familiarization with different systemsof I.C. engines: Air cleaning, cooling, lubrication ,fuel supply and hydraulic control system ofa tractor, Familiarization with Power transmission system : clutch, gear box, differential andfinal drive of a tractor , Tractor types, Cost analysis of tractor power and attached

implement,Familiarization with Primary and Secondary Tillage implement, Implement for hill agriculture,implement for intercultural operations, 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, Familiarizationwith lubrication and fuel supply system of engine, Familiarization with brake, steering, hydraliccontrol system of engine, Learning of tractor driving, Familiarization with operation of power tiller,Implements for hill agriculture, Familiarization with different types of primary and secondarytillage implements: mould plough, disc plough and disc harrow . Familiarization with seedcum-fertilizer drills their seed metering mechanism and calibration, planters and transplanterFamiliarization with different types of sprayers and dusters Familiarization with different intercultivationequipment, Familiarization with harvesting and threshing machinery.Measurement of irrigation water

2. Renewable Energy and Green Technology 2(1+1)

Theory

Classification of energy sources, contribution of these of sources in agricultural sector,Familiarization with biomass utilization for biofuel production and their application,Familiarization with types of biogas plants and gasifiers, biogas, bioalcohol, biodiesel and biooilproduction and their utilization as bioenergy resource, introduction of solar energy, collectionand their application, Familiarization with solar energy gadgets: solar cooker, solar water heater,application of solar energy: solar drying, solar pond, solar distillation, solar photovoltaic systemand their application, introduction of wind energy and their application.

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 photovoltaicsystem: solar light, solar pumping, solar fencing. To study solar cooker, To study solar dryingsystem. To study solar distillation and solar pond.

3. Protected Cultivation and Secondary Agriculture 2(1+1)

Theory

Green house technology: Introduction, Types of Green Houses; Plant response to Green house environment, Planning and design of greenhouses, Design criteria of green house for cooling and heating purposes. Green house equipments, materials of construction for traditional and low cost green houses. Irrigation systems used in greenhouses, typical applications, passive solar green house, hot air green house heating systems, green house drying. Cost estimation and economic

analysis.Important Engineering properties such as physical, thermal and aero & hydrodynamic properties of cereals, pulses and oilseed, their application in PHT equipment design and operation. Drying and dehydration; moisture measurement, EMC, drying theory, various drying method, commercial grain dryer (deep bed dryer, flat bed dryer, tray dryer, fluidized bed dryer, recirculatory dryer and solar dryer). Material handling equipment; conveyer and elevators, their principle, working and selection.

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.

4. Introductory Agro-meteorology and Climate Change 2(1+1)

Theory

Meaning and scope of agricultural meteorology; Earth atmosphere- its composition, extentand structure; Atmospheric weather variables; Atmospheric pressure, its variation with height;Wind, types of wind, daily and seasonal variation of wind speed, cyclone, anticyclone, land breezeand sea breeze; 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 profileof temperature, Energy balance of earth; Atmospheric humidity, concept of saturation, vaporpressure, process of condensation, formation of dew, fog, mist, frost, cloud; Precipitation, processof precipitation, types of precipitation such as rain, snow, sleet, and hail, cloud formation andclassification; Artificial rainmaking. Monsoon- mechanism and importance in Indian agriculture,Weather hazards - drought, floods, frost, tropical cyclones and extreme weather conditions such asheat-wave and cold-wave. Agriculture and weather relations; Modifications of crop microclimate,climatic normals for crop and livestock production. Weather forecasting- types of weather forecastand their uses. Climate change, climatic variability, global warming, causes of climate change andits impact on regional and national Agriculture.

Practical

Visit of Agro-meteorological Observatory, site selection of observatory, exposure ofinstruments 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 airtemperatures, its tabulation, trend and variation analysis. Measurement of soil temperatureand computation of soil heat flux. Determination of vapor pressure and relative

humidity.Determination of dew point temperature. Measurement of atmospheric pressure and analysis ofatmospheric conditions. Measurement of wind speed and wind direction, preparation of windrose. Measurement, tabulation and analysis of rain. Measurement of open pan evaporation andevapotranspiration. Computation of PET and AET.

5. Introductory Soil and Water Conservation 3(2+1)

Theory

Introduction to Soil and Water Conservation, causes of soil erosion. Definition and agents of soil erosion, water erosion: Forms of water erosion. Gully classification and control measures. Soil loss estimation by universal Loss Soil Equation. Soil loss measurement techniques. Principlesof erosion control: Introduction to contouring, strip cropping. Contour bund. Graded bund andbench terracing. Grassed water ways and their design. Water harvesting and its techniques. Winderosion: mechanics of wind erosion, types of soil movement. Principles of wind erosion controland its control measures.

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 water ways. Designof contour bunds. Design of graded bunds. Design of bench terracing system. Problem on winderosion.

6. Introduction to Forestry 3(2+1)

Theory

Introduction – definitions of basic terms related to forestry, objectives of silviculture, forest classification, salient features of Indian Forest Policies. 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 preliminaryconsiderations. Crown classification. Tending operations – weeding, cleaning, thinning –mechanical, ordinary, crown and advance thinning. Forest mensuration – objectives, diametermeasurement, instruments used in diameter measurement; Non instrumental methods of heightmeasurement - shadow and single pole method; Instrumental methods of height measurement- geometric and trigonometric principles, instruments used in height measurement; tree stemform, form factor, form quotient, measurement of volume of felled and standing trees, agedetermination of trees. 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 importantfast growing tree species of the region.

Practical

Identification of tree-species. Diameter measurements using calipers and tape, diameter measurements of forked, buttressed, fluted and leaning trees. Height measurement of standing trees by shadow method, single pole method and hypsometer. Volume measurement of logs using various formulae. Nursery lay out, seed sowing, vegetative propagation techniques. Forest plantations and their management. Visits of nearby forest based industries.

7. System Simulation and Agro-advisory 3(2+1) (Elective Course)

Theory

System Approach for representing soil-plant-atmospheric continuum, system boundaries, Crop models, concepts & techniques, types of crop models, data requirements, relational diagrams.Evaluation of crop responses to weather elements; Elementary crop growth models; calibration,validation, verification and sensitivity analysis. Potential and achievable crop production- conceptandmodelling techniques for their estimation. Crop production in moisture and nutrientslimited conditions; components of soil water and nutrients balance. Weather forecasting, types,methods, tools & techniques, forecast verification; Value added weather forecast, ITK for weatherforecast and its validity; Crop-Weather Calendars; Preparation of agro-advisory bulletin based onweather forecast. Use of crop simulation model for preparation of Agro-advisory and its effectivedissemination.

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

IX. AGRICULTURAL EXTENSION AND COMMUNICATION

1. Comprehension and Communication Skills in English 2(2+0)

Theory

War Minus Shooting- The sporting Spirit. A Dilemma- A layman looks at science Raymond B. Fosdick. You and Your English – Spoken English and broken English G.B. Shaw. Reading Comprehension, Vocabulary- Antonym, Synonym, Homophones, Homonyms, often confused words. Exercises to Help the students in the enrichment of vocabulary based on TOEFL and other competitive examinations. Functional grammar: Articles, Prepositions, Verb, Subject verb Agreement, Transformation, Synthesis, Direct and Indirect Narration. Written Skills: Paragraph writing, Precise writing, Report writing and Proposal writing. The Style: Importance of professional writing. Preparation of Curriculum Vitae and Job applications. Synopsis Writing. Interviews: kinds, Importance and process.

2. Fundamentals of Agricultural Extension Education 3(2+1)

Theory

Education: Meaning, definition & Types; Extension Education- meaning, definition, scope and process; objectives and principles of Extension Education; Extension Programme planning-Meaning, Process, Principles and Steps in Programme Development. Extension systems in

India: extension efforts in pre-independence era (Sriniketan, Marthandam, Firka Development Scheme, Gurgaon Experiment, etc.) and post-independence era (Etawah Pilot Project, Nilokheri Experiment, etc.); various extension/ agriculture development programmes launched by ICAR/ Govt. of India (IADP, IAAP, HYVP, KVK, IVLP, ORP, ND,NATP, NAIP, etc.). New trends in agriculture extension: privatization extension, cyber extension/ e-extension, market-led extension,farmer-led extension, expert systems, etc.
Rural Development: concept, meaning, definition; various rural development programmes launched by Govt. of India. Community Dev.-meaning, definition, concept & principles, Philosophy of C.D. Rural Leadership: concept and definition, types of leaders in rural context; extension administration: meaning and concept, principles and functions. Monitoring and evaluation: concept and definition, monitoring and evaluation of extension programmes; transfer of technology: concept and models, capacity building of extension personnel; extension teaching methods: meaning, classification, individual, group and mass contact methods, ICT Applications in TOT (New and Social Media), media mix strategies; communication: meaning and definition; Principles and Functions of Communication, models and barriers to communication. Agriculture journalism; diffusion and adoption of innovation: concept and meaning, 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 understandthe problems being encountered by the villagers/ farmers; to study organization and functioningof DRDA and other development departments at district level; visit to NGO and learning fromtheir experience in rural development; understanding PRA techniques and their application invillage development planning; exposure to mass media: visit to community radio and televisionstudio for understanding the process of programme production; script writing, writing for printand electronic media, developing script for radio and television.

3. Communication Skills and Personality Development 2 (1+1)

Theory

Communication Skills: Structural and functional grammar; meaning and process of communication, verbal and nonverbal communication; listening and note taking, writing skills, oral presentation skills; field diary and lab record; indexing, footnote and bibliographic procedures.Reading and comprehension of general and technical articles, precise writing, summarizing,abstracting; individual and group presentations, impromptu presentation, public speaking; Groupdiscussion. Organizing seminars and conferences.

Practical

Listening and note taking, writing skills, oral presentation skills; field diary and lab record; indexing, footnote and bibliographic procedures. Reading and comprehension of general and technical articles, precise writing, summarizing, abstracting; individual and group presentations.

4. Rural Sociology and Educational Psychology 2(2+0)

Theory

Sociology and Rural sociology: Definition and scope, its significance in agriculture extension, Social Ecology, Rural society, Social Groups, Social Stratification, Culture concept, Social Institution, Social Change & Development. Educational psychology: Meaning & its importance inagriculture extension. Behavior: Cognitive, affective, psychomotor domain, Personality, Learning,Motivation, Theories of Motivation, Intelligence.

5. Entrepreneurship Development and Business Communication 2 (1+1)

Theory

Concept of Entrepreneur, Entrepreneurship Development, Characteristics of entrepreneurs; SWOT Analysis & achievement motivation, Government policy and programs and institutions forentrepreneurship development, Impact of economic reforms on Agribusiness/Agri-enterprises,Entrepreneurial Development Process; Business Leadership Skills; Developing organizationalskill (controlling, supervising, problem solving, monitoring & evaluation), DevelopingManagerial skills, Business Leadership Skills (Communication, direction and motivationSkills), Problem solving skill, Supply chain management and Total quality management, ProjectPlanning Formulation and report preparation; Financing of enterprise, Opportunities for agri-entrepreneurshipand rural enterprise.

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.

6. Agricultural Journalism (Elective Course) 3(2+1)

Theory

Agricultural Journalism: The nature and scope of agricultural journalism characteristics andtraining of the agricultural journalist, how agricultural journalism is similar to and different fromother types of journalism. Newspapers and magazines as communication media: Characteristics;kinds and functions of newspapers and magazines, characteristics of newspaper and magazinereaders. Form and content of newspapers and magazines: Style and language of newspapers andmagazines, parts of newspapers and magazines. The agricultural story: Types of agricultural stories,subject matter of the agricultural story, structure of the agricultural story. Gathering agriculturalinformation: Sources of agricultural information, interviews, coverage of events, abstracting fromresearch and scientific materials, wire services, other agricultural news sources. Writing the story:Organizing the material, treatment of the story, writing the news lead and the body, readabilitymeasures. 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. Electingpictures and artwork for the agricultural story. Practice in editing, copy reading, headline and titlewriting, proofreading, layouting. Testing copy with a readability formula. Visit to a publishingoffice.

X. ANIMAL HUSBANDRY AND DAIRYING

1. Introductory Animal Husbandry 2(1+1)

Importance of live stock in agriculture and economy. Dairying under specialized and mixed farming. live stock and milk production statistics. Dairy Cattle and Buffaloes management: cattle and buffaloes breeds, breeding methods and systems, care and management of pregnant and mulching animals, raising of calves, management of heifer and bulls, maintenance of livestock records, milking methods and principles,clean milk production, feed and feeding,

Pig, Management: importance, important beeds, raising of piglet upto age of slaughter, general aspect of breeding, care of sow and boar.

Sheep and goat:importance, important beeds, raising of kids and lambs,breeding, feeding of goat and sheep.Health Management:Common animal diseases of cattle,buffalo, goat, sheep and swin *viz.*anthrex, BQ, HS, Brucellosis, Mastitis, swinfever and enterotoximea, vaccinartion schedule.

Practical

Judging of cattle, ship and wool. Detection of heat and pregnancy, computation of ration for different purposes of different animals. Milking methods, record keeping and use of quardrall in swains.

2. Livestock Production and Management 3 (2+1)

Theory

Important Indian and exotic breeds of cattle, buffalo, sheep, goat, swine.

Animal breeding and artificial insemination**:**Animal breeding-concepts and their application, breed improvement and policy, government and Non-government approaches for breed improvement. Role of livestock in the national economy Aims of breeder, Mendelian rules and its importance in livestock improvement, Heredity and variation, Elementary idea of essential and accessory organs of male and femalere productive system in different farm animals, Mechanism of gametogenesis and oestrus in farm animals, Methods and system of breeding in farm animals, their merits and demerits, Artificial Insemination (A.I.), their techniques and its importance in improvement of farm animals, Selection Methods, Sire indexing, cattle breeding problems in India and work so far done in this direction.

Animal feeding and fodder conservation:Classification of feeds stuffs. Proximate principles offeed and feeding. Nutrients and their functions. Feed ingredients for ration for livestock. Feedsupplements and feed additives, conservation of fodder. Customized feeds. Feed

formulation and standardization. Elementary idea of digestive system of ruminant and non-ruminant farm animals, Animal feeds & their classification, Evolution of feeding standards, Modern feeding standards, their merits and demerits and applicability under Indian conditions, Ration and its kind, principles of rationing, characteristics of ideal ration, food requirements for growth, reproduction, pregnancy, milk, work and wool production in farm animals, computation of ration. Calf feeding schedule and feeding of crossbred cows. Principles and methods of fodder preservation, Hay and Silage Making.

Dairy farm management and health care:Building, Location,Housingprinciples, space requirements for different species of livestock,various dairy farm buildings. (a) Fodder requirement: of a dairy farm and cropping scheme for the supply of succulent fodders throughout the year, pasture land and their management, Land &labour requirements for a dairy farm, maintenance of different essential dairy farm registers, purchase and culling of dairy cattle. (b) Animal Health & Hygiene:Health and diseases management policyfor livestock.Symptoms of ill health principles of immunzition, first aid in farm animals. Sterility in farm animals simple obstetrics in farm animals such as abonormalpasturisation, Retention of placenta, prolapse of uterus, milk fever, tymphanitis, impaction of rumen. Elementaryidea about poisoning in farm animals. General measure for prevention and control of infectious and contagious diseases, care of down calvers and newly born calf.

Practical

External body parts of cattle, buffalo, sheep, goat, swine . Handling and restrainingof livestock. Identification methods of farm animals. Visit to IDF and IPF to studybreeds of livestock and daily routine farm operations and farm records. Judging ofcattle, buffalo . Culling of livestock . Planning and layout of housing fordifferent types of livestock. Computation of rations for livestock. Formulation of concentratemixtures. Clean milk production, milking methods.
Management of livestock and vaccination.Economics of cattle, buffalo, sheep, goat and swine production.

3.DAIRY TECHNOLOGY 3(2+1)

Elementary idea of milk secretion, colostrums its nature and properties, composition. Physical properties & food value of milk, factors influencing, the quality and quantity of milk produced, PFA/BIS Specifications for different milks production or clean milk, adulteration of milk and its detection. MILK PROCESSING**:**Receiving of milk, staining, filteration, classification, standardization, cooling, pasteurization, sterilization and homogenization, packaging and distribution of milk, Cleaning and sanitization of dairy equipments and Machinery.**MILK MICRO ORGANISM:** Types of micro organism in milk, sources of contamination tests employed to ascertain the quality of milk & various quality control measures. Fermentation in milk. **MILK PRODUCTS:**Composition of cream, different methods of cream separation factors affecting the rechness of cream and essentials of successful cream separation objects of ripening natural cream ripening and ripening with starters, neutralization of cream for butter making.**BUTTER:** Composition of butter, making of butter from ripened cream. Sweet cream and whole milk Factors influencing churning Judging of butter common defects of butter and

their causes factors influencing the quality and composition of butter. **GHEE:**Manufacture of ghee from cream and butter. Composition, factors affecting the quality of ghee, AG marking of ghee.**FROZEN and FERMENTED MILK PROCUCTS:**Classification of ice-cream, Role of ingredients, standardization and manufacture of ice-cream. Defects in ice-cream, Marketing of ice-cream. Manufactures of fermented milk products such as Dahi. Cultured butter milk and yoghurt.Condensed and Evaporated milk product. Milk powders and baby food. **INDEGENIOUS MILK PRODUCTS:**Manufacturing techniques of various indigenous milk products such as Chenna&Paneer, Khoa, Rabbari.

PRACTICALS

Sampling of milk, Testing of milk for:(a) Specific gravity by Lactometer.
(b) Fat by Garber's method.(c) Solid not fat with the help of formula.(d) Total Solid with the help of Richmond's scale and formula. Determination of Acidity in milk.Detection of Adulteration of milk. (a) Extraction of fat or addition of separated milk. (b) Addition of water. (c) Addition of both separated milk and water.Standardization of milk and cream. Fitting and adjusting of cream separator.Manufacture of dairy product such as butter. Ghee, dahi, Khoachenna, rabbari and ice- cream.Cream separation and neutralization.Judging of milk products.

4. Principles of Food Science and Nutrition 2(1+1)

Theory

Concepts of Food Science (definitions, measurements, density, phase change, pH, osmosis, surface tension, colloidal systems etc.); Food composition and chemistry (water, carbohydrates, proteins, fats, vitamins, minerals, flavours, colours, miscellaneous bioactives, important reactions);Food microbiology (bacteria, yeast, moulds, spoilage of fresh & processed foods, Production offermented foods); Principles and methods of food processing and preservation (use of heat, lowtemperature, chemicals, radiation, drying etc.); Food and nutrition, Malnutrition (over and undernutrition), nutritional disorders; Energy metabolism (carbohydrate, fat, proteins); Balanced/modified diets, Menu planning, New trends in food science and nutrition.

Practical

Management of ph in different food, estimation of carbohydrate, protein and fat in different food and study about probiotic in food. Preparation of balance ration, staining of microorganism.

5.POULTRY PRODUCTION AND MANAGEMENT 3(2+1)

Development of poultry industry: Development of poultry industry in India and national poultry improvement plans, Different breeds of chickens for egg and meatproduction, crosses and their relative importance. **Anatomy and Physiology:** External feature of the Chickens, digestive and reproductive systems, formation and structure of the egg, nutritive value of egg, abnormalities of eggs. **Breeding:** Principles of breeding, Systems of breeding, breeding for egg production and development of strains of broilers selection and Culling, breeding practices. **Incubation of hatching eggs:** Selection handling and care of hatching eggs, natural and artificial incubation, types of incubators, embryo mortality and its cause, Factors affecting successful incubation, testing of eggs during incubation stages of embryo development during incubation

stages of embryo development during incubation sexing, vaccination packaging and transportation of day old Chicks.

Brooding of Chicks: Brooding requirements natural and artificial brooding care and management during brooding types of brooders used and their relative importance. **Feeding Principles and Practices:** Requirement of nutrients for different age groups of chickens and their sources in the ration composition formulation and preparation of poultry ration for different categories of chickens, various feeding practices used feed additive and supplements. **Housing,Equipments and Management:** Housing system; requirement of house of poultry requirement for different categories of birds, Equipments required in a poultry house, lighting arrangement for poultry, sanitation of poultry house, vaccination Common poultry disease, their control, prevention and treatment such as New Castle, Chicken pox coccidiosis makers and C.R.D. External and internal parasites of Poultry.

Practical

Study of external features of male and female chickens.Study of normal and abnormal eggs.Candling for hatching and marketing of the eggs.Debeaking of chickens.Demonstration of dissection of male and female chickens.Hatchery operations, incubation and hatching. equipmentsFormulation of poultry rations for different classes of chickens.Disinfection and litter management of poultry house.Vaccination and deworming of the poultry.Method of sexing of Day Old Chicks.Poultry records on commercial poultry farms.Selection and culling of layers.

6. Food Safety and Standards 3(2+1)

Theory

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. Food storage. Product design. Hygiene and Sanitationin Food Service Establishments- Introduction. Sources of contamination and their control. WasteDisposal. Pest and Rodent Control. Personnel Hygiene. Food Safety Measures. Food SafetyManagement Tools- Basic concepts. PRPs, GHPs, GMPs, SSOPs etc. HACCP. ISO series. TQM- concept and need for quality, components of TQM, Kaizen. Risk Analysis. Accreditation andAuditing, Water Analysis, Surface Sanitation and Personal Hygiene. Food laws and Standards-Indian Food Regulatory Regime, FSSA. Global Scenario CAC. Other laws and standards relatedto food. Recent concerns- New and Emerging Pathogens. Packaging, Product labeling andNutritional labeling. Genetically modified foods\ transgenics. Organic foods. Newer approachesto food safety. Recent Outbreaks. Indian and International Standards for food products.

Practical

Water quality analysis physico-chemical and microbiological. Preparation of different types of media. Microbiological Examination of different food samples. Assessment of surface sanitation by swab/rinse method. Assessment of personal hygiene. Biochemical tests for identification of bacteria. Scheme for the detection of food borne pathogens. Preparation of plans for Implementation of FSMS - HACCP, ISO: 22000.

1. NSS/NCC/Rovers and Rangers/Physical Education & Yoga Practices 2 (0+2) NON-GRADIAL COURSES

Theory

Course aims at evoking social consciousness among students through various activities viz., working together, constructive and creative social work, to be skilful in executing democratic leadership, developing skill in programme development to be able for self employment, reducing gap between educated and uneducated, increasing awareness and desire to help sections of society.

Following activities are to be taken up under the NSS course:

1. Introduction and basic components of NSS: Orientation
2. NSS programmes and activities
3. Understanding youth
4. Community mobilisation
5. Social harmony and national integration
6. Volunteerism and shramdan
7. Citizenship, constitution and human rights
8. Family and society
9. Importance and role of youth leadership
10. Life competencies
11. Youth development programmes
12. Health, hygiene and sanitation
13. Youth health, lifestyle, HIV AIDS and first aid
14. Youth and yoga
15. Vocational skill development
16. Issues related environment
17. Disaster management
18. Entrepreneurship development
19. Formulation of production oriented project
20. Documentation and data reporting
21. Resource mobilization
22. Additional life skills
23. Activities directed by the Central and State Government

All the activities related to the National Service Scheme course is distributed under four different courses viz., National Service Scheme I, National Service Scheme II, National Service Scheme III and National Service Scheme IV each having one credit load. The entire four courses should be offered continuously for two years. A student enrolled in NSS course should put in at least 60 hours of social work in different activities in a semester other than five regular one day camp in a year and one special camp for duration of 7 days at any semester break period in the twoyear. Different activities will include orientation lectures and practical works. Activities

directed by the Central and State Government have to be performed by all the volunteers of NSS as per direction.

SYLLABUS

Semester I

Course Title: National Service Scheme I

Introduction and basic components of NSS:

Orientation: history, objectives, principles, symbol, badge; regular programmes under NSS, organizational structure of NSS, code of conduct for NSS volunteers, points to be considered by NSS volunteers awareness about health

NSS programmes and activities

Concept of regular activities, special camping, day camps, basis of adoption of village/slums, conducting survey, analysing guiding financial patterns of scheme, youth programme/ schemes ofGOI, coordination with different agencies and maintenance of diary

Understanding youth

Definition, profile, categories, issues and challenges of youth; and opportunities for youth who is agent of the social change

Community mobilisation

Mapping of community stakeholders, designing the message as per problems and their culture; identifying methods of mobilisation involving youth-adult partnership

Social harmony and national integration

Indian history and culture, role of youth in nation building, conflict resolution and peacebuilding

Volunteerism and shramdan

Indian tradition of volunteerism, its need, importance, motivation and constraints; shramdan as part of volunteerism

Citizenship, constitution and human rights

Basic features of constitution of India, fundamental rights and duties, human rights, consumer awareness and rights and rights to information

Family and society

Concept of family, community (PRIs and other community based organisations) and society

Semester II

Course Title: National Service Scheme II

Importance and role of youth leadership

Meaning, types and traits of leadership, qualities of good leaders; importance and roles of youth leadership

Life competencies

Definition and importance of life competencies, problem-solving and decision-making, inter personal communication

Youth development programmes

Development of youth programmes and policy at the national level, state level and voluntary sector; youth-focused and youth-led organisations

Health, hygiene and sanitation

Definition needs and scope of health education; role of food, nutrition, safe drinking water, water born diseases and sanitation (Swachh Bharat Abhiyan) for health; national health programmes and reproductive health.

Youth health, lifestyle, HIV AIDS and first aid

Healthy lifestyles, HIV AIDS, drugs and substance abuse, home nursing and first aid

Youth and yoga

History, philosophy, concept, myths and misconceptions about yoga; yoga traditions and its impacts, yoga as a tool for healthy lifestyle, preventive and curative method

Semester III

Course Title: National Service Scheme III

Vocational skill development

To enhance the employment potential and to set up small business enterprises skills of volunteers, a list of 12 to 15 vocational skills will be drawn up based on the local conditions and opportunities. Each volunteer will have the option to select two skill-areas out of this list

Issues related environment

Environmental conservation, enrichment and sustainability, climatic change, natural resource management (rain water harvesting, energy conservation, forestation, waste land development and soil conservations) and waste management

Disaster management

Introduction and classification of disaster, rehabilitation and management after disaster; role of NSS volunteers in disaster management.

Entrepreneurship development

Definition, meaning and quality of entrepreneur; steps in opening of an enterprise and role of financial and support service institution.

Formulation of production oriented project

Planning, implementation, management and impact assessment of project

Documentation and data reporting

Collection and analysis of data, documentation and dissemination of project reports

Semester IV

Course Title: National Service Scheme IV

Youth and crime

Sociological and psychological factors influencing youth crime, cyber crime, pear mentoring in preventing crime and awareness for juvenile justice

Civil/self defence

Civil defence services, aims and objectives of civil defence; needs and training of self defence

Resource mobilisation

Writing a project proposal of self fund units (SFUs) and its establishment

Additional life skills

Positive thinking, self confidence and esteem, setting life goals and working to achieve them,

management of stress including time management.

National Cadet Corps Credit hours: 2(0+2)

Semester I: National Cadet Corps

1. Aims, objectives, organization of NCC and NCC song. DG's cardinals of discipline.
2. Drill- aim, general words of command, attention, stands at ease, stand easy and turning.
3. Sizing, numbering, forming in three ranks, open and close order march and dressing.
4. Saluting at the halt, getting on parade, dismissing and falling out.
5. Marching, length of pace, and time of marching in quick/slow time and halt. Side pace, pace forward and to the rear.
6. Turning on the march and wheeling. Saluting on the march.
7. Marking time, forward march and halt.
8. Changing step, formation of squad and squad drill.
9. Command and control, organization, badges of rank, honours and awards
10. Nation Building- cultural heritage, religions, traditions and customs of India. National integration.
11. Values and ethics, perception, communication, motivation, decision making, discipline and duties of good citizen.
12. Leadership traits, types of leadership. Character/personality development.
13. Civil defense organization, types of emergencies, fire fighting, protection,
14. Maintenance of essential services, disaster management, aid during development projects.
15. Basics of social service, weaker sections of society and their needs, NGO's and their contribution,

contribution of youth towards social welfare and family planning.

16. Structure and function of human body, diet and exercise, hygiene and sanitation.
17. Preventable diseases including AIDS, safe blood donation, first aid, physical and mental health.
18. Adventure activities
19. Basic principles of ecology, environmental conservation, pollution and its control.
20. Precaution and general behaviour of girl cadets, prevention of untoward incidents, vulnerable parts of the body, self defense.

Semester II: National Cadet Corps

1. Arms Drill- Attention, stand at ease, stand easy. Getting on parade. Dismissing and falling out. Ground/take up arms, examine arms.
2. Shoulder from the order and vice-versa, present from the order and vice-versa.
3. Saluting at the shoulder at the halt and on the march. Short/long trail from the order and viceversa.
4. Guard mounting, guard of honour, Platoon/Coy Drill.
5. Characteristics of rifle (.22/.303/SLR), ammunition, fire power, stripping, assembling, care, cleaning and sight setting.
6. Loading, cocking and unloading. The lying position and holding.
7. Trigger control and firing a shot. Range Procedure and safety precautions. Aiming and

alteration of sight.
8. Theory of groups and snap shooting. Firing at moving targets. Miniature range firing.
9. Characteristics of Carbine and LMG.
10. Introduction to map, scales and conventional signs. Topographical forms and technical terms.
11. The grid system. Relief, contours and gradients. Cardinal points and finding north. Types of bearings and use of service protractor.
12. Prismatic compass and its use. Setting a map, finding north and own position. Map to ground and ground to map.
13. Knots and lashings, Camouflage and concealment, Explosives and IEDs.
14. Field defenses obstacles, mines and mine lying. Bridging, waterman ship
15. Field water supplies, tracks and their construction.
16. Nuclear, Chemical and Biological Warfare (NCBW)
17. Judging distance. Description of ground and indication of landmarks.
18. Recognition and description of target. Observation and concealment. Field signals. Section formations.
19. Fire control orders. Fire and movement. Movement with/without arms. Section battle drill.
20. Types of communication, media, latest trends and developments.

Physical Education and Yoga Practices Credit hours: 2(0+2) (0+2)
Semester I: Physical Education and Yoga Practices
1. Teaching of skills of Football – demonstration, practice of the skills, correction, involvement in game situation (For girls teaching of Tennikoit)
2. Teaching of different skills of Football – demonstration, practice of the skills, correction, involvement in game situation (For girls teaching of Tennikoit)
3. Teaching of advance skills of Football – involvement of all the skills in game situation with teaching of rules of the game
4. Teaching of skills of Basketball – demonstration, practice of the skills, correction of skills, involvement in game situation
5. Teaching of skills of Basketball – demonstration, practice of the skills, involvement in game situation
6. Teaching of skills of Basketball – involvement of all the skills in game situation with teaching of rule of the game
7. Teaching of skills of Kabaddi – demonstration, practice of the skills, correction of skills, involvement in game situation
8. Teaching of skills of Kabaddi – demonstration, practice of the skills, correction of skills, involvement in game situation
9. Teaching of advance skills of Kabaddi – involvement of all the skills in game situation with teaching of rule of the game
10. Teaching of skills of Ball Badminton – demonstration, practice of the skills, correction of skills, involvement in game situation
11. Teaching of skills of Ball Badminton – involvement of all the skills in game situation with

teaching of rule of the game
12. Teaching of some of Asanas – demonstration, practice, correction and practice
13. Teaching of some more of Asanas – demonstration, practice, correction and practice
14. Teaching of skills of Table Tennis – demonstration, practice of skills, correction and practice and involvement in game situation
15. Teaching of skills of Table Tennis – demonstration, practice of skills, correction and practice and involvement in game situation
16. Teaching of skills of Table Tennis – involvement of all the skills in game situation with teaching
of rule of the game
17. Teaching – Meaning, Scope and importance of Physical Education
18. Teaching – Definition, Type of Tournaments
19. Teaching – Physical Fitness and Health Education
20. Construction and laying out of the track and field (*The girls will have Tennikoit and Throw Ball).

Semester II: Physical Education and Yoga Practices

1. Teaching of skills of Hockey – demonstration practice of the skills and correction.
2. Teaching of skills of Hockey – demonstration practice of the skills and correction. And involvement of skills in games situation
3. Teaching of advance skills of Hockey – demonstration practice of the skills and correction. Involvement of all the skills in games situation with teaching of rules of the game
4. Teaching of skills of Kho-Kho – demonstration practice of the skills and correction.
5. Teaching of skills of Kho-Kho – demonstration practice of the skills and correction. Involvement of the skills in games situation
6. Teaching of advance skills of Kho-Kho – demonstration practice of the skills and correction. Involvement of all the skills in games situation with teaching of rules of the game
7. Teaching of different track events – demonstration practice of the skills and correction.
8. Teaching of different track events – demonstration practice of the skills and correction.
9. Teaching of different track events – demonstration practice of the skills and correction with competition among them.
10. Teaching of different field events – demonstration practice of the skills and correction.
11. Teaching of different field events – demonstration practice of the skills and correction.
12. Teaching of different field events – demonstration practice of the skills and correction.
13. Teaching of different field events – demonstration practice of the skills and correction with competition among them.
14. Teaching of different asanas – demonstration practice and correction.
15. Teaching of different asanas – demonstration practice and correction.
16. Teaching of different asanas – demonstration practice and correction.
17. Teaching of different asanas – demonstration practice and correction.
18. Teaching of weight training – demonstration practice and correction.
19. Teaching of circuit training – demonstration practice and correction.

20. Teaching of calisthenics – demonstration practice and correction.

Note: 1) Compulsory Uniform: Half pants, Tee Shirts, Shoes and socks all white (Girls will have white Tee Shirt and Track pants) 2) The games mentioned in the practical may be inter changed depending on the season and facilities.

organizational structure of NSS, code of conduct for NSS volunteers, points to be considered by NSS volunteers awareness about health

NSS programmes and activities

Concept of regular activities, special camping, day camps, basis of adoption of village/slums, conducting survey, analysing guiding financial patterns of scheme, youth programme/ schemes ofGOI, coordination with different agencies and maintenance of diary

Understanding youth

Definition, profile, categories, issues and challenges of youth; and opportunities for youth who is agent of the social change

Community mobilisation

Mapping of community stakeholders, designing the message as per problems and their culture; identifying methods of mobilisation involving youth-adult partnership

Social harmony and national integration

Indian history and culture, role of youth in nation building, conflict resolution and peacebuilding

Volunteerism and shramdan

Indian tradition of volunteerism, its need, importance, motivation and constraints; shramdan as part of volunteerism

Citizenship, constitution and human rights

Basic features of constitution of India, fundamental rights and duties, human rights, consumer awareness and rights and rights to information

Family and society

Concept of family, community (PRIs and other community based organisations) and society

Semester II

Course Title: National Service Scheme II

Importance and role of youth leadership

Meaning, types and traits of leadership, qualities of good leaders; importance and roles of youth leadership

Life competencies

Definition and importance of life competencies, problem-solving and decision-making, inter personal communication

Youth development programmes

Development of youth programmes and policy at the national level, state level and voluntary sector; youth-focused and youth-led organisations

Health, hygiene and sanitation

Definition needs and scope of health education; role of food, nutrition, safe drinking water, water born diseases and sanitation (Swachh Bharat Abhiyan) for health; national health programmes and reproductive health.

Youth health, lifestyle, HIV AIDS and first aid

Healthy lifestyles, HIV AIDS, drugs and substance abuse, home nursing and first aid

Youth and yoga

History, philosophy, concept, myths and misconceptions about yoga; yoga traditions and its impacts, yoga as a tool for healthy lifestyle, preventive and curative method

Semester III

Course Title: National Service Scheme III

Vocational skill development

To enhance the employment potential and to set up small business enterprises skills of volunteers, a list of 12 to 15 vocational skills will be drawn up based on the local conditions and opportunities. Each volunteer will have the option to select two skill-areas out of this list

Issues related environment

Environmental conservation, enrichment and sustainability, climatic change, natural resource management (rain water harvesting, energy conservation, forestation, waste land development and soil conservations) and waste management

Disaster management

Introduction and classification of disaster, rehabilitation and management after disaster; role of NSS volunteers in disaster management.

Entrepreneurship development

Definition, meaning and quality of entrepreneur; steps in opening of an enterprise and role of financial and support service institution.

Formulation of production oriented project

Planning, implementation, management and impact assessment of project

Documentation and data reporting

Collection and analysis of data, documentation and dissemination of project reports

Semester IV

Course Title: National Service Scheme IV

Youth and crime

Sociological and psychological factors influencing youth crime, cyber crime, pear mentoring in preventing crime and awareness for juvenile justice

Civil/self defence

Civil defence services, aims and objectives of civil defence; needs and training of self defence

Resource mobilisation

Writing a project proposal of self fund units (SFUs) and its establishment

Additional life skills

Positive thinking, self confidence and esteem, setting life goals and working to achieve them, management of stress including time management.

3.Human Value and Ethics **1(1+0)**

Theory

Values and Ethics-An Introduction. Goal and Mission of Life. Vision of Life. Principles and Philosophy. Self Exploration. Self Awareness. Self Satisfaction. Decision Making. Motivation. Sensitivity. Success. Selfless Service. Case Study of Ethical Lives. Positive Spirit. Body, Mind andSoul. Attachment and Detachment. Spirituality Quotient. Examination.

Minimum Standards for Establishing a College of Agriculture

1. Degree Nomenclature: B.Sc. (Hons.) Agriculture

2. Eligibility Criteria :10+2 or intermediate with PCMB, PCB, PCM or Agriculture (P - Physics,
C - Chemistry, M - Mathematics, B – Biology) from a recognised Board/university.

3. Medium of Instruction: English

4. MinimumIntake: 60 students per year

5. Divisions/Departments/Sections

1. Agronomy
2. Agricultural Economics and Statistics
3. Agricultural Extension and Communication
4. Agricultural Entomology
5. Genetics and Plant Breeding
6. Horticulture
7. Soil Science and Agricultural Chemistry
9. Plant Pathology
10. Animal Husbandry and Dairying
14. Agricultural Engineering

Note: To reduce the number,the subjects which have only one or two courses may be mergedwith major Division/Department. Colleges/Universities have liberty to do this at their level.However, for practical purposes following model has been proposed giving minimum teachingstaff required for each Division/Department taking into account the merger of related subjects.

6. Divisions/Departments/Sections proposed along with Cadre-wise teaching staff required.

Divisions/Departments

1. Agronomy

2. Agricultural Economics (BasicEconomics, Mathematics, Computer Scienceand Statistics)
3. Agriculture Extension and Communication (Sociology and Psychology, English, Agricultural
Journalism)
4. Agricultural Entomology
5. Genetics & Plant Breeding (Seed Science, Biotechnology,Crop Physiologyand Environmental
Sciences)
6. Horticulture
7. Soil Science and Agricultural Chemistry (Biochemistry, Environmental Sciences)
8. Plant Pathology and Microbiology,
9. Soil Conservation (Agro-forestry, Agro-meteorology)
10. Animal Sciences-Animal Husbandry and Dairying (Poultry units, Food Science &Technology)
11. Agriculture Engineering

Note: Total strength after four years should have 45 teachers as faculty. However, in extremecases, it can be 31 and few courses viz. Basic Sciences, and Humanities, Mathematics and ComputerSciences, etc. can be completed by hiring the teachers.

7. Infrastructure facilities (Floor space required)

1. Dean Office	1	20x24
2. P.A. Room	1	10x12
3. Committee Room with video conferencing facility	1	20x30
4. Assistant Administrative Officer including staff	1	20x12
5. Assistant Accounts Officer including staff	1	20x12
6. Assistant Academic Officer including staff	1	20x12
7. Exam Cell (300 capacity)	1	20x12
8. Evaluation Room	1	20x36
9. Faculty Room (Ladies)	1	10x12
10. Faculty Room (Gents)	1	20x12
11. Placement Cell	1	20x12
12. Smart Lecture Halls	5	40x30 (60 capacity)
13. Exam Hall Cum Auditorium	1	100x50
14. Library/Book Bank	1	30x72
15. Common Utility Room	1	20x36
16. Central Laboratory	1	50x36

17. Hostels including Mess, Gym/Indoor, Reading Room,Warden Room, Store etc. 1 (boys) 150,1 (girls) 150
18. Canteen 120x12 (kitchen withstore)20x36 Seating
19. Wash room (with toilet & urinary facilities) 10 20x12 (keeping ladiesrequirements)
20. Parking space As per requirement
21. Farm stores, threshing yards including implements andtractor sheds, One core, complex
22. VehiclesCar 1(Jeep/Car -staff 2,Bus 1,Pickup van 1,Motor Bikes 2,Minibus (30 capacity) 1, Tractors 2
23. Drinking water and irrigation facilities As per requirements
24. Vehicles shed 1 10x80

Divisions/Departments/Sections – Requirements

No. Details No. of Rooms Dimensions(ft)

1. Office of Head 11 24x12 with wash room facility
2. Faculty Rooms 1+1 12 12x10 + 18x1224x10 depending on the strength of each deptt.
3. Clerical/technical staff 12 12x10 to 24x10 depending on the strength of each deptt.
5. Laboratories 12 30x 60 Larger deptt. will have two
6. Field/Lab Stores 5

1. Agronomy
2. Genetics and Plant Breeding
3. Soil Science and Agricultural Chemistry
4. Horticulture
5. Pests & Chemicals

7. Green house/poly house/Nursery facilities (Horticulture Deptt.) 0.02 ha

Requirements of Lab/field equipment for each Division/Department/Section)

1. Agronomy

1. Crop Cafeteria . acre land, small implements like spade,hoe, khurpi, darati etc.
2. Museum for identification of seeds, fertilizer, weeds, commonly usedagro-chemical and medicinal and aromatic plants etc.

Storage bottle ,Herbarium posting material

3. Field of sowing method, fertilizer application, irrigation and soilproductivity and yield estimationSmall equipment/ implement

Equipment Number

i. Hot air oven 02
ii Moisture box 30
iii Moisture meter 05
iv Tube Auger 10
v Bucket auger 10
vi Weighing Balance 01

vii Seed Germinator 02
viii Conductivity Meter 01
ix pH Meter 02
x Water Bath 01
xi Shaker 01
xii Chlorophyll Meter 01
xiii Drip and Sprinkler System 03
xiv Sprayer 03
xv Spring Balance 50 Kg 05
xvi Spring Balance 10 Kg 05
xvii Top Pan Balance 1 kg capacity 05
xviii Top Pan Balance 2 kg capacity 05
xix Meter Scale 10
xx Tape 05
xxi Brix meter 02

2. Agricultural Economics + (Basic Economics, Maths& Computer Science and Statistics)

1. Computers 15
2. Camera 01
3. Software As per requirement

3. Agriculture Extension & Communication + (Sociology and Psychology, English)Audio-visual Lab

1. LCD projector 1
2. Camera (SLR) with zoom, wide-angle, tele-photo lens 1
3. Video camera with tripod, lighting accessories and editing facility 1
4. Computers (workstation) with editing softwares 1
5. Digital voice recorders 5
6. Audio recording-mixing consoles 1
7. Computation softwares for statistics

4. Entomology

1. Binocular Microscope 20
2. Insect Box 60
3. Insect Collection Nets 60
4. Collection Bottles 60
5. Insect Collection Big Boxes for Museum (1 for each order) 29
6. Insecticides for showing students/Representative for each group As per requirement
7. Stereomicroscope 01
8. Electronic Balance 01
9. Soxhlet Extraction Apparatus 01

10. Bee keeping equipment 01 Set
11. Oven 01
12. PattersTower 01
13. Sprayers 01 of each type
14. Light traps 01 set
15. Fumigation Chamber 01
16. Sides/cover slips as per requirement
17. pH meter 01
18. Computer with printer 01 set

5. Genetics and Plant Breeding + (Crop Physiology, Biotechnology, Seed Science & Technology)

1. Microscope 10
2. Binocular microscope 10
3. Electronic Moisture Meter 02
4. Electronic Balance 02
5. Seed Germinator 02
6. Automatic seed/grain counter 01
7. Hot Air Oven 01
8. BOD Incubator 01
9. Fluorescence microscope 01
10. Centrifuge 01
11. Growth Chamber 01
12. Distillation Assembly 01

6. Horticulture + (Food Science & Technology)a. Labs (Post Harvest)

1 Hand Refractometer 05
2 Digital Refractometer 02
3 Oven 01
4 Refrigerator 01
5 Electronic Weighing Balance 02
6 Pan Balance (1 kg & 10 kg. capacity each) 02
7 Deep Freezer 01
8 pH Meter 01
9 Fruit crusher 01
10 Grinding and Mixing Machine 01
11 Distillation Assembly 01

b. Lab (UG Lab)No. Items Nos.

1. Seed Germinator 02
2. Grafting and budding knife 60
3. Secateur 60
4. Saw 05

5. Loppers 05
6. Mist Chamber 01
7. Poly house with drip irrigation system 02
8. Microscope

c. Food Science & Technology

No. Items Nos.

1. Refrigerator 1
2. Muffle furnace 1
3. Weighing balance 2
4. Water bath 2
5. Hot air oven 2
6. Fruit penetrometer 2
7. Pulper 1
8. Juice extractor 1
9. Crown corking machine 1
10. Spectrophotometer 1
12. Microwave oven 1
13. Baking oven 1
14. Sieve shaker 1
15. Poly pouch sealer 1
16. Crusher 1
17. Masala grinder 1
18. Dehydrator 1
19. Cold room 1
20. Vacuum pump

7. Agricultural Chemistry and Soil Science + (Biochemistry, Microbiology, EnvironmentalSciences)

1. Electronic Top pan balance (0.1 g capacity) 02
2. Electronic Top pan balance (1 mg capacity) 02
3. Hot air oven 02
4. pH Meter 05
5. EC Meter 05
6. Flame Photometer 01
7. Visible spectrophotometer 01
8. Hot Plate 02
9. Distilled water unit 02
10. Water Bath 01
11. Rotary Shaker 02
12. Binocular Microscope 20
13. BOD Incubator 02

14. Autoclave 02
15. Laminar Air Flow 01
16. Microwave oven 01
17. Digestion block 02
18. Hydrometer 05
19. Infiltrometer 02
20. Hydraulic conductivity meter 01
21. Atterberg'slimitsmeter 05
22. Nitrogen Analyser 02
23. GPS 10
24. AWS 01
25. Lysimeter 01
26. Luxmeter 02
27. Solar Pyranometer 01
28. Nitrogen Distillation Unit 01
29.Chromatography equipment-01
30.Soil sampling tools 01 set
31.Moisture box 30
32.Moisture meter 05
33.Tube Auger 10
34. Bucket auger 10
35.Weighing Balance 01
36. Chlorophyl Meter 01
37.Centrifuge machine 01

8. Soil Conservation including Agro-meteorology and Agroforestry

1. Thermometer Max 05
2. Thermometer Min 05
3. Digital Anemometer 02
4. Cup Anemometer 02
5. Pan Evaporimeter 01
6. Soil thermometer05 cm.10 cm.15 cm.05,05,05,
7. Rain gauge 01
8. Self-recording Rain gauge 01
9. Sunshine Recorder 01
10. Stevenson's Screen 01
11. Thermograph 01
12. Hygrograph 01
13. Soil Heat Flux Plate 01

9. Plant Pathology

1. Microscope compound with photodisplay arrangement 03

2. Sterobinocular 05
3. Sample processing Board (Dry preservation of samples) 04
4. Wet preservation Jars 50
5. Autoclave 02
6. Oven 01
7. Deep Freeze 01
8. Centrifuge (3000 rpm) 01
9. Refrigerator 01
10. Water bath 02
11. Electronic balance 02
12. Weighing machine 01
13. Incubator 02
14. Occular meter 05
15. Stage Micrometer 05
16. Camera Lucida 05

10. Animal Sciences including Dairy & Poultry

1. 5000/6500 Feed and Forage Analyzer 01
2. Hand and electric centrifuge 01
3. Analytical balance 01
4. Hot air oven 01
5. Micro kjeldahl N digestion & distillation apparatus 01
6. Soxhlet unit for fat estimation 01
7. Hot plate, Fiber Tech. 01
8. Vacuum pump 01
9. Willy mill grinder 01
10. Platform balance (100 kg cap) 01
11. Gerber centrifuge unit (for milk fat testing) 01
12. Milk analyzer (automatic) 01
13. Crude fiber estimation unit 01
14. Distilled water unit 01
15. Incubator cum hatcher 01
16. Brooder machine 01
17. Feeder 01
18. Waterer 01
19. Egg candling machine 01
20. Debeaker 01
21. Vaccinator 01
22. Milking machine As per requirements
23. Milking bucket As per requirement
24. Milking can As per requirements

25. Animal and bird identification tools As per requirement
26. Chaff cutter 01
27. Lactometer 01
28. Castrator 01
29. Shearer 01
30. Electric dehorner 01
31. Artificial vagina 01
32. Common medication device 01
33. Cattle crate 01

11. Agriculture Engineering

No. Items Nos.

1. Working models of MB plough, Disk plough and indigenous plough 2 sets each
2. Working model of different harrows Actual
3. Seed drill 01
4. Different types of threshing drums As per requirement
5. Working models of reaper and mowers 02
6. Different types of sprayers and dusters As per requirement
7. Cut model of CI & SI engine 01
8. Cut model of Tractor 01

12. Central Library and Information System

1. Internet Server 01
2. Intranet Server 01
3. Computers for Reading Hall 20
4. Heavy Duty Photocopiers 02
5. Computerized Issue and Catalogue Systems 02
6. Wi-Fi facility in college/library/hostels As per requirement
7. CCTV monitoring system for library 01
8. RFID and Access Control System (Optional) 01
9. Broadband Internet Connectivity with minimum speed of 1Gbps

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