

CBCS Based Study & Evaluation Scheme

(As per ICAR Fifth Deans' Committee Recommendations)

of

Bachelor of Science (Hons.) Agriculture

[Applicable w.e.f. Academic Session 2019-2020 till revised]



TEERTHANKER MAHAVEER UNIVERSITY

N.H.-24, Delhi Road, Moradabad, Uttar Pradesh-244001

www.tmu.ac.in





Study & Evaluation Scheme

SUMMARY

<u>Study & Evaluation Scheme</u>	
<u>SUMMARY</u>	
Institute Name	Teerthankar Mahaveer College of Agriculture Sciences
Programme	Bachelor of Science (Hons.) Agriculture
Duration	Four Years full time (Eight Semesters)
Medium	English/Hindi
Minimum Required Attendance	75%
<u>Credits</u>	
Maximum Credits	192
Minimum Credits Required for Degree	184

Assessment:					
Evaluation			Internal	External	Total
Theory			40	60	100
Practical/ Dissertations/ Project Reports/ Viva-Voce			50	50	100
Class Test-1	Class Test-2	Class Test-3	Assignment(s)	Attendance & Participation	Total
Best two out of three					
10	10	10	10	10	40
Duration of Examination			Internal	External	
			1.5 Hours	3 Hours	

(To qualify the course a student is required to secure a minimum of 45% marks in aggregate in each course including the semester-end examination and the teacher's continuous evaluation shall be essential for passing the course and earning its assigned credits. A student, who secures less than 45% marks in a course, shall be deemed to have failed in that course.)

Question Paper Structure

Question paper shall have two sections and examiner shall set questions specific to respective sections. Section wise details shall be as under:

Section-1: It will consist of short answer type questions. The length of answers in this segment should not exceed 50 words. This section will essentially assess the course outcomes (COs) related to “Remembering” and “Understanding”. This section will contain five questions (one from each unit) and every question shall have an option with it from the same unit. Each question shall have equal weightage of two marks and the total weightage of this section shall be 10 marks.

Section-2: It shall consist of five long answer type questions and each question should assess a specific CO. The questions should be from the entire syllabus with an “or” option which assesses the same CO. Each question shall have equal weightage of 10 Marks and total weightage of this section shall be 50 Marks.

There must be at least one question from entire syllabus to assess the specific element of higher level of learning. Every question in this section must essentially assess at least one of the following aspects of learning:

“Applying”, “Analyzing”, “Evaluating” and “Creating”/ “Designing”/“Developing”.

The questions must be designed in such a way that it assesses the concerned COs in entirety. It means a question may have multiple parts depending upon the requirement of the specific course outcome.

Usually, each question paper should be designed to have a numerical component as per the course (wherever applicable).

Programme Structure- B.Sc. (Hons.) Agriculture

A. Introduction:

Agriculture sector is an integral part of development and economic growth of a nation. Agriculture plays a key role in the economy of developing countries and provides food, income and job opportunities to a significant portion of population. The curriculum of Agriculture studies offers a wide range of learning and paves way to widespread opportunities to learners as professionals or entrepreneurs. Some of the agriculture core and allied areas that are designed in the curriculum are - Plant Sciences, Agronomy, Entomology, Agricultural Economics, Agricultural Extension and Communication, Genetics and Plant Breeding, Plant Pathology, Horticulture, Crop Modeling, Animal Sciences, Soil Science, Crop Physiology, Agricultural Engineering, Agro Forestry, Food Science, Seed Science and Technology, Agro Meteorology, Environmental Sciences, Microbiology, Floriculture, Vegetable Science, Production Techniques and Pest Management etc.

Agriculture study is a fine blend of classroom teaching and hands-on training at the field. Therefore, the teaching pedagogy is an excellent mix of these two aspects of learning. Students are made aware about the pedagogical tools at various stages of the program. Complete plan of teaching discourse is shared with the stakeholders and the faculty follows the teaching plan as per the schedule. The teaching pedagogy involves class room teaching, role plays, home and class assignments, lesson plan, field works at demonstration and regular fields, hands-on training etc. Keeping in view the consciousness and sensitization of students on various issues, the college ensures learning of students through various outreach programs too. National Service Scheme (NSS) unit of college leaves no stone unturned to meet the objectives laid through this program.

B.Sc. (Hons.) Agriculture : Four-Year (8-Semester) CBCS Programme			
Basic Structure: Distribution of Courses			
S.No.	Type of Course	No. of Courses	Credits
1	Core Course (CC)	91	115
2	Remedial Courses (RC)	01	02
3	Value Added Course (VAC)	03	02
4	Ability Enhancement Course (AEC)	10	20
5	Discipline Specific Elective Course (DSEC)	06	09
6	Open Electives Course (OEC)	02	-
7	Skill Enhancement Courses (SEC)	02	4
8	Student READY Programme (Rural Agricultural Work Experience (RAWE) and Experience Learning Programme)	03	40
	Total	119	192

B. Choice Based Credit System (CBCS)

Following is the course module designed for the B.Sc. (Hons.) Agriculture programme:

1. Core Course (CC): A wide range of core courses are provided in the basic agriculture disciplines like agronomy, entomology, horticulture, plant pathology, agriculture economics, statistics etc. Core courses are offered in semester I, II, III, IV, V, and VII during the B.Sc. (Hons.) Agriculture programme.

2. Remedial Courses (RC): These courses are offered in Ist semester of programme. Students having Biology in intermediate (10+2) register for Elementary Mathematics (BAG108) whereas the students having Mathematics register for Introductory Biology (BAG107). Other students choose any of the above two courses.

3. Value added course (VAC) Value added courses include *Practical Crop Production*, *Soft Skills*, and *Educational Tour*. These courses are offered in V and VI semesters of degree programme.

4. Ability Enhancement Compulsory Course (AEC): These courses enhance the ability in students in various aspects. These courses are offered in I, II, III, IV and V semester of degree programme.

5. Discipline Specific Elective Course (DSEC): The discipline specific elective course is offered to inculcate specific knowledge of a domain in learners. The specific areas may include agronomy, horticulture, and entomology. It will be covered in IV, V and VI semester of programme.

6. Open Electives Courses (OEC): Open elective courses are provided to the students in Vth and VIth semester where students can learn various concepts.

7. Skill Enhancement Courses (SEC): Here, students are made familiar with the rural agricultural activities. This course is offered in VII semester of degree programme.

8. Student READY Programme: The term READY refers to “Rural Entrepreneurship Awareness Development Yojana.” This component envisages reorienting graduates of agriculture and allied subjects for ensuring and assuring employability and developing entrepreneurs for emerging knowledge intensive agriculture. Two types of courses are offered under READY programme Rural Agricultural Work Experience (RAWE) and Experience Learning Programme (ELP)

Rural Agricultural Work Experience (RAWE): The Rural Agricultural Work Experience (RAWE) helps the students primarily to understand the rural situations, status of agricultural technologies adopted by the farmers to prioritize the farmers’ problems and to develop skills & attitude of working with farm families for overall development in rural area. It is offered in VII semester.

Experience Learning Programme (ELP): In this course, learning and development are achieved through personally determined experience and involvement, rather than on received teaching or training, typically in group, by observation, study of theory or hypothesis and bring in innovation or some other transfer of skills or knowledge. This course may be chosen from a pool of courses designed to provide value/skill based knowledge. In VIII semester, the student can choose two skill enhancement course of his/her choice.

C. Programme Outcomes (POs)

On completion of the four-year B.Sc. (Hons.) Agriculture, the students will be

PO – 1	Understanding the concepts of agriculture for their practical utility in Indian context
PO – 2	Understanding efficient utilization of agri-resources in farming
PO – 3	Improving of communication and learning skills
PO – 4	Analyzing strengths, weaknesses, opportunities and threats of modern technologies
PO – 5	Analyzing site-specific and tactical solutions under ambient and stressful situations.
PO – 6	Developing entrepreneurial skills and business management competence in agriculture and allied sectors.
PO – 7	Developing team spirit and leadership quality for searching novel solutions of site-specific agriculture.

D. Programme Specific Outcomes (PSOs)

On completion of four year B.Sc. (Hons.) Agriculture the students will be

PSO-1	Understanding the integrated management of sustainable agriculture, horticulture, vegetable science, forestry, agro forestry and livestock production.
PSO-2	Applying the tools and techniques of agronomy, soil science, plant pathology, and entomology and allied sciences for enhancing agriculture productivity.
PSO-3	Analyzing the information related to agricultural economics for finding solution for various problems.
PSO-4	Collaborating with farmers, industries and different types of institutions for devising useful solutions.
PSO-5	Evaluating the efficiency of various technologies for identifying better site-specific solutions for agriculture sector.
PSO-6	Developing competence in agricultural extension and managing different types of agricultural resources.
PSO-7	Developing entrepreneurial skills and business management competence in agriculture and allied sciences.
PSO-8	Developing entrepreneurial skill with using smart agri- practices in agribusiness module through Experience Learning Programmes.

E. Pedagogy & Unique practices adopted:

1. Case Studies exposure: Case studies provide live examples to the students from around the world demonstrating the best practices for sustainable agriculture. They provide evidence on farming practices in various ways. Case studies also demonstrate the dangers of excessive use of chemical fertilizers and pesticides in agriculture. Therefore, they understand sustainable organic agriculture practices too for achieving food security without harming the environment and public health.

2. Emphasis on practical exposure: Emphasis on practical exposure is much better than mere attaining the theoretical knowledge. The primary reason behind emphasizing upon the importance of practical learning is the kind of exposure students receive from such practices which helps them improve their skills. Here students can test their skills and help themselves to identify their weaknesses. This student-centered space enables learner-oriented assessment, where the design of the task is created for active student learning. Therefore, Practical exposure helps students to learn from self experiences which make them ready for the framework of the industry even before joining them.

3. Inclusion of IT tools in teaching: Various types of IT tools are used to support student learning. In present scenario, technology has taken a front seat and classrooms are well equipped with equipment and gadgets. Computers and mobiles are playing an important role in teaching- learning process. The use of open educational resources and other technologies are helping to increase educational productivity by accelerating the rate of learning, reducing costs associated with instructional materials or program delivery and better utilizing teacher time.

4. Field/Live Projects: Field work is one of the major important part in the field of Agriculture. A truly hands on training is given to the students in Practical Crop Production (PCP) in which students learn by doing the each and every step of crop production.

5. Learning visits organized: Our institute organizes learning visits of KVK, Industrial units, agriculture markets, Kisan Mela and various Agriculture institutes of repute. These visits are essential to give students hands on exposure and experience of how things work in industries. Such visits play a vital role to enhance students' exposure to practical learning in various domains.

6. Guest Lectures: To cater the present needs of industry we organize guest lectures, as part of lecture-series. Guest lectures are delivered in the college by eminent speakers from industry/ academia. The objective of these lectures is to provide extra attention on some topics/concepts as they either may be high in difficulty level or requires experts from specific industry/domain to make things/concepts clear for a better understanding from the perspective of the industry.

7. Experience Learning Programme (ELP): The Experiential Learning Programme aims at promoting professional skills and knowledge through hands on experience and confidence building sessions. Ability to work in project requires management capabilities to build confidence. This programme provides a good platform for students with an approach of "Learning by Doing" and "Seeing by Believing" in various area of agriculture. The experiential learning programme is offered in the final semester.

8. Special assistance programme: A special attention is given on slow learners & fast learners to develop their potential. We identify slow & fast learners through continuous evaluation in class room practices as well

sessional exam performance. We develop the mechanism to correcting knowledge gap according to their need through extra classes and personal interaction.

9. ***Orientation programme:*** 15 days orientation programme is conducted for first year admitted students. Students orientation programme is designed to guide students about university and college. The programme includes domains like syllabus, library, examination system, college environment, and physical facilities, which aids to their educational and personal goals. Orientation programme play a vital role in developing positive attitude, minimizing stress and creating self confidence among newly admitted students.

10. ***Mentor mentee scheme:*** Faculty members of College of Agriculture Science are actively involved in mentoring of students. Students share their problems with their respective mentors. Teachers maintain the academic progress record on prescribed booklet.

11. ***Career & personal counseling:*** Training and placement department is copiously involved in developing career oriented skill development activities and personality development to help the students in getting job.

12. ***Competitive exam preparation:*** The College run competitive exam preparation classes for final year students to provide guidance, necessary literature and other information about cracking competitive examinations.

13. ***Extracurricular Activities:*** Participation in extracurricular activities is set mandatory for the students to develop self-confidence and public speaking.

Discipline-wise courses offered in B.Sc. (Hons.) Agriculture:

Discipline/ Course title	Credit Hours
Agronomy	
Fundamentals of Agronomy	4(3+1)
Introductory Agro-meteorology & Climate Change	2(1+1)
Crop Production Technology –I (<i>Kharif Crops</i>)	2(1+1)
Crop Production Technology –II (<i>Rabi Crops</i>)	2(1+1)
Farming system & sustainable Agriculture	1(1+0)
Practical Crop Production- I (<i>Kharif Crops</i>)	2(0+2)
Practical Crop Production- II (<i>Rabi Crops</i>)	2(0+2)
Principles of Organic Farming	2(1+1)
Geoinformatics and Nanotechnology and Precision Farming	2(1+1)
Rainfed Agriculture & Watershed Management	2(1+1)
Agriculture Heritage	1(1+0)
Genetics & Plant Breeding	
Fundamental of Genetics	3(2+1)
Principles of Seed technology	3(1+2)
Fundamentals of Plant Breeding	3(2+1)
Crop Improvement – I (<i>Kharif Crops</i>)	2(1+1)
Crop Improvement –II (<i>Rabi Crops</i>)	2(1+1)
Soil science & Agriculture Chemistry	
Fundamentals of Soil Science	3(2+1)
Manures, Fertilizers and Soil Fertility Management	3(2+1)
Problematic Soils and Their Management	2(2+0)
Entomology	
Fundamentals of Entomology	4(3+1)
Pests of Crops and Stored Grain and their Management	3(2+1)
Management of Beneficial Insects	2(1+1)
Agriculture Economics	
Fundamentals of Agriculture Economics	2(2+0)
Agricultural Finance and Co-Operation	3(2+1)
Agricultural Marketing Trade & Prices	3(2+1)
Farm Management, Production & Resource economics	2(1+1)
Agricultural Engineering	
Soil and Water Conservation Engineering	2(1+1)
Farm Machinery and Power	2(1+1)
Renewable Energy and Green Technology	2(1+1)
Protected Cultivation and Secondary Agriculture	2(1+1)
Plant Pathology	
Fundamentals Of Plant Pathology and Agricultural Microbiology	4(3+1)
Diseases of Field and Horticulture Crops and their Management - I	3(2+1)
Diseases of Field and Horticulture Crops and their Management - II	3(2+1)
Principles of Integrated Pest and Disease Management	3(2+1)
Horticulture	
Fundamentals of Horticulture	2(1+1)
Production Technology for Fruits and Plantation Crops	2(1+1)

Production Technology for Vegetables and Spices	2(1+1)
Production Technology for Ornamental Crops , MAP and Landscaping	2(1+1)
Post- harvest Management and Value Addition of Fruits and Vegetables	2(1+1)
Food Science & Technology	
Principles of Food Science & Nutrition	2(2+0)
Agriculture Extension and Communication	
Fundamentals of Agriculture Extension Education	4(3+1)
Rural Sociology & Educational Psychology	2(2+0)
Entrepreneurship Development and Business Communication	2(1+1)
Biochemistry/ Physiology / Environmental Sciences	
Fundamentals of Plant Biochemistry and Biotechnology	3(2+1)
Fundamentals of Crop Physiology	2(1+1)
Environmental Studies & Disaster Management	3(2+1)
Introduction to Forestry	2(1+1)
Statistics, Computer Application and I.P.R.	
Statistical Methods	2(1+1)
Agri- Informatics	2(1+1)
Intellectual Property Rights	1(1+0)
Computer fundamentals, internet, MS-office	4
Animal Production	
Livestock and Poultry Management	4(3+1)
Language	
English	10
Remedial Courses	
Introductory Biology	2(1+1)
Elementary Mathematics	2(2+0)
NSS/NCC/Physical Education & Yoga Practices	2(0+2)
Human Values & Ethics	1(1+0)
Educational Tour	2(0+2)

Discipline-wise summary of credit hours

S.N.	Group	Credits
1.	Agronomy	22
2.	Genetics & Plant Breeding	13
3.	Soil Science & Agricultural Chemistry	8
4.	Entomology	9
5.	Agricultural Economics	10
6.	Agricultural Engineering	8
7.	Plant Pathology	13
8.	Horticulture	10
9.	Food Science	2
10.	Agricultural Extension	8
11.	Biochemistry / Physiology / Environmental Sciences	10
12.	Statistics, Computer Application and I.P.R.	9
13.	Animal Production	4
14.	English	10
15.	Remedial courses	2
16.	Physical Education & Yoga Practices	2
17.	Human Values and Ethics	1
18.	Educational Tour	2
19.	Discipline Specific Elective Courses	9
20.	Open Elective Courses	-
21.	RAWE	20
22.	ELP	20
	Total	192

**COURSE OUTLINE AND SYLLABUS OF B.Sc. (Hons.) AGRICULTURE
SEMESTER- I
TEERTHANKER MAHAVEER COLLEGE OF AGRICULTURE SCIENCES
Teerthanker Mahaveer University**

Sr. No.	Course Type	Course Code	Course Title	Periods			Credit	Evaluation Scheme		
				L	T	P		Internal	External	Total
1.	CC	BAG 107	Fundamentals of Agronomy	3	-	-	3	40	60	100
2.	CC	BAG 102	Fundamentals of Soil Science	2	-	-	2	40	60	100
3.	CC	BAG 104	Fundamentals of Horticulture	1	-	-	1	40	60	100
4.	CC	BAG 108	Introduction to Forestry	1	-	-	1	40	60	100
5.	CC	BAG 109	Fundamentals of Plant Biochemistry and Biotechnology	2	-	-	2	40	60	100
6.	CC	BAG 110	Rural Sociology & Educational Psychology	2	-	-	2	40	60	100
7.	CC	BAG 113	Agricultural Heritage	1	-	-	1	40	60	100
8.	AEC	TMUGE 114	English Communication-I	2	-	2	3	40	60	100
9.	CC	BAG 154	Fundamentals of Agronomy Practical	-	-	2	1	50	50	100
10.	CC	BAG 152	Fundamentals of Soil Science Practical	-	-	2	1	50	50	100
11.	CC	BAG 153	Fundamentals of Horticulture Practical	-	-	2	1	50	50	100
12.	CC	BAG 155	Introduction to Forestry Practical	-	-	2	1	50	50	100
13.	CC	BAG 156	Fundamentals of Plant Biochemistry and Biotechnology Practical	-	-	2	1	50	50	100
14.	RC*	BAG 111 AND BAG 157 OR BAG 112	Introductory Biology AND Introductory Biology Practical OR Elementary Mathematics	1/2		2/0	2	90/40	110/60	200/100
			Total*	15/16		14/12	22	660/610	840/790	1500/1400

* RC: Students having Biology at intermediate (10+2) will opt Elementary Mathematics (BAG 112) and students having Mathematics will opt Introductory Biology (BAG111 and BAG 157). Other students can choose any one of these. Maximum marks for those students who opt Introductory Biology (BAG111 and BAG 157) will be 1500 (660 internal+840 external) and for those who opt Elementary Mathematics (BAG 112) will be 1400 (610 internal+790 external).

COURSE OUTLINE AND SYLLABUS OF B.Sc. (Hons.) AGRICULTURE
SEMESTER- II
TEERTHANKER MAHAVEER COLLEGE OF AGRICULTURE SCIENCES
Teerthanker Mahaveer University

Sr. No.	Course Type	Course Code	Course Title	Periods			Credit	Evaluation Scheme		
				L	T	P		Internal	External	Total
1.	CC	BAG 207	Fundamentals of Genetics	2	-	-	2	40	60	100
2.	CC	BAG 208	Fundamentals of Plant Pathology and Agricultural Microbiology	3	-	-	3	40	60	100
3.	CC	BAG 209	Soil and Water Conservation Engineering	1	-	-	1	40	60	100
4.	CC	BAG 210	Fundamentals of Crop Physiology	1	-	-	1	40	60	100
5.	CC	BAG 211	Fundamentals of Entomology	3	-	-	3	40	60	100
6.	CC	BAG 212	Fundamentals of Agricultural Extension Education	3	-	-	3	40	60	100
7.	CC	BAG 213	Fundamentals of Agricultural Economics	2	-	-	2	40	60	100
8.	AEC	BAG 231	Computer Fundamentals, Internet, MS-Office	4	-	-	4	40	60	100
9.	AEC	TMUGE 232	English Communication-II	2	-	2	3	40	60	100
10.	CC	BAG 253	Fundamentals of Genetics Practical	-	-	2	1	50	50	100
11	CC	BAG 254	Fundamentals of Plant Pathology and Agricultural Microbiology Practical	-	-	2	1	50	50	100
12	CC	BAG 255	Soil and Water Conservation Engineering Practical	-	-	2	1	50	50	100
13	CC	BAG 256	Fundamentals of Crop Physiology Practical	-	-	2	1	50	50	100
14.	CC	BAG 257	Fundamentals of Entomology Practical	-	-	2	1	50	50	100
15	CC	BAG 258	Fundamentals of Agricultural Extension Education Practical	-	-	2	1	50	50	100
Total				21		14	28	660	840	1500

**COURSE OUTLINE AND SYLLABUS OF B.Sc. (Hons.) AGRICULTURE
SEMESTER- III
TEERTHANKER MAHAVEER COLLEGE OF AGRICULTURE SCIENCES
Teerthanker Mahaveer University**

Sr. No.	Course Type	Course Code	Course Title	Periods			Credit	Evaluation Scheme		
				L	T	P		Internal	External	Total
1.	CC	BAG 308	Crop Production Technology – I (<i>Kharif Crops</i>)	1	-	-	1	40	60	100
2.	CC	BAG 309	Fundamentals of Plant Breeding	2	-	-	2	40	60	100
3.	CC	BAG 310	Agricultural Finance and Cooperation	2	-	-	2	40	60	100
4.	CC	BAG 312	Production Technology for Vegetables and Spices	1	-	-	1	40	60	100
5.	AEC	BAG 313	Environmental Studies and Disaster Management	2	-	-	2	40	60	100
6.	CC	BAG 314	Statistical Methods	1	-	-	1	40	60	100
7.	CC	BAG 315	Livestock and Poultry Management	3	-	-	3	40	60	100
8.	CC	BAG 316	Agri- Informatics	1	-	-	1	40	60	100
9.	CC	BAG 317	Farm Machinery and Power	1	-	-	1	40	60	100
10.	AEC	TMUGE 314	English Communication-III	2	-	-	2	40	60	100
11.	CC	BAG 358	Crop Production Technology – I (<i>Kharif Crops</i>) Practical	-	-	2	1	50	50	100
12.	CC	BAG 359	Fundamentals of Plant Breeding Practical	-	-	2	1	50	50	100
13.	CC	BAG 360	Agricultural Finance and Cooperation Practical	-	-	2	1	50	50	100
14.	CC	BAG 362	Production Technology for Vegetables and Spices Practical	-	-	2	1	50	50	100
15.	CC	BAG 364	Statistical Methods Practical	-	-	2	1	50	50	100
16.	CC	BAG 365	Livestock and Poultry Management Practical	-	-	2	1	50	50	100
17.	CC	BAG 367	Agri- Informatics Practical	-	-	2	1	50	50	100
18.	AEC	BAG 368	Environmental Studies and Disaster Management Practical	-	-	2	1	50	50	100

19.	CC	BAG 369	Farm Machinery and Power Practical	-	-	2	1	50	50	100
20.	AEC	BAG 370	# Physical Education & Yoga Practices	-	-	2	1	100	-	100
			Total	16		20	26	950	1050	2000

#NSS/NCC/ Physical Education & Yoga Practices: These courses are non-gradual. The College offers Physical Education & Yoga Practices in III and IV semesters. The duration of NSS is two years (4 semester) and Physical Education & Yoga Practices of one year (2 semesters). Students have to opt either NSS or Physical Education & Yoga Practices.

COURSE OUTLINE AND SYLLABUS OF B.Sc. (Hons.) AGRICULTURE
SEMESTER- IV
TEERTHANKER MAHAVEER COLLEGE OF AGRICULTURE SCIENCES
Teerthanker Mahaveer University

Sr. No.	Course Type	Course Code	Course Title	Periods			Credit	Evaluation Scheme		
				L	T	P		Internal	External	Total
1.	CC	BAG 410	Crop Production Technology – II (<i>Rabi Crops</i>)	1	-	-	1	40	60	100
2.	CC	BAG 411	Production Technology for Ornamental Crops, MAP and Landscaping	1	-	-	1	40	60	100
3.	CC	BAG 412	Agricultural Marketing Trade & Prices	2	-	-	2	40	60	100
4.	CC	BAG 413	Introductory Agro-meteorology & Climate Change	1	-	-	1	40	60	100
5.	CC	BAG 414	Farming System & Sustainable Agriculture	1	-	-	1	40	60	100
6.	CC	BAG 415	Renewable Energy and Green Technology	1	-	-	1	40	60	100
7.	CC	BAG 416	Problematic Soils and their Management	2	-	-	2	40	60	100
8.	CC	BAG 417	Production Technology for Fruit and Plantation Crops	1	-	-	1	40	60	100
9.	CC	BAG 418	Principles of Seed Technology	1	-	-	1	40	60	100
10.	AEC	BAG 419	Human Values & Ethics	1	-	-	1	40	60	100
11.	AEC	TMUGE 414	English Communication-IV	2	-	-	2	40	60	100
12.	CC	BAG 455	Crop Production Technology – II (<i>Rabi Crops</i>) Practical	-	-	2	1	50	50	100
13.	CC	BAG 456	Production Technology for Ornamental Crops, MAPs and Landscaping Practical	-	-	2	1	50	50	100
14.	CC	BAG 458	Agricultural Marketing Trade & Prices Practical	-	-	2	1	50	50	100
15.	CC	BAG 459	Introductory Agro-meteorology & Climate Change Practical	-	-	2	1	50	50	100
16.	CC	BAG 460	Renewable Energy and Green Technology Practical	-	-	2	1	50	50	100
17.	CC	BAG 461	Production Technology for Fruit and Plantation Crops Practical	-	-	2	1	50	50	100
18.	CC	BAG 462	Principles of Seed Technology Practical	-	-	4	2	50	50	100
19.	AEC	BAG 470	# Physical Education & Yoga Practices	-	-	2	1	100	-	100
20.	DSEC	Select one theory course and its practical from		2		2	3	90	110	200

		Table 1								
			Total	16		20	26	980	1120	2100

Table 1: Discipline Specific Elective Courses (DSEC): Select any one-

Sr. No .	Course Type	Course Code	Course Title	Periods			Credit	Evaluation Scheme		
				L	T	P		Internal	External	Total
1	DSEC	BAGE 401	Agribusiness Management	2	-	-	2	40	60	100
2	DSEC	BAGE 402	Agrochemicals	2	-	-	2	40	60	100
3	DSEC	BAGE 403	Commercial Plant Breeding	2	-	-	2	40	60	100
4	DSEC	BAGE 404	Landscaping	2	-	-	2	40	60	100
5	DSEC	BAGE 451	Agribusiness Management Practical	-	-	2	1	50	50	100
6	DSEC	BAGE 452	Agrochemicals Practical	-	-	2	1	50	50	100
7	DSEC	BAGE 453	Commercial Plant Breeding Practical	-	-	2	1	50	50	100
8	DSEC	BAGE 454	Landscaping Practical	-	-	2	1	50	50	100

#NSS/NCC/ Physical Education & Yoga Practices: These courses are non-gradual. The College offers Physical Education & Yoga Practices in III and IV semesters. The duration of NSS is two years (4 semester) and Physical Education & Yoga Practices of one year (2 semesters). Students have to opt either NSS or Physical Education & Yoga Practices.

*The student has to take the theory and practical of the same course

COURSE OUTLINE AND SYLLABUS OF B.Sc. (Hons.) AGRICULTURE
SEMESTER- V
TEERTHANKER MAHAVEER COLLEGE OF AGRICULTURE SCIENCES
Teerthanker Mahaveer University

Sr. No.	Course Type	Course Code	Course Title	Periods			Credit	Evaluation Scheme		
				L	T	P		Internal	External	Total
1.	CC	BAG 509	Principles of Integrated Pest and Disease Management	2	-	-	2	40	60	100
2.	CC	BAG 510	Manures, Fertilizers and Soil Fertility Management	2	-	-	2	40	60	100
3.	CC	BAG 511	Pests of Crops and Stored Grain and their Management	2	-	-	2	40	60	100
4.	CC	BAG 512	Diseases of Field and Horticultural Crops and their Management -I	2	-	-	2	40	60	100
5.	CC	BAG 513	Crop Improvement-I (<i>Kharif Crops</i>)	1	-	-	1	40	60	100
6.	CC	BAG 514	Entrepreneurship Development and Business Communication	1	-	-	1	40	60	100
7.	CC	BAG 515	Geoinformatics, Nano-technology and Precision Farming	1	-	-	1	40	60	100
8.	CC	BAG 516	Intellectual Property Rights	1	-	-	1	40	60	100
9.	CC	BAG-555	Principles of Integrated Pest and Disease Management Practical	-	-	2	1	50	50	100
10.	CC	BAG 556	Manures, Fertilizers and Soil Fertility Management Practical	-	-	2	1	50	50	100
11.	CC	BAG-557	Pests of Crops and Stored Grain and their Management Practical	-	-	2	1	50	50	100
12.	CC	BAG 558	Diseases of Field and Horticultural Crops and their Management –I Practical	-	-	2	1	50	50	100
13.	CC	BAG 559	Crop Improvement-I (<i>Kharif Crops</i>)Practical	-	-	2	1	50	50	100
14.	CC	BAG 560	Entrepreneurship Development and Business Communication Practical	-	-	2	1	50	50	100
15.	CC	BAG 561	Geoinformatics and Nano-	-	-	2	1	50	50	100

			technology and Precision Farming Practical							
16.	SEC	BAG 562	Practical Crop Production – I (<i>Kharif</i> crops)	-	-	4	2	100	-	100
17.	VAC	TMUGS 501	Managing Self*	2	1	-	-	50	50	100
18.	DSE-C	Select one theory course and its practical from Table 2**		2		2	3	90	110	200
19.	OEC-1	MOOC Course ***		-		-	-	-	-	-
			Total	16	1	20	24	910	990	1900

Table 2: Discipline Specific Elective Courses (DSEC): Select any ONE-

Sr. No.	Course Type	Course Code	Course Title	Periods			Credit	Evaluation Scheme		
				L	T	P		Internal	External	Total
1	DSEC	BAGE 501	Food Safety and Standards	2	-	-	2	40	60	100
2	DSEC	BAGE 502	Biopesticides and Biofertilizers	2	-	-	2	40	60	100
3	DSEC	BAGE 503	Protected Cultivation	2	-	-	2	40	60	100
4	DSEC	BAGE 504	Micro propagation and Technologies	2	-	-	2	40	60	100
5	DSEC	BAGE 551	Food Safety and Standards Practical	-	-	2	1	50	50	100
6	DSEC	BAGE 552	Biopesticides and Biofertilizers Practical	-	-	2	1	50	50	100
7	DSEC	BAGE 553	Protected Cultivation Practical	-	-	2	1	50	50	100
8	DSEC	BAGE 554	Micro propagation and Technologies Practical	-	-	2	1	50	50	100

*Non-gradual course: This course is taught by Centre for Teaching Learning and Development (CTLTD) to enhance soft skills in students. In the 50 marks internal 10 marks for attendance+40 marks for continuous evaluation process

**The student has to take the theory and practical of the same course

***Open elective course (OEC) is a MOOC course of eight week (minimum). This course is mandatory to qualify for the award of degree. The students have to submit the certificate of the MOOC to the University.

**COURSE OUTLINE AND SYLLABUS OF B.Sc. (Hons.) AGRICULTURE
SEMESTER- VI
TEERTHANKER MAHAVEER COLLEGE OF AGRICULTURE SCIENCES
Teerthanker Mahaveer University**

Sr. No.	Course Type	Course Code	Course Title	Periods			Credit	Evaluation Scheme		
				L	T	P		Internal	External	Total
1.	CC	BAG-607	Rainfed Agriculture & Watershed Management	1	-	-	1	40	60	100
2.	CC	BAG-608	Protected Cultivation and Secondary Agriculture	1	-	-	1	40	60	100
3.	CC	BAG-609	Diseases of Field and Horticultural Crops and their Management-II	2	-	-	2	40	60	100
4.	CC	BAG-610	Post-harvest Management and Value Addition of Fruits and Vegetables	1	-	-	1	40	60	100
5.	CC	BAG-611	Crop Improvement-II (<i>Rabi crops</i>)	1	-	-	1	40	60	100
6.	CC	BAG-612	Farm Management, Production & Resource Economics	1	-	-	1	40	60	100
7.	CC	BAG-614	Principles of Food Science and Nutrition	2	-	-	2	40	60	100
8.	CC	BAG-615	Principles of Organic Farming	1	-	-	1	40	60	100
9.	CC	BAG-616	Management of Beneficial Insects	1	-	-	1	40	60	100
10.	CC	BAG-657	Rainfed Agriculture & Watershed Management Practical	-	-	2	1	50	50	100
11.	CC	BAG-658	Protected Cultivation and Secondary Agriculture Practical	-	-	2	1	50	50	100
12.	CC	BAG-659	Diseases of Field and Horticultural Crops and their Management-II Practical	-	-	2	1	50	50	100
13.	CC	BAG-660	Post-harvest Management and Value Addition of Fruits and Vegetables Practical	-	-	2	1	50	50	100
14.	CC	BAG-661	Crop Improvement-II (<i>Rabi crops</i>) Practical	-	-	2	1	50	50	100
15.	CC	BAG-662	Farm Management, Production & Resource Economics Practical	-	-	2	1	50	50	100
16.	SEC	BAG-663	Practical Crop Production –II (<i>Rabi crops</i>)	-	-	4	2	50	50	100

17.	CC	BAG-665	Principles of Organic Farming Practical	-	-	2	1	50	50	100
18.	CC	BAG-666	Management of Beneficial Insects Practical	-	-	2	1	50	50	100
19.	VAC	TMUGS-601	Managing Work and Others*	2	1	-	-	50	50	100
20.	DSEC	Select one theory course and its practical from Table 3**		2		2	3	90	110	200
21.	OEC-2	MOOC Course***		-		-	-	-	-	-
			Total	15	1	22	24	950	1150	2100

Table 3: Discipline Specific Elective Courses (DSEC): Select any one-

Sr. No.	Course Type	Course Code	Course Title	Periods			Credit	Evaluation Scheme		
				L	T	P		Internal	External	Total
1	DSEC	BAGE 601	Hi-tech. Horticulture	2	-	-	2	40	60	100
2	DSEC	BAGE 602	Weed Management	2	-	-	2	40	60	100
3	DSEC	BAGE 603	System Simulation and Agro-advisory	2	-	-	2	40	60	100
4	DSEC	BAGE 604	Agricultural Journalism	2	-	-	2	40	60	100
5	DSEC	BAGE 651	Hi-tech. Horticulture Practical	-	-	2	1	50	50	100
6	DSEC	BAGE 652	Weed Management Practical	-	-	2	1	50	50	100
7	DSEC	BAGE 653	System Simulation and Agro-advisory Practical	-	-	2	1	50	50	100
8	DSEC	BAGE 654	Agricultural Journalism Practical	-	-	2	1	50	50	100

*Non-gradual course. This course is taught by Centre for Teaching Learning and Development (CTLTD) to enhance soft skills in students. In the 50 marks internal 10 marks for attendance+40 marks for continuous evaluation process

**The student has to take the theory and practical of the same course

***Open elective course (OEC) is a MOOC course of eight week (minimum). This course is mandatory to qualify for the award of degree. The students have to submit the certificate of the MOOC to the University.

**COURSE OUTLINE AND SYLLABUS OF B.Sc. (Hons.) AGRICULTURE
SEMESTER- VII
TEERTHANKER MAHAVEER COLLEGE OF AGRICULTURE SCIENCES
Teerthanker Mahaveer University**

Student READY (Rural and Entrepreneurship Awareness Development Yojana)

Course: Rural Agricultural Work Experience and Agro-industrial Attachment (RAWE & AIA)-BAG-754

Sr. No.	Activities	No. of weeks	Credit Hours
1	General orientation & On campus training by different faculties	1	14
2	Village attachment	8	
3	Unit attachment in Univ./ College. KVK/ Research Station Attachment	5	
4	Plant clinic	2	02
5	Agro-Industrial Attachment	3	04
6	Project Report Preparation, Presentation and Evaluation	1	
Total weeks for RAWE & AIA		20	20
Total Marks = 100			

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

RAWE Component-I

Village Attachment Training Programme

Sr. 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	
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, Post-harvest-processing-value addition, 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

Evaluation

Internal Evaluation (100 marks)

The above mentioned RAWE programme conducted under the supervision of concerned faculty members and would be evaluated by the 3 internal faculty members on a 8 point scale as mentioned below.

Plant Health Clinic	Field Visits	Unit attachment in Univ./ College. KVK/ Research Station Attachment	Agro-industrial Attachment	Village Attachment	Report/Presentation	Viva	Attendance	Total Internal
10 marks	10 marks	10 marks	10 marks	30 marks	10 marks	10 marks	10 marks	100 marks

Educational tour

Educational tour will be conducted in break between IV & V Semester or VI & VII Semester. Student study and educational tours will be conducted for 1-2 weeks to well-known institutions and organizations and interactions with their faculty to help students broaden their knowledge and skills.

The course will be non-gradual and expenditure on tour will be borne by the students.

Sr. No.	Course Type	Course Code	Course Title	Credit	Marks (internal)
01.	VAC	BAG 755	Educational tour	2	100

The students have to prepare the tour report and present it before a committee of three faculty members including the coordinators. The evaluation of this course will be internal.

**COURSE OUTLINE AND SYLLABUS OF B.Sc.(Hons.) AGRICULTURE
SEMESTER- VIII
TEERTHANKER MAHAVEER COLLEGE OF AGRICULTURE SCIENCES
Teerthanker Mahaveer University**

Student READY (Rural and Entrepreneurship Awareness Development Yojana)

Course: Experiential Learning Programme (ELP)

Sr. No.	Course Type	Course Code	Course Title	Periods			Credit	Evaluation Scheme		
				L	T	P		Internal	External	Total
1.	ELP	BAG-852	Production Technology for Bioagents and Biofertilizer	-	-	20	10	50	50	100
2.	ELP	BAG-853	Seed Production and Technology	-	-	20	10	50	50	100
3.	ELP	BAG-854	Mushroom Cultivation Technology	-	-	20	10	50	50	100
4.	ELP	BAG-855	Soil, Plant, Water and Seed Testing	-	-	20	10	50	50	100
5.	ELP	BAG-856	Commercial Beekeeping	-	-	20	10	50	50	100
6	ELP	BAG-857	Poultry Production Technology	-	-	20	10	50	50	100
7	ELP	BAG-858	Commercial Horticulture	-	-	20	10	50	50	100
8	ELP	BAG-859	Floriculture and Landscaping	-	-	20	10	50	50	100
9	ELP	BAG-860	Food Processing	-	-	20	10	50	50	100
10	ELP	BAG-861	Agriculture Waste Management	-	-	20	10	50	50	100
11	ELP	BAG-862	Organic Production Technology	-	-	20	10	50	50	100
12	ELP	BAG-863	Commercial Sericulture	-	-	20	10	50	50	100
			Total	-	-	40	20			200

Following courses of ELP are offered by College of Agriculture Sciences, Teerthanker Mahaveer University

1-Production technology for bioagents and biofertilizer

2-Mashroom cultivation technology

3- Commercial Horticulture

4- Food Processing

A student has to register 20 credits opting for two modules of 10 credits each (total 20 credits) from the package of modules in the VIII semester

Evaluation

Internal Evaluation (100 marks)

S.No.	Parameters	Internal	External	Total
1.	Project Planning and Writing	5	5	10
2.	Presentation	10	-	10
3.	Regularity	10	-	10
4.	Monthly Assessment	10	-	10
5.	Output delivery	-	10	10
6.	Technical Skill Development	-	10	10
7.	Entrepreneurship Skills	-	10	10
8.	Business networking skills	10	-	10
9.	Report Writing Skills	5	5	10
10.	Final Presentation	-	10	10
	Total	50	50	100



Fundamentals of Agronomy

Course Type	Course Code	L	T	P	C
Core Course	BAG 107	3	0	0	3

The Course Outcomes (COs).

On completion of the course the students will be

CO – 1	Understanding the scope and practices of Agronomy.
CO – 2	Demonstrating the methods of irrigation, crop rotation, weeding in different crops.
CO – 3	Applying the method of seed sowing, tillage, weeding, irrigation, and crop management in problematic areas.
CO – 4	Analyzing the effect of weed-crop competition on agricultural productivity.

Unit1 (8 Hours)

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-water relationship.

Unit2 (8 Hours)

Crop water requirement, water use efficiency, irrigation- scheduling criteria and methods, quality of irrigation water, water logging.

Unit3 (8 Hours)

Weeds- importance, classification, crop weed competition, concepts of weed management-principles and methods.

Unit4 (8 Hours)

Herbicides- classification, selectivity and resistance, allelopathy. Growth and development of crops, factors affecting growth and development, plant ideotypes, principles, adaptation and distribution of crops.

Unit5 (8 Hours)

Crop rotation and its crop management technologies in problematic areas, harvesting and threshing of crops.

Text Books:

1. Handbook of Agriculture: Indian Council of Agricultural Research, New Delhi.

Reference Books:

1. Principles of Agronomy - S. R. Reddy. Kalyani Publisher
2. Manures and Fertilizers - K. S. Yawalkar, J.P. Agrawal and S. Bokde Agri-Horticultural Pub. House.
3. Fundamentals of Agronomy Gopal Chandra De. Oxford and IBH Publishing Co. PVT. LTD.



Fundamentals of Soil Science

Course Type	Course Code	L	T	P	C
Core Course	BAG 102	2	0	0	2

The Course Outcomes (COs).

On completion of the course the students will be

CO – 1	Understanding the concept of soil and soil profile.
CO – 2	Explaining the concept of soil texture, soil taxonomy, soil water retention, movement and availability.
CO – 3	Analyzing the effect of pH on soil nutrient availability.
CO – 4	Identifying the macro and microorganisms and their effect on soil.
CO – 5	Examining the physical and chemical properties of soil.

Unit1

(4Hours)

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

Unit2

(4Hours)

Components of soil; Soil physical properties: soil-texture, structure, density and porosity, soil color, consistence and plasticity; Elementary knowledge of soil taxonomy. Classification and Soils of India

Unit3

(4Hours)

Soil water retention, movement and availability; Soil air, composition, gaseous exchange, problem and plant growth, Soil temperature; source, amount and flow of heat in soil; effect on plant growth

Unit4

(4Hours)

Soil reaction-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;

Unit5

(4Hours)

Soil organic matter: composition, properties and its influence on soil properties; humic substances - nature and properties; soil organisms: macro and microorganisms, their beneficial and harmful effects; Soil pollution - behavior of pesticides and inorganic contaminants, prevention and mitigation of soil pollution.

Text Books:

1. Fundamentals of Soil science-Indian Society of SoilScience.

Reference Books:

1. Soil Fertility and Fertilizer Use- Samuel L. Tisdale and Werner L. Nelson Macmillan Coll Div.
2. Nature and Property of Soil- N. C. Braby. Macmillan Publishing Company Incorporated
3. Soil Science- Mangat Rai Anmol Publications Pvt. Ltd.



Fundamentals of Horticulture

Course Type	Course Code	L	T	P	C
Core Course	BAG 104	1	0	0	1

Course Outcomes (COs).

On completion of the course the students will be

CO – 1	Understanding the concepts of horticulture including the management of water, weed, fertility, and market chain.
CO – 2	Explaining the vegetable gardens, orchards and their management practices.
CO – 3	Analyzing the weed management, fertility management, organic farming and production for fruit, vegetable and floriculture crops.

Unit1

(4Hours)

Scope and importance, classification of horticultural crops and nutritive value, area and production, exports and imports, fruit and vegetable zones of India and of different states, nursery techniques and their management, soil and climate.

Unit2

(4Hours)

Vegetable gardens, nutrition and kitchen garden and other types of gardens – principles, planning and layout, management of orchards, planting systems and planting densities.

Unit3

(4Hours)

Principles objectives, types and methods of pruning and training of fruit crops, types and use of growth regulators in horticulture, water management– irrigation methods, merits and demerits, weed management, fertility management in horticultural crops-manures and fertilizers, different methods of application

Unit4

(4Hours)

Cropping systems, intercropping, multi-tier cropping, mulching– objectives, types merits and demerits, Classification of bearing habits of fruit trees, factors influencing the fruitfulness and unfruitfulness.

Unit5

(4Hours)

Rejuvenation of old orchards, top working, frame working, principles of organic farming, market chain management. Production and practices for fruit, vegetable and floriculture crops.

Text Books:

1. Basic Horticulture-Jitendra Singh. Kalyani Publisher

Reference Books:

1. Basics of Horticulture by K.V. Peter. New India Publishing Agency, New Delhi.
2. Principles of Horticulture by C.R. Adams, M.P. Early. Routledge.
3. Terminology of Horticulture by Neeraj Pratap Singh. International Book Distributing Co (IBDC Publishers).

Latest editions of all the suggested books are recommended.



Introduction to Forestry

Course Type	Course Code	L	T	P	C
Core Course	BAG 108	1	0	0	1

The Course Outcomes (COs).

On completion of the course the students will be

CO – 1	Understanding the basic concepts and principles of forestry and agro-forestry systems.
CO – 2	Applying various methods, designs and techniques for the establishment of agro-forestry systems in different agro-climatic conditions.
CO – 3	Analyzing various procedures, methods and theories adopted for identifying, measuring and establishing the different agro-forestry systems.
CO – 4	Evaluating the different methodologies and techniques adopted for the development of agro-forestry systems for ensuring food security.

Unit1

(4Hours)

Agroforestry – definition, objectives and potential. Distinction between agroforestry and social forestry. Status of Indian forests and role in India farming systems.

Unit 2

(4Hours)

Agroforestry system, sub-system and practice: Agri-silviculture, silvipastoral, horti-silviculture, horti-silvipastoral

Unit 3

(4Hours)

Shifting cultivation, taungya, home gardens, alley cropping, intercropping, wind breaks, shelterbelts and energy plantations. Planning for agroforestry – constraints, diagnosis and design methodology

Unit 4

(4Hours)

Selection of tree crop species for agro-forestry. Agroforestry projects – national, overseas, MPTS – their management practices

Unit 5

(4Hours)

Economics of cultivation – nursery and planting (*Acacia catechu*, *Dalbergiasissoo*, *Tectona*, *Populus*, *Morus*, *Grewia*, *Eucalyptus*, *Quercus* spp. and bamboo, tamarind, neem etc.).

Text Books:

1. Indian wood technology, Brown, H., IBD Publishers, Dehra Dun.

Reference Books:

1. Heygreen, G. and J.L. Bowyer, Forest products and wood science. The Ohio State University Press, Ames.
2. Lal, J.B. India's forest – Myth and reality. Natraj Publishers, Dehra Dun. Journals.
3. Indian Journal of Forestry.
4. Indian Journal of Agroforestry.



Fundamentals of Plant Biochemistry and Biotechnology

Course Type	Course Code	L	T	P	C
Core Course	BAG 109	2	0	0	2

The Course Outcomes (COs).

On completion of the course the students will be

CO – 1	Understanding the structure, functions and chemical nature of living systems
CO – 2	Understanding the application of the modern approaches of biotechnology in micro-propagation and crop improvement
CO – 3	Analyzing the qualitative and quantitative properties of various biomolecules.

Unit-1

(4Hours)

Importance of Biochemistry. Properties of Water, pH and Buffer. Carbohydrate: Importance and classification. Structures of Monosaccharide, Reducing and oxidizing properties of Monosaccharide, Mutarotation; Structure of Disaccharides and Polysaccharides. Lipid: Importance and classification; Structures and properties of fatty acids; storage lipids and membrane lipids.

Unit2

(4Hours)

Proteins: Importance of proteins and classification; Structures and zwitterions nature of amino acids; Structural organization of proteins. Enzymes: General properties; Classification; Mechanism of action; Introduction to allosteric enzymes.

Unit3

(4 Hours)

Nucleic acids: Importance and classification. Structure of Nucleotides, A, B & Z DNA; RNA: Types and Secondary & Tertiary structure. Mechanism of DNA replication.

Unit4

(4 Hours)

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

Unit5

(4 Hours)

Somaclonal variation and its use in crop improvement; cryo-preservation; Introduction to recombinant DNA methods: physical (Gene gun method), chemical (PEG mediated) and Agrobacterium mediated gene transfer methods; Transgenics and its importance in crop improvement; PCR techniques and its applications; RFLP, RAPD, SSR.

Text books:

1. Agricultural microbiology, D. J. Bagyaraj, g. Rangaswami phi learning Pvt. Ltd.,

Reference books:

1. Soil Microbiology Rao Oxford and IBHPublishing,
2. Agricultural Applications of Microbiology Neelima Rajvaidya, Dilip Kumar Markandey APH Publishing.
3. Fundamentals of Agricultural Microbiology K. C. MahantaOxford & IBHPublishing.



Rural Sociology and Educational Psychology

Course Type	Course Code	L	T	P	C
Core Course	BAG 110	2	0	0	2

The Course Outcomes (COs).

On completion of the course the students will be

CO – 1	Understanding the concepts and scope of rural societies, groups, stratification, culture and social Institutions.
CO – 2	Recognizing the learning domains, personality and motivation in agriculture extension
CO – 3	Applying the educational psychology in agriculture extension.
CO – 4	Analyzing the personality, learning process and motivation in rural context

Unit-1

(4Hours)

Sociology and Rural sociology: Definition and scope, its significance in agriculture extension, Social Ecology

Unit-2

(4 Hours)

Rural society, Social Groups, Social Stratification, Culture concept, Social Institution,

Unit-3

(4Hours)

Social Change & Development. Educational psychology: Meaning & its importance in agriculture extension.

Unit-4

(4 Hours)

Behavior: Cognitive, affective, psychomotor domain,

Unit-5

(4 Hours)

Personality, Learning, Motivation, Theories of Motivation, Intelligence.

Text books:

1. Introductory Rural Sociology: A synopsis of concepts and principles. J. B. Chitambar. New Age International.

Reference books:

1. Rural Sociology and Psychology. B. D. Tyagi, Anshu and Parul Tyagi. Rama PublishingHouse.
2. Rural Sociology J. M. Gillette. McmillonPublishers.
3. Extension communication and management. G. L. Ray. KalyaniPublication.



Introductory Biology

Course Type	Course Code	L	T	P	C
Remedial Course	BAG 111	1	0	0	1

The Course Outcomes (COs).

On completion of the course the students will be

CO – 1	Understanding the diversity and morphology of living world.
CO – 2	Explaining different levels of biological organizations
CO – 3	Identifying the specifications of important families of angiosperms
CO – 4	Evaluating the germination capacities of seeds of important crops

Unit-1 (4 Hours)

Introduction to the living world, diversity and characteristics of life, origin of life

Unit-2 (4 Hours)

Evolution and Eugenics. Binomial nomenclature and classification Cell and cell division.

Unit-3 (4 Hours)

Morphology of flowering plants.

Unit-4 (4 Hours)

Seed and seed germination. Plant systematic- viz; Brassicaceae, Fabaceae and Poaceae.

Unit-5 (4 Hours)

Role of animals in agriculture.

Text Books:

1. Cytogenetics, Evolution and Biostatistics, P S Chandel & R S Shukla, S. Chand Publishing

Reference Books:

1. Concept of Biology, Eldon D. Enger, Frederick C. Ross, David B. Bailey, McGraw Hill Education
2. Principles of Genetics- Phundan Singh, Kalyani Publishers
3. Klug, W.S. and Cummings, M.R. 1983. Concepts of Genetics. Charles E. Merrill Publishing Co., London.



Elementary Mathematics

Course Type	Course Code	L	T	P	C
Remedial Course	BAG 112	2	0	0	2

The Course outcomes (COs).

On completion of the course the students will be

CO – 1	Understanding the basic concepts of mathematics applied in agriculture
CO – 2	Applying the mathematical equations in various fields of agriculture science

Unit 1

(4Hours)

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, Parallel lines, Perpendicular lines, Angle of bisectors between two lines , Area of triangle.

Unit 2

(4Hours)

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

Unit 3

(4Hours)

Differential Calculus: Definition of function, limit and continuity, Simple problems on limit, Simple problems on continuity, Differentiation of x^n , e^x , $\sin x$ & $\cos x$ from first principle, Derivatives of sum, difference, product and quotient of two functions.

Unit 4

(4Hours)

Differentiation: Differentiation of functions of functions (Simple problem based on it), Logarithmic differentiation (Simple problem based on it), Differentiation by substitution method and simple problems based on it. Maxima and Minima of the functions of the form $y=f(x)$ (Simple problems based on it).

Unit 5

(4Hours)

Integral Calculus: Integration of simple functions, Integration of Product of two functions, Integration by substitution method, Definite Integral (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 their evaluation.

Text books:

1. Applied Mathematics-I, H. R. Luthra, Bharat Bharti Publication.

Reference books:

1. Mathematics, class XII Vol-I and Vol-II, R.D. Sharma, Dhanpat Rai Publications.
2. Linear Algebra A Geometric Approach, S. Kumaresan, Prentice Hall India Learning Private Limited.
3. Elementary Mathematics, G. Dorofeev, M. Potapov, N. Rozov, CBS Publisher.



Agricultural Heritage

Course Type	Course Code	L	T	P	C
Core Course	BAG 113	1	0	0	1

The Course outcomes (COs).

On completion of the course the students will be

CO – 1	Understanding the principles, theories, practices and status of ancient and modern Indian agricultural systems.
CO – 2	Applying various traditional methods and techniques for plant production and protection in present day agriculture system.
CO – 3	Analyzing the effect of indigenous traditional knowledge on the development of modern agriculture system.
CO – 4	Evaluating the different ancient methodologies and techniques adopted for the development of Indian agriculture system.

Unit-I

(4Hours)

Introduction of Indian agricultural heritage; Ancient agricultural practices, Relevance of heritage to present day agriculture;

Unit-II

(4Hours)

Past and present status of agriculture and farmers in society; Journey of Indian agriculture and its development from past to modern era;

Unit-III

(4Hours)

Plant production and protection through indigenous traditional knowledge; Crop voyage in India and world;

Unit-IV

(4Hours)

Agriculture scope; Importance of agriculture and agricultural resources available in India; Crop significance and classifications;

Unit-V

(4Hours)

National agriculture setup in India; Current scenario of Indian agriculture; Indian agricultural concerns and future prospects.

Text books:

1. Handbook of Agriculture: Indian Council of Agricultural Research, New Delhi. 6th edition.

Reference books:

1. Principles of Agronomy - S. R. Reddy. Kalyani Publisher
2. Manures and Fertilizers - K. S. Yawalkar, J.P. Agrawal and S. Bokde Agri- Horticultural Pub. House
3. Fundamentals of Agronomy Gopal Chandra De. Oxford and IBH Publishing Co. PVT. LTD.
4. Agricultural Extension: Worldwide Innovations R. Saravanan, New India Publishing,



English Communication – I

Course Type	Course Code	L	T	P	C
Academic Enhancement Course	TMUGE 114	2	0	2	3

The Course Outcomes (COs).

On completion of the course the students will be

CO – 1	Understanding importance of English language.
CO – 2	Understanding the basics of communication
CO – 3	Applying the written communication skills.

Course Contents:

Unit – I Introductory Sessions

(06 hours)

- Self-Introduction
- Building Self Confidence: Identifying strengths and weakness, reasons of Fear of Failure, strategies to overcome Fear of Failure Importance of English Language in present scenario (Practice: Self-introduction session)

Unit – II Basics of Grammar

(12 hours)

- Parts of Speech
- Tense
- Subject and Predicate
- Vocabulary: Synonym and Antonym (Practice: Conversation Practice)

Unit – III Basics of Communication

(10 hours)

- Communication : Process, Types, 7Cs of Communication, Importance & Barrier
- Language as a tool of communication
- Non-verbal communication: Body Language
- Etiquette & Manners
- Basic Problem Sounds (Practice :Pronuciation drill and building positive body language)

Unit – IV Application writing

(08 hours)

- Format & Style of Application Writing
- Practice of Application writing on common issues.

Unit – V Value based text reading: Short Story (Non- detailed study)

(04 hours)

- Gift of Magi – O. Henry

Text Books:

1. Singh R.P., An Anthology of Short stories, O.U.P. New Delhi. For Undergraduate

Reference Books:

- Kumar, Sanjay. &Pushp Lata. “Communication Skills” New Delhi: Oxford University Press.
- Carnegie Dale. “How to win Friends and Influence People” New York: Simon & Schuster.
- Harris, Thomas. A. “I am ok, You are ok” New York: Harper and Row.
- Goleman, Daniel. “Emotional Intelligence” Bantam Book.

Methodology:

1. Language Lab software.
2. The content will be conveyed through Real life situations, Pair Conversation, Group Talk and Class Discussion.
3. Conversational Practice will be effectively carried out by Face to Face & Via Media (Telephone, Audio-Video Clips)
4. Modern Teaching tools (PPT Presentation, Tongue-Twisters & Motivational videos with sub-titles) will be utilized.

Note:

- Class (above 30 students) will be divided in to two groups for effective teaching.
- For effective conversation practice, groups will be changed weekly.

Evaluation Scheme

Internal Evaluation			External Evaluation		Total Marks
40 Marks			60 Marks		100
20 Marks (Best 2 out of Three CTs) (From Unit-II, IV & V)	10 Marks (Oral Assignments) (From Unit I & III)	10 Marks (Attendance)	40 Marks (External Written Examination) (From Unit II, IV & V)	20 Marks (External Viva)* (From Unit - I & III)	

***Parameters of External Viva**

Content	Body Language	Confidence	Question Responsiveness	TOTAL
05 Marks	05 Marks	05 Marks	05 Marks	20 Marks

Note: External Viva will be conducted by 2-member committee comprising

a) One Faculty teaching the class

b) One examiner nominated by University Examination cell.

Each member will evaluate on a scale of 20 marks and the average of two would be the 20 marks obtained by the students.



Fundamentals of Agronomy Practical

Course Type	Course Code	L T P C
Core Course	BAG 154	0 0 2 1

The course outcomes(Cos):

On completion of the course the students will be

CO – 1	Analyzing the numerical exercises on fertilizer requirement
CO – 2	Understanding the proper application of seeds, fertilizers, pesticides and tillage
CO – 3	Applying the seed germination and viability test.

LIST OF PRACTICALS

1. Identification of crops, seeds, fertilizers, pesticides and tillage implements,
2. study of agro-climatic zones of India,
3. Identification of weeds in crops, Methods of herbicide and fertilizer application,
4. Study of yield contributing characters and yield estimation,
5. Seed germination and viability test,
6. Numerical exercises on fertilizer requirement, plant population, herbicides and water requirement,
7. Use of tillage implements-reversible plough, one-way plough, harrow, leveler, seed drill,
8. Study of soil moisture measuring devices,
9. Measurement of field capacity, bulk density and infiltration rate,
10. Measurement of irrigation water.

Evaluation of practical examination:

Internal Evaluation

(50marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3-point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks 50
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	

External Evaluation

(50marks)

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks



Fundamentals of Soil Science Practical

Course Type	Course Code	L	T	P	C
Core Course	BAG 152	0	0	2	1

The Course outcomes (COs).

On completion of the course the students will be

CO-1	Understanding and evaluating soil acidity and alkalinity with the help of pH meter
CO-2	Analyzing the physical properties of soil
CO-3	Applying stokes' law for obtaining terminal velocity of a partial

LIST OF PRACTICALS

1. Study of soil profile in field. Study of soil sampling tools,
2. Collection of representative soil sample, its processing and storage.
3. Study of soil forming rocks and minerals.
4. Determination of soil density, moisture content and porosity.
5. Determination of soil texture by feel and Bouyoucos Methods.
6. Studies of capillary rise phenomenon of water in soil column and water movement in soil.
7. Determination of soil pH and electrical conductivity.
8. Determination of cation exchange capacity of soil.
9. Study of soil map. Determination of soil colour.
10. Demonstration of heat transfer in soil. Estimation of organic matter content of soil.

Evaluation of practical examination:

Internal Evaluation

(50marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3-point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks 50
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	

External Evaluation

(50marks)

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks



Fundamentals of Horticulture Practical

Course Type	Course Code	L	T	P	C
Core Course	BAG 153	0	0	21	

The Course outcomes (COs)

On completion of the course the students will be

CO-1	Understanding the identification scheme of garden tools and horticultural crops.
CO-2	Applying the techniques of micro propagation in horticultural crops.
CO-3	Applying different methods of pruning in fruit trees.

LIST OF PRACTICALS

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

Evaluation of Practical Examination:

Internal Evaluation

(50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3-point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks 50
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	

External Evaluation**(50marks)**

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks



Introduction to Forestry Practical

Course Type	Course Code	L	T	P	C
Core Course	BAG 155	0	0	2	1

The Course outcomes (COs)

On completion of the course, the students will be

CO-1	Applying various designs and layouts of agro-forestry systems for maximizing the production and income in agriculture.
CO-2	Applying the genetic and agronomic principles for growing various multipurpose tree species to achieve maximum economic yield per year

LIST OF PRATICALS

1. Identification and seeds and seedlings of multipurpose treespecies.
2. Nursery practices for poplar, Grewiaoptiva, Morusalba,
3. Nursery practices for Acacia catechu, *Dalbergia sissoo*, robinia, leucaena etc.
4. Visit to agro-forestry fields to study the compatibility of MPTS with agricultural crops: silvipastoral,
5. Alley cropping, horti-silviculture, agro-silvipasture, fuel and fodder blocks.
6. Visit to social forestry plantations – railway line plantations, canal plantations,
7. Visit to roadside plantations,
8. Visit to industrial plantations and shelter belts.
9. Rapid assessment of farmers needs for green manure, fodder, fuel wood in selected villages.
10. Economics and marketing of products raised in agro-forestry systems.

Evaluation of Practical Examination:

Internal Evaluation

(50marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3-point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practicalfile.

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks 50
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	

External Evaluation

(50marks)

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks



Fundamentals of Plant Biochemistry and Biotechnology Practical

Course Type	Course Code	L	T	P	C
Core Course	BAG 156	0	0	2	1

The Course outcomes (Cos)

On completion of the course the students will be

CO – 1	Applying the approaches of biotechnology in micro-propagation and crop improvement.
CO – 2	Analyzing the qualitative and quantitative properties of various biomolecules.
CO – 3	Evaluating the optimum chemical conditions required for proper functioning of life

LIST OF PRACTICALS

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

Evaluation of Practical Examination:

Internal Evaluation

(50marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3-point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks 50
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	

External Evaluation (50 marks)

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks



Introductory Biology Practical

Course Type	Course Code	L	T	P	C
Core Course	BAG 157	0	0	21	

The Course outcomes (Cos).

On completion of the course the students will be

CO – 1	Understanding the concept of morphology and anatomy of flowering plants for evaluating their different modifications
CO – 2	Applying the concepts of systematic botany to compare the family characteristics of agricultural crops

LIST OF PRACTICALS

1. Morphology of flowering plants – root, stem and leaf and their modifications.
2. Inflorescence, flower and fruits.
3. Cell, tissues & cell division.
4. Internal structure of root, stem and leaf.
5. Study of specimens and slides.
6. Description of plants - Brassicaceae, Fabaceae and Poaceae.

Evaluation of Practical Examination:

Internal Evaluation

(50 Marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3-point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks 50
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	

External Evaluation (50 Marks)

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks



Fundamentals of Genetics

Course Type	Course Code	L	T	P	C
Core Course	BAG 207	2	0	02	

The Course outcomes (Cos).

On completion of the course the students will be

CO – 1	Understanding basic concepts, theories and principles of genetics for improving yield and other attributing characters in crop plants.
CO – 2	Applying the methods and techniques of cyto-genetics to overcome various problems and drawbacks of plant breeding.
CO – 3	Analyzing various procedures, approaches and practices of qualitative and quantitative genetics adopted for the effective crop improvement programme.
CO – 4	Evaluating different methodologies and techniques used to enhance quality and yield of crops at genetic level.

Unit1

(4Hours)

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.

Unit2

(4Hours)

Chromosomal theory of inheritance- 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, sex limited and sex influenced traits, Blood group genetics.

Unit3

(4Hours)

Linkage and its estimation, crossing over mechanisms, chromosome mapping. Structural and numerical variations in chromosome and their implications, Use of haploids, dihaploids and doubled haploids in Genetics.

Unit4

(4Hours)

Mutation, classification, Methods of inducing mutations & CIB technique, mutagenic agents and induction of mutation. Qualitative & Quantitative traits, Polygenes and continuous variations, multiple factor hypothesis, Cytoplasmic inheritance.

Unit5**(4Hours)**

Genetic disorders. Nature, structure & replication of genetic material. Protein synthesis, Transcription and translational mechanism of genetic material, Gene concept: Gene structure, function and regulation, Lac and Trp operons.

Text Books:

1. Fundamentals of Genetics-B.D. Singh, Kalyani Publishers.

Reference Books:

1. Singh, B.D. 1990. Fundamentals of Genetics. Kalyani Publishers, Ludhiana.
2. Strickberger, M.W. 1996. Genetics (3rd edn.). Mac Millan Publishing Co., New Delhi.
3. Klug, W.S. and Cummings, M.R. 1983. Concepts of Genetics. Charles E. Merrill Publishing Co., London.



Fundamentals of Plant Pathology and Agricultural Microbiology

Course Type	Course Code	L	T	P	C
Core Course	BAG 208	3	0	0	3

The Course Outcomes (COs).

On completion of the course the students will be

CO – 1	Understanding the basic aspects of plant health and disease caused by parasitic and non-parasitic pathogens
CO – 2	Understanding the plant disease management through chemical, cultural and biological practices
CO – 3	Identifying the importance of microorganisms in agriculture

Unit1

(8Hours)

Introduction to the science of phytopathology, its objectives, scope and historical background. Classification of plant diseases, symptoms, signs, and related terminology. Parasitic causes of plant diseases (fungi, bacteria, viruses, phytoplasma, protozoa, algae and flowering parasitic plants), their characteristics and classification.

Unit2

(8Hours)

Non-parasitic causes of plant diseases. Infection process. Survival and dispersal of plant pathogens. Plant disease epidemiology, forecasting and disease assessment. Principles and methods of plant disease management.

Unit3

(8Hours)

Fungicides classification based on chemical nature, Commonly used fungicides, bactericides and nematicides. Integrated plant disease management. Role of microbes in soil fertility and crop production: Carbon, Nitrogen, Phosphorus and Sulphur cycles. Bacterial genetics: Genetic recombination- transformation, conjugation and transduction; plasmids, transposon.

Unit4

(8Hours)

Introduction to Microbial world: Prokaryotic and eukaryotic microbes. Bacteria: cell structure, chemoautotrophy, photo autotrophy and growth.

Unit5

(8Hours)

Microbes in human welfare: silage production, biofertilizers, biopesticides, biofuel production and biodegradation of agro-waste. Biological nitrogen fixation- symbiotic, associative and asymbiotic. Azolla, blue green algae and mycorrhiza. Rhizosphere and phyllosphere.

Text Books:

1. Plant Pathology – P.D. Sharma. Rastogi Publications.
- 2.

Reference Books:

1. Plant pathology by G. N. Agrios, Elsevier Academic press, London.
2. Introductory Plant Pathology by M. N. Kamat, Prakash Publ, Jaipur (1967).
3. Plant diseases by R. S. Singh. Oxford and IBH Publishing.
4. Soil Microbiology Rao Oxford and IBH Publishing.
5. Agricultural Applications of Microbiology Neelima Rajvaidya, Dilip Kumar Markandey APH Publishing.
6. Fundamentals of Agricultural Microbiology K. C. Mahanta Oxford & IBH Publishing.



Soil and Water Conservation

Course Type	Course Code	L	T	P	C
Core Course	BAG 209	1	0	0	1

The Course outcomes (Cos).

On completion of the course the students will be

CO – 1	Understanding the classification, cause and type of soil erosion
CO – 2	Applying and analyzing the control measures for soil erosion
CO – 3	Understanding and analyzing soil loss by USLE (universal soil loss equation)

Unit1

(4Hours)

Soil erosion - Introduction, causes and types - geological and accelerated erosion, agents, factors affecting and effects of erosion. Water erosion - Mechanics and forms - splash, sheet, rill, gully, ravine and stream bank erosion. Gullies - Classification, stages of development.

Unit2

(4Hours)

Soil loss estimation – Universal soil loss equation (USLE) and modified USLE. Rainfall erosivity - estimation by $KE > 25$ and EI_{30} methods. Soil erodibility - topography, crop management and conservation practice factors.

Unit3

(4Hours)

Measurement of soil erosion - Runoff plots, soil samplers. Water erosion control measures - agronomical measures - contour farming, strip cropping, conservation tillage and mulching. Engineering measures – Bunds and terraces. Bunds - contour and graded bunds - design and surplussing arrangements.

Unit4

(4Hours)

Terraces - level and graded broad base terraces, bench terraces - planning, design and layout procedure, contour stonewall and trenching. Gully and ravine reclamation - principles of gully control - vegetative measures, temporary structures and diversion drains. Grassed waterways and design.

Unit5

(4Hours)

Wind erosion- Factors affecting, mechanics, soil loss estimation and control measures - vegetative, mechanical measures, wind breaks and shelter belts and stabilization of sand dunes. Land capability classification. Rate of sedimentation, silt monitoring and storage loss in tanks.

Text Books:

1. Principles of soil conservation and water management Hanumappa Ramappa Arakeri, Roy Luther Donahue Rowman & Allanheld

Reference Books:

1. Principles of Soil Conservation and Management, Humberto Blanco-Canqui, Rattan Lal, Springer.
2. Advances in Soil and Water Conservation Francis J. Pierce CRC Press.
3. Integrated Watershed Management in Rainfed Agriculture, Suhas P. Wani, Johan Rockstrom, Kanwar Lal Sahrawat, CRC Press.



Fundamentals of Crop Physiology

Course Type	Course Code	L	T	P	C
Core Course	BAG 210	1	0	0	1

The Course outcomes (Cos).

On completion of the course the students will be

CO – 1	Understanding the physiological aspects of plant life and their impact on plant growth and development
CO – 2	Applying the concepts of crop physiology for developing good agricultural practices.
CO – 3	Evaluating the crop health and productivity through applying various parameters of crop physiology

Unit1 (4Hours)

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

Unit2 (4Hours)

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

Unit3 (4Hours)

Photosynthesis: Light and Dark reactions, C₃, C₄ and CAM plants. Respiration: Glycolysis, TCA cycle and electron transport chain.

Unit4 (4Hours)

Fat Metabolism: Fatty acid synthesis and Breakdown; Plant growth regulators: Physiological roles and agricultural uses.

Unit5 (4Hours)

Physiological aspects of growth and development of major crops: Growth analysis, Role of Physiological growth parameters in crop productivity.

Text Books:

1. Gardner, F.P., Pearce, R.B. and Mitchell, R.L. 1988. Physiology of Crop Plants. Scientific Publishers, Jodhpur.

Reference Books:

1. Crop Physiology, Girish Chand Srivastava Biotech Books
2. Crop Physiology S. R. Ghadekar, C. N. Chore, R. K. Patil Agromet Publishers
3. A Text Book of Crop Physiology, A.B. Jadhav, S.B. Borgaonkar, Shri Rajlaxmi Prakashan,



Fundamentals of Entomology

Course Type	Course Code	L	T	P	C
Core Course	BAG 211	3	0	0	3

The Course Outcomes (Cos).

On completion of the course the students will be

CO-1	Understanding the characteristics, diversity, importance, identification, structure, and function of class Insecta.
CO-2	Explaining the evolutionary and ecological relationships of insects with other life forms.
CO-3	Describing the principles and methods of managing insect pest populations.

Unit1 (8Hours)

Introduction to phylum arthropoda. Importance of class Insecta. Insect dominance. History of entomology in India, Importance of entomology in different fields. Definition, division and scope of entomology.

Unit2 (8Hours)

Comparative account of external morphology-types of mouth parts, antennae, legs, wings and genitalia. Structure, function of cuticle & molting and body segmentation,

Unit3 (8Hours)

Anatomy of digestive, Circulatory, Sensory, respiratory, glandular, excretory, nervous and reproductive systems.

Unit4 (8Hours)

Types of reproduction. Postembryonic development-eclosion. Metamorphosis. Types of egg larvae and pupa.

Unit5 (8Hours)

Classification of insects upto orders, sub-order and families of economic importance and their distinguished characters. Plant mites – morphological features, important families with examples.

Text books:

1. Insecta: An Introduction- K. N. Ragumoorthi, V. Balasubramani, M.R. Srinivasan, N. Natarajan. A.E. Publications.

Reference books:

1. Integrated Pest Management. G.S.Dhaliwal and Ramesh Arora. Kalyani Publisher.
2. Agricultural Pests of South Asia and Their Management. G.S.Dhaliwal and Ramesh Arora. Kalyani Publisher.

3. Principles of Insect Morphology. R. E. Snodgrass. Cornell University Press.
4. Pedigo, L.P. 1999. *Entomology and pest management*. III Edition. Prentice Hall, New Jersey, USA, 691p.



Fundamentals of Agricultural Extension Education

Course Type	Course Code	L	T	P	C
Core Course	BAG 212	2	0	0	2

The Course Outcomes (COs).

On completion of the course the students will be

CO – 1	Understanding the principles of extension programme in agriculture.
CO – 2	Applying various concepts and leadership skills for effective extension administration at village level.
CO – 3	Analyzing various procedures and ICT methods adopted for effective communication skills.

Unit1

(4Hours)

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.

Unit2

(4Hours)

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.).

Unit3

(4Hours)

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.

Unit4

(4Hours)

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,

Unit5**(4Hours)**

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.

Text Books:

1. Textbook of Agricultural Extension Management, C. Karthikeyan, R. Sendikumar And D. Jaganathan Atlantic Publishers & Dist.

Reference Books:

1. Agricultural Extension Systems: Issues and Approaches B.S. Hansra (ed.) Concept Publishing Company
2. Handbook of Agriculture. ICAR Publication.
3. A Textbook of Agricultural Extension Management, by C. Karthikeyan, R. Sendikumar, D. Jaganathan, Atlantic.



Fundamentals of Agricultural Economics

Course Type	Course Code	L	T	P	C
Core Course	BAG 213	2	0	0	2

The Course Outcomes (Cos).

On completion of the course the students will be

CO-1	Understanding the principles, importance and application of economics in agriculture and allied sectors.
CO-2	Explaining the market forms, various factors of production, money and demand-supply dynamics of commodities and its role in price determination

Unit1

(4Hours)

Economics: Meaning, scope and subject matter, definitions, activities, approaches to economic analysis; micro and macroeconomics, positive and normative analysis. Nature of economic theory; rationality assumption, concept of equilibrium, economic laws as generalization of human behavior. Basic concepts: Goods and services, desire, want, demand, utility, cost and price, wealth, capital, income and welfare.

Unit2

(4Hours)

Agricultural economics: meaning, definition, characteristics of agriculture, importance and its role in economic development. Agricultural planning and development in the country. *Demand*: meaning, law of demand, 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.

Unit3

(4Hours)

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*: Cost concepts, short run and long run cost curves. Supply: Stock v/s supply, law of supply, supply schedule, supply curve, determinants of supply, elasticity of supply. Market structure: meaning and types of market, basic features of perfectly competitive and imperfect markets.

Unit4

(4Hours)

Price determination under perfect competition; short run and long run equilibrium of firm and industry, shut down and break-even points. Distribution theory: meaning, factor market and pricing of factors of production. Concepts of rent, wage, interest and profit. *National income*: Meaning and importance, circular flow, concepts of national income accounting and approaches to measurement, difficulties in measurement. Population: Importance, Malthusian and Optimum population theories, natural and socio-economic determinants, current policies and programmes on population control.

Unit5

(4Hours)

Money: Barter system of exchange and its problems, evolution, meaning and functions of money, classification of money, money supply, general price index, inflation and deflation. Banking: Role in modern economy, types of banks, functions of commercial and central bank, credit creation policy. Agricultural and public finance: meaning, micro v/s macro finance, need for agricultural finance, public revenue 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.

Text Books

1. Principles of Agricultural Economics, David Colman and Trevor Young, Cambridge University Press

Reference Books

1. Handbook of Agriculture: Indian Council of Agricultural Research, New Delhi. 6th edition.
2. Agricultural Finance And Management Subba Reddy.
3. Modern Economic Theory” by Dewett K.K.



Computer Fundamentals, Internet, & MS-Office

Course Type	Course Code	L	T	P	C
Ability Enhancement Course	BAG 231	4	0	0	4

The Course Outcomes (COs).

On completion of the course the students will be

CO -1	Understanding the basic components of computer, operating systems, an application programs.
CO-2	Practicing various applications on computer like MS DOS, MS Office, and internet

Course Contents

Unit 1

(08Hours)

Introduction and Definition of Computer: Computer Generation, Characteristics of Computer, Advantages and Limitations of a computer, Classification of computers, Functional components of a computer system (Input, CPU, Storage and Output Unit), Types of memory (Primary and Secondary) Memory Hierarchy. Hardware: a) Input Devices- Keyboard, Mouse, Scanner, Bar Code Reader b) Output Devices – Visual Display Unit (VDU), Printers, Plotters etc. Software: Introduction, types of software with examples, Introduction to languages, Compiler, Interpreter and Assembler. Number System: Decimal, Octal, Binary and Hexadecimal Conversions, BCD, ASCII and EBCDIC Codes.

Unit 2

(08Hours)

MS – DOS: Getting Started on DOS with Booting the System, Internal Commands: CHDIR(CD),CLS, COPY, DATE, DEL(ERASE), DIR, CHARACTER, EXIT,MKDIR(MD), REM, RENAME(REN), RMDIR(RD), TIME, TYPE, VER, VOL, External Commands: ATTRIB, CHKDSK, COMMAND, DOSKEY, EDIT, FORMAT,HELP, LABEL, MORE, REPLACE, RESTORE, SORT, TREE, UNDELETE, UNFORMAT,XCOPY.

Introduction of Internet: History of internet, Web Browsers, Searching and Surfing, Creating an E-Mail account, sending and receiving E-Mails.

Unit 3

(08Hours)

MS Word: Starting MS WORD, Creating and formatting a document, Changing fonts and point size, Table Creation and operations, Autocorrect, Auto text, spell Check, Word Art, Inserting objects, Page setup, PagePreview, Printing a document, Mail Merge.

Unit 4

(08Hours)

MS Excel: Starting Excel, Work sheet, cell inserting Data into Rows/ Columns, Alignment, Text wrapping , Sorting data, Auto Sum, Use of functions, Cell Referencing form, Generating graphs,

Worksheet data and charts with WORD, Creating Hyperlink to a WORD document, Page set up, Print Preview, Printing Worksheets.

MS Power Point: Starting MS–Power Point,, Creating a presentation using auto content Wizard, Blank Presentation, creating, saving and printing a presentation, Adding a slide to presentation, Navigating through a presentation, slide sorter, slide show, editing slides, Using Clipart, Word art gallery, Adding Transition and Animation effects, setting timings for slide show, preparing note pages, preparing audience handouts, printing presentation documents. MS – Access: creating table and database.

Unit 5

(08Hours)

MS-POWERPOINT: Starting MS–Power Point,, Creating a presentation using auto content Wizard, Blank Presentation, creating, saving and printing a presentation, Adding a slide to presentation, Navigating through a presentation, slide sorter, slide show, editing slides, Using Clipart, Word art gallery, Adding Transition and Animation effects, setting timings for slide show, preparing note pages, preparing audience handouts, printing presentation documents.

Text Books:

1. Sinha P.K., Computer Fundamentals, BPB Publishing.

Reference Books:

1. Peter Norton's, Introductions to Computers, Tata McGraw Hill.
2. Price Michael, Office in Easy Steps, TMHPublication.



English Communication-II

Course Type	Course Code	LT P C
Ability Enhancement Course	TMUGE 232	2 0 2 3

The Course Outcomes (COs).

On completion of the course the students will be

CO – 1	Understanding the correct use of English grammar.
CO – 2	Applying non-verbal communication skills
CO – 3	Understanding strategies of oral presentation.
CO – 4	Applying correct writing techniques in official communication.

Course Contents:

Unit – I Functional Grammar

(10 hours)

- Prefix, suffix and One words substitution
- Modals
- Concord

Unit – II Listening Skills

(04 hours)

- Difference between listening & hearing, Process and Types of Listening
- Importance and Barriers to listening

Unit – III Writing Skills

(12 hours)

- Official letter and email writing
- Essentials of a paragraph,
- Developing a paragraph: Structure and methods
- Paragraph writing (100-120 words)

Unit – IV Strategies & Structure of Oral Presentation

(08 hours)

- Purpose, Organizing content, Audience & Locale, Audio-visual aids, Body language
- Voice dynamics: Five P's - Pace, Power, Pronunciation, Pause, and Pitch.
- Modes of speech delivery and 5 W's of presentation

Unit – V Value based text reading: Short Essay (Non- detailed study)

(06 hours)

- How should one Read a book? – Virginia Woolf

Text Books:

- 1.Singh R.P., An Anthology of English Essay, O.U.P. New Delhi.

Reference Books:

- 1.Nesfield J.C. “English Grammar Composition & Usage” Macmillan Publishers
- 2.Sood Madan “The Business letters” Goodwill Publishing House, New Delhi
- 3.Kumar Sanjay &Pushlata “Communication Skills” Oxford University Press, New Delhi.

Methodologies:

1. Words and exercises, usage in sentences.
2. Language Lab software.
3. sentence construction on daily activities and conversations.
4. Format and layout to be taught with the help of samples and preparing letters on different subjects.
5. JAM sessions and Picture presentation.
6. Tongue twisters, Newspaper reading and short movies.
7. Modern Teaching tools (PPT Presentation, Tongue-Twisters & Motivational videos with sub-titles) will be utilized.
8. Text reading : discussion in detail, critical appreciation by reading the text to develop students' reading habits with voice modulation.

Note:

- Class (above 30 students) will be divided in to two groups for effective teaching.
- For effective conversation practice, groups will be changed weekly.

Evaluation Scheme

Internal Evaluation			External Evaluation		Total Marks
40 Marks			60 Marks		100
20 Marks (Best 2 out of Three CTs) (From Unit-I, III & V)	10 Marks (Oral Assignments) (From Unit-II & IV)	10 Marks (Attendance)	40 Marks (External Written Examination) (From Unit- I, III & V)	20 Marks (External Viva)* (From Unit- II & IV)	

***Parameters of External Viva**

Content	Body Language	Communication skills	Confidence	TOTAL
05 Marks	05 Marks	05 Marks	05 Marks	20 Marks

Note: External Viva will be conducted by 2-member committee comprising

- a) One Faculty teaching the class
- b) One examiner nominated by University Examination cell.

Each member will evaluate on a scale of 20 marks and the average of two would be the 20 marks obtained by the students.



Fundamentals of Genetics Practical

Course Type	Course Code	L	T	P	C
Core Course	BAG 253	0	0	2	1

The Course Outcomes (COs)

On completion of the course the students will be

CO – 1	Applying the various principles and techniques of cytogenetics and molecular genetics.
CO – 2	Analyzing the information, creatively and imaginatively in seeking the solutions to overcome the challenges related to genetics.
CO – 3	Evaluating the effectiveness of the different mechanisms used to enhance genetic level of the crops.

LIST OF PRACTICALS

- 1) Study of microscope.
- 2) Study of cell structure.
- 3) Mitosis and Meiosis cell division.
- 4) Experiments on monohybrid, dihybrid, trihybrid, test cross and backcross,
- 5) Experiments on epistatic interactions including test cross and backcross,
- 6) Practice on mitotic and meiotic cell division,
- 7) Experiments on probability and Chi-square test.
- 8) Determination of linkage and cross-over analysis (through two-point test cross and three-point test cross data).
- 9) Study on sex linked inheritance in *Drosophila*.
- 10) Study of models on DNA and RNA structures.

Evaluation of Practical Examination:

Internal Evaluation

(50marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3-point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks 50
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	

External Evaluation

(50marks)

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks



Fundamentals of Plant Pathology and Agricultural Microbiology Practical

Course Type	Course Code	L	T	P	C
Core Course	BAG 254	0	0	2	1

The Course outcomes (COs).

On completion of the course the students will be

CO-1	Analyzing various signs and symptoms for proper identification of plant diseases through Koch's postulates
CO-2	Analysis potential of beneficial plant associated microbes for enhancing plant growth and health
CO-3	Understanding the laboratory setup and equipment used in microbiology.

LIST OF PRACTICALS

1. Familiarity with general plant pathological laboratory and field equipment.
2. Study of disease symptoms and signs and host parasite relationship.
3. Identification and isolation of plant pathogens. Koch's postulates. Preparation of fungicidal solutions, slurries, pastes and their applications.
4. Introduction to microbiology laboratory and its equipment.
5. Microscope- parts, principles of microscopy, resolving power and numerical aperture. Methods of sterilization. Nutritional media and their preparations.
6. Enumeration of microbial population in soil- bacteria, fungi, actinomycetes.
7. Methods of isolation and purification of microbial cultures.
8. Isolation of *Rhizobium* from legume root nodule.
9. Isolation of *Azotobacter* from soil. Isolation of *Azospirillum* from roots. Isolation of BGA.
10. Staining and microscopic examination of microbes.

Evaluation of Practical Examination:

Internal Evaluation

(50marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3-point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks 50
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	

External Evaluation**(50marks)**

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks



Soil and Water Conservation Practical

Course Type	Course Code	L	T	P	C
Core Course	BAG 255	0	0	2	1

The Course Outcomes (COs).

On completion of the course the students will be

CO-1	Understanding and applying different concept of soil conservation
CO-2	Understanding and evaluating the soil loss with the help of USLE

LIST OF PRACTICALS

1. Study of different types and forms of water erosion. Exercises on computation of rainfall erosivity index.
2. Computation of soil erodibility index in soil loss estimation.
3. Determination of length of slope (LS) and cropping practice (CP) factors for soil loss estimation by USLE and MUSLE.
4. Exercises on soil loss estimation/measuring techniques. Study of rainfall simulator for erosion assessment.
5. Estimation of sediment rate using Coshocton wheel sampler and multi-slot device.
6. Determination of sediment concentration through oven dry method. Design and layout of contour bunds.
7. Design and layout of graded bunds and Design and layout of broad base terraces.
8. Design and layout of bench terraces. Design of vegetative waterways. Exercises on rate of sedimentation and storage loss in tanks.
9. Computation of soil loss by wind erosion. Design of shelterbelts and wind breaks for wind erosion control.
10. Visit to soil erosion sites and watershed project areas for studying erosion control and water conservation measures.

Evaluation of Practical Examination:

Internal Evaluation

(50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3-point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks 50
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	

External Evaluation

(50marks)

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks



Fundamentals of Crop Physiology Practical

Course Type	Course Code	L	T	P	C
Core Course	BAG 256	0	0	2	1

The Course Outcomes (Cos)

On completion of the course the students will be

CO-1	Applying various parameters of crop physiology for evaluating the crop health and productivity
CO-2	Applying the concepts of crop physiology for developing good agricultural practices for enhancing sustainable crop productivity.

LIST OF PRACTICALS

- 1) Study of plant cells.
- 2) Structure and distribution of stomata.
- 3) Measurement of Imbibitions, osmosis, plasmolysis.
- 4) Measurement of root pressure.
- 5) Rate of transpiration.
- 6) Separation of photosynthetic pigments through paper chromatography.
- 7) Rate of transpiration, photosynthesis and respiration.
- 8) Tissue test for mineral nutrients.
- 9) Estimation of relative water content.
- 10) Measurement of photosynthetic CO₂ assimilation by Infra-Red Gas Analyzer (IRGA).

Evaluation of Practical Examination:

Internal Evaluation

(50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3-point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks 50
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	

External Evaluation**(50marks)**

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks



Fundamentals of Entomology Practical

Course Type	Course Code	L	T	P	C
Core Course	BAG 257	0	0	2	1

The Course Outcomes (COs)

On completion of the course the students will be

CO – 1	Applying the approaches of Entomology to carry out the identification, taxonomy and status of the insects.
CO – 2	Applying the concepts of Agricultural Entomology in the field of plant protection.

LIST OF PRACTICALS

1. Insect collection and preservation.
2. Identification of important insects.
3. General body organization of insects.
4. Study on morphology of grasshopper or cockroach.
5. Preparation of permanent mounts of mouth parts, antennae, legs and wings.
6. Dissection of grasshopper and caterpillar for study of internal morphology.
7. Observations on metamorphosis of larvae and pupae. Dissection of cockroaches.

Evaluation of Practical Examination:

Internal Evaluation

(50 Marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3-point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks 50
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	

External Evaluation

(50marks)

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks



Fundamentals of Agricultural Extension Education Practical

Course Type	Course Code	L	T	P	C
Core Course	BAG 258	0	0	2	1

The Course Outcomes (COs).

On completion of the course the students will be

CO – 1	Understanding the principles and various steps of extension Programme planning in agriculture.
CO – 2	Applying various concepts and leadership skills for effective extension administration at village level.
CO – 3	Analyzing various procedures, methods and theories adopted for effective ICT to develop communication skills.

LIST OF PRACTICALS

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

Evaluation of Practical Examination:

Internal Evaluation

(50 Marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3-point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks 50
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	

External Evaluation

(50 Marks)

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks



Crop Production Technology-I (Kharif Crops)

Course Type	Course Code	L T P C
Core Course	BAG 308	1 0 0 1

The Course outcomes (COs).

On completion of the course the students will be

CO – 1	Understanding cultivation practices of kharif crops.
CO – 2	Understanding production technology of major cereals, pulses, oilseeds, fiber and forage crops.

Unit 1 (4 Hours)

Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of Kharif cerealcrops– rice and maize,

Unit 2 (4 Hours)

Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of Kharif cereal crops-sorghum, pearl millet and finger millet,

Unit 3 (4 Hours)

Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of Kharif pulse crops-pigeonpea, mungbean and urdbean;

Unit 4 (4 Hours)

Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of Kharif oilseed crops- groundnut and soybean. Kharif fibre crops- Cotton and Jute.

Unit 5 (4 Hours)

Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of Kharif forage crops -sorghum, cowpea, cluster bean and napier.

Text books:

1. Handbook of Agriculture: Indian Council of Agricultural Research, New Delhi. 6th edition.

Reference books:

1. Principles of Agronomy - S. R. Reddy. Kalyani Publisher
2. Manures and Fertilizers - K. S. Yawalkar, J.P. Agrawal and S. Bokde Agri Horticultural Pub. House
3. Fundamentals of Agronomy Gopal Chandra De. Oxford and IBH Publishing Co. PVT. LTD.



Fundamentals of Plant Breeding

Course Type	Course Code	L	T	P	C
Core Course	BAG 309	2	0	0	2

The Course outcomes (Cos).

On completion of the course the students will be

CO – 1	Understanding the basic concepts, theories and principles of plant breeding
CO – 2	Applying various methods and approaches of traditional and advanced plant breeding
CO – 3	Analyzing various procedures, techniques and strategies for high quality seed production
CO – 4	Evaluating different methodologies and procedures used to increase in the productivity of field crops.

Unit 1

(4 Hours)

Historical development, concept, nature and role of plant breeding, major achievements and future prospects; Genetics in relation to plant breeding, modes of reproduction and apomixes, self-incompatibility and male sterility- genetic consequences, cultivar options.

Unit 2

(4 Hours)

Domestication, Acclimatization and Introduction; Centres of origin/diversity, components of Genetic variation; Heritability and genetic advance; Genetic basis and breeding methods in self- pollinated crops - mass and pure line selection, hybridization techniques and handling of segregating population; Multiline concept.

Unit 3

(4 Hours)

Concepts of population genetics and Hardy-Weinberg Law, Genetic basis and methods of breeding cross pollinated crops, modes of selection; Population improvement Schemes- Ear to row method, Modified Ear to Row, recurrent selection schemes; Heterosis and inbreeding depression, development of inbred lines and hybrids, composite and synthetic varieties;

Unit 4

(4 Hours)

Breeding methods in asexually propagated crops, clonal selection and hybridization; Maintenance of breeding records and data collection; Wide hybridization and pre-breeding; Polyploidy in relation to plant breeding, mutation breeding-methods and uses; Breeding for important biotic and abiotic stresses;

Unit 5

(4 Hours)

Biotechnological tools-DNA markers and marker assisted selection. Participatory plant breeding; Intellectual Property Rights, Patenting, Plant Breeders and & Farmer's Rights.

Text Books:

1. Principles of Plant Breeding. Robert Wayne Allard, John Wiley and Sons

Reference Books:

1. Elementry Principles of Plant Breeding, Choudhary H.K. IBH Publication

2. Breeding of field crops, D.N. Bhardwaj, Agrobios

3. Breeding of Horticultural crops: Principles and Practices, N. Kumar, New India Publishing



Agricultural Finance and Cooperation

Course Type	Course Code	L	T	P	C
Core Course	BAG 310	2	0	0	2

The Course outcomes (Cos).

On completion of the course the students will be

CO-1	Understanding the importance of credit and role of financial institution in Indian Agriculture.
CO-2	Describing the computer operating system and ICT tools and their application in Agriculture
CO-3	Analyzing the agricultural credit and financial statements for the farmers and agri entrepreneur

Unit 1

(4 Hours)

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.

Unit 2

(4 Hours)

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.

Unit 3

(4 Hours)

An introduction to higher financing institutions – RBI, NABARD, ADB, IMF, world bank, Insurance and Credit Guarantee Corporation of India. Cost of credit. Recent development in agricultural credit. Preparation and analysis of financial statements – Balance Sheet and Income Statement. Basic guidelines for preparation of project reports- Bank norms – SWOT analysis.

Unit 4

(4 Hours)

Agricultural Cooperation – Meaning, brief history of cooperative development in India, objectives, principles of cooperation, significance of cooperatives in Indian agriculture.

Unit 5

(4 Hours)

Agricultural Cooperation in India- credit, marketing, consumer and multi-purpose cooperatives, farmers' service cooperative societies, processing cooperatives, farming cooperatives, cooperative warehousing; role of ICA, NCUI, NCDC, NAFED.

Text Books:

1. Agricultural Cooperation, Martin Abraham Abrahamsen, Claude L. Scroggs U of Minnesota Press.

Reference Books:

1. Cooperation Principles, Problems And Practice, T.N. Hajela Ane Books Pvt Ltd.
2. Agricultural Prices and Commodity Market Analysis. John N. Ferris McGraw-Hill Inc., US
3. Agricultural Economics. Subba Reddy. Oxford



Production Technology for Vegetable and Spices

Course Type	Course Code	L T P C
Core Course	BAG 312	1 0 0 1

The Course Outcomes (COs).

On completion of the course the students will be

CO-1:	Understanding the importance of vegetable & spice crops
CO-2:	Understanding the production technologies of roots, tuber and leafy vegetable crops

Unit 1 (4 Hours)

Importance of vegetables & spices in human nutrition and national economy, kitchen gardening,

Unit 2 (4 Hours)

Brief about origin, area, climate, soil, improved varieties and cultivation practices such as time of sowing, sowing, transplanting techniques, planting distance, fertilizer requirements, irrigation, weed management, harvesting and yield, physiological disorders, of important vegetable and spices (Tomato, Brinjal, Chilli, Capsicum,

Unit 3 (4 Hours)

Brief about origin, area, climate, soil, improved varieties and cultivation practices such as time of sowing, sowing, transplanting techniques, planting distance, fertilizer requirements, irrigation, weed management, harvesting and yield, physiological disorders, of important vegetable and spices Cucumber, Melons, Gourds, Pumpkin,

Unit 4 (4 Hours)

Brief about origin, area, climate, soil, improved varieties and cultivation practices such as time of sowing, sowing, transplanting techniques, planting distance, fertilizer requirements, irrigation, weed management, harvesting and yield, physiological disorders, of important vegetable and spices French bean, Peas; Cole crops such as Cabbage, Cauliflower, Knol-khol; Bulb crops such as Onion, Garlic;

Unit 5 (4 Hours)

Brief about origin, area, climate, soil, improved varieties and cultivation practices such as time of sowing, sowing, transplanting techniques, planting distance, fertilizer requirements, irrigation, weed management, harvesting and yield, physiological disorders, of important vegetable and spices French bean, Root crops such as Carrot, Raddish, Beetroot; Tuber crops such as Potato; Leafy vegetables such as Amaranth, Palak. Perennial vegetables).

Text Books:

1. Introduction to spices, plantation crops, medicinal and aromatic plants, N. Kumar, JBM Md. Abdul Khader, P. Rangaswami, I. Irulappan. Oxford and IBH.

Reference Books:

1. Postharvest Management and Value Addition Ashwai K. Goel, Rajinder Kumar, Satwinder S. Mann Day Books.
2. Handbook of Agriculture. ICAR.
3. Production Technology Of Plantation Crops, Spices, Aromatic And Medicinal Plants, L K Dashora, Abhay Dashora, S S Lakhawat, Agrotech Publishing Academy



Environmental Studies Disaster Management

Course Type	Course Code	L T P C
Core Course	BAG 313	2 0 0 2

The Course outcomes (COs).

On completion of the course the students will be

CO-1	Understanding of various environmental aspects, biodiversity conservation and role of individual, NGOs and Government for environmental protection activities
CO-2	Recognizing the importance of sustainable development and appropriate use of natural resources and maintaining the balanced ecosystem.
CO-3	Discussing new techniques of development through Environmental Impact Assessment (EIA) to reduce the rate of consumption of natural resources
CO-4	Analyzing various controlling measures of environmental pollution, ozone layer depletion, global warming and acid rain
CO-5	Evaluating the importance of eco-friendly activities to maintain the quality of environment and human life

Course Content:

Unit 1 (Lectures 08)

Definition and Scope of environmental studies, multidisciplinary nature of environmental studies, concept of sustainability & sustainable development.

Ecology and Environment: Concept of an Ecosystem- its structure and functions, Energy Flow in an Ecosystem, Food Chain, Food Web, Ecological Pyramid & Ecological succession, Study of following ecosystems: Forest Ecosystem, Grass land Ecosystem & Aquatic Ecosystem & Desert Ecosystem.

Unit 2(Lectures 08)

Natural Resources: Renewable & Non-Renewable resources; Land resources and land use change; Land degradation, Soil erosion & desertification. Deforestation: Causes & impacts due to mining, Dam building on forest biodiversity & tribal population. Energy Resources: Renewable & Non-Renewable resources, Energy scenario & use of alternate energy sources, Case studies. Biodiversity: Hot Spots of Biodiversity in India and World, Conservation, Importance and Factors Responsible for Loss of Biodiversity, Biogeographical Classification of India

Unit 3(Lectures 08)

Environmental Pollutions: Types, Causes, Effects & control; Air, Water, soil & noise pollution, Nuclear hazards & human health risks, Solid waste Management; Control measures of urban & industrial wastes, pollution case studies.

Unit 4

(Lectures 08)

Environmental policies & practices: Climate change & Global Warming (Greenhouse Effect), Ozone Layer - Its Depletion and Control Measures, Photochemical Smog, Acid Rain Environmental laws: Environment protection Act; air prevention & control of pollution act, Water Prevention & Control of Pollution Act, Wild Life Protection Act, Forest Conservation Acts, International Acts; Montreal & Kyoto Protocols & Convention on biological diversity, Nature reserves, tribal population & Rights & human wild life conflicts in Indian context

Unit 5(Lectures 08)

Human Communities & Environment: Human population growth; impacts on environment, human health & welfare, Resettlement & rehabilitation of projects affected person: A case study, Disaster Management; Earthquake, Floods & Droughts, Cyclones & Landslides, Environmental Movements; Chipko, Silent Valley, Vishnoi's of Rajasthan, Environmental Ethics; Role of Indian & other regions & culture in environmental conservation, Environmental communication & public awareness; Case study

Text Books:

1. "Environmental Chemistry", De, A. K., New Age Publishers Pvt. Ltd.

Reference Books:

1. "Biodiversity and Conservation", Bryant, P. J., Hypertext Book
2. "Textbook of Environment Studies", Tewari, Khulbe & Tewari, I.K. Publication



Statistical Methods

Course Type	Course Code	L T P C
Core Course	BAG 314	1 0 0 1

The Course Outcomes (COs).

On completion of the course the students will be

CO-1:	Understanding the basic concepts, uses & applications of statistics in agriculture.
CO-2:	Understanding, applying & analyzing the concepts of diagrammatic & graphical representation of data.
CO-3:	Understanding, applying & analyzing the concepts of central tendency & dispersion.
CO-4:	Understanding, applying, analyzing & evaluating the concepts of correlation & regression.

Unit 1

(4 Hours)

Introduction to Statistics and its Applications in Agriculture, Concept of primary & secondary sources of data, Classification- objectives & types of classification, Construction of frequency distribution, Tabulation- meaning advantages & types of tabulation.

Unit 2

(4 Hours)

Diagrammatic presentation- meaning , importance & rules for constructing diagrams, types of diagrams- bar, square, pie diagrams, cartograms, Graphical presentation- histogram, frequency curve, ogive.

Unit 3

(4 Hours)

Measures of central tendency- meaning, objectives, characteristics of a good average, arithmetic mean, median, quartiles, mode & their applications.

Unit 4

(4 Hours)

Measures of dispersion- meaning, objectives, characteristics of a good measure of dispersion, types – range, quartile deviation, mean deviation, standard deviation, coefficient of variation & their applications.

Unit 5

(4 Hours)

Correlation analysis- meaning importance, types- positive, negative & linear correlation, methods- scatter diagram, Karl Pearson's coefficient of correlation (for ungrouped data), linear regression analysis- meaning utility, regression lines & regression coefficients (for ungrouped data).

Text Books:

1. Hand Book of Agricultural Statistics, Shri Ram Singh Chandel, Achal Prakashan Mandir.

Reference Books:

1. Agricultural Statistics. R. Singh, A.K.Sharma and S.P. Singh. Aman Publication.
2. Agricultural Mathematics and Statistics. R. Singh. Rama Publication.



Livestock & Poultry Management

Course Type	Course Code	L	T	P	C
Core Course	BAG 315	3	0	0	3

The Course comes (COs).

On completion of the course the students will be

CO-1:	Understanding the importance of Indian and exotic breeds of livestock and poultry.
CO-2:	Understanding the management of different species of livestock and poultry.
CO-3:	Analyzing the prevention and control of important diseases of livestock and poultry.

Unit 1

(8 Hours)

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

Unit 2

(8 Hours)

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

Unit 3

(8 Hours)

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

Unit 4

(8 Hours)

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

Unit 5

(8 Hours)

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

Text books:

1. Handbook of Agriculture: Indian Council of Agricultural Research, New Delhi. 6th edition.

Reference books:

1. Fundamentals of Agriculture-Arun Katyayan- Kushal Publication
2. Agriculture and Live-stock in India, Indian Council of Agricultural Research.
3. Mineral Nutrition of Livestock, CABI By N. F. Suttle Manager of Publications [Government of India], 1939



Agri-Informatics

Course Type	Course Code	L	T	P	C
Core Course	BAG 316	1	0	0	1

Unit 1

(4 Hours)

Introduction to Computers, Operating Systems, definition and types, Applications of MS Office for document creation & Editing, Data presentation, interpretation and graph creation, statistical analysis, mathematical expressions, Database, concepts and types, uses of DBMS in Agriculture

Unit 2

(4 Hours)

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.

Unit 3

(4 Hours)

Computer Models for understanding plant processes. IT application for computation of water and nutrient requirement of crops, Computer-controlled devices (automated systems) for Agri-input management, Smartphone Apps in Agriculture for farm advises, market price, postharvest management etc.

Unit 4

(4 Hours)

Geospatial technology for generating valuable agri-information. Decision support systems, concepts, components and applications in Agriculture, Agriculture Expert System, Soil Information Systems etc for supporting Farm decisions

Unit 5

(4 Hours)

Preparation of contingent crop-planning using IT tools.

Text Books:

1. Agri Informatics: An Introduction (Industry Series), by R Chakravarthy, ICFAI UNIVERSITY PRESS

Reference Books:

1. Agro-Informatics, G. vanitha, New Delhi Publishing Agency
2. Leon & Leon, Fundamental of Information Technology, Vikas Publishing
3. Lehngart, Internet 101, Addison Wesley



Farm Machinery and Power

Course Type	Course Code	L	T	P	C
Core course	BAG 317	1	0	0	1

Course Outcomes (COs).

On completion of the course the students will be

CO-1	Understanding the working, operation and uses of different farm machines
CO-2	Understanding the various scientific principles for the efficient operation of farming activities
CO-3	Applying the different farming machine-operational methods
CO-5	Creating an appropriate method of farm machining that can give maximum crop productivity with minimum cost and human efforts.

Unit 1

(4 Hours)

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 ,

Unit 2

(4 Hours)

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

Unit 3

(4 Hours)

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

Unit 4

(4 Hours)

Familiarization with Primary and Secondary Tillage implement, Implement for hill agriculture, implement for intercultural operations, Familiarization with sowing and planting equipment,

Unit 5

(4 Hours)

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

Text Books

1. Farm Machinery Fundamentals, Marshall F. Finner, Richard J. Straub, American Publishing.

Reference Books

1. Principles of Farm Machinery, Roy Bainer, Read Books Design
 2. Farm Machinery, Claude Culpin, Read Books.
 3. Farm Machinery: Heavy Equipment, David Amentrout, Patricia Amentrout.
- * Latest editions of all the suggested books are recommended.



English Communication-III

Course Type	Course Code	L	T	P	C
Ability Enhancement Compulsory Course	TMUGE 314	2	0	0	2

The Course Outcomes (COs).

On completion of the course the students will be

CO – 1	Understanding the correct use of English vocabulary.
CO – 2	Applying verbal and non verbal communication skills.
CO – 3	Understanding strategies of oral presentation.
CO – 4	Applying reading comprehension skills.

Course Contents:

Unit – I English Grammar & Vocabulary

(14 hours)

- Correction of Common Errors (with recap of English Grammar with its usage in practical context.)
- Synthesis : Simple , complex and compound sentence
- Commonly used Idioms & phrases (Progressive learning whole semester)

Unit – II Speaking Skills

(10 hours)

- Art of public speaking
- Common conversation
- Extempore
- Power Point Presentation (Ppt) Skills: Nuances of presenting PPTs

Unit – III Comprehension Skills

(06 hours)

- Strategies of Reading comprehension: Four S's
- How to solve a Comprehension (Short unseen passage: 150-200 words)

Unit – IV Professional Writing

(03 hours)

- Preparing Notice, Agenda & Minutes of the Meeting

Unit – V Value based text reading: Short story

(07 Hours)

- The Barber's Trade Union – Mulk Raj Anand

Text Books:

- 1.Singh R.P., An Anthology of Short stories, O.U.P. New Delhi.

Reference Books:

1. Allen, W. "Living English Structure" Pearson Education, New Delhi.

2. Joseph, Dr C.J. & Myall E.G. “A *Comprehensive Grammar of Current English*” Inter University Press, Delhi
3. Wren & Martin “*High School English Grammar and Composition*” S.Chand&Co.Ltd., New Delhi.
4. Norman Lewis “*Word Power Made Easy*” Goyal Publications & Distributers, New Delhi.
5. Chaudhary, Sarla “Basic Concept of Professional Communication” Dhanpat Rai Publication, New Delhi.
6. Kumar Sanjay & Pushplata “*Communication Skills*” Oxford University Press, New Delhi.
7. Agrawal, Malti “*Professional Communication*” KrishanaPrakashan Media (P) Ltd. Meerut.

Methodologies:

1. Idiom & Phrases and exercises, usage in sentences.
2. Language Lab software.
3. Power Point presentation.
4. Newspaper reading, short articles from newspaper to comprehend and short movies.
5. Modern Teaching tools (PPT Presentation & Motivational videos with sub-titles) will be utilized.
6. Text reading: discussion in detail, Critical appreciation by reading the text to develop students’ reading habits with voice modulation.

Note:

- Class (above 30 students) will be divided into two groups for effective teaching.
- For effective conversation practice, groups will be changed weekly.

Evaluation Scheme

Internal Evaluation			External Evaluation		Total Marks
40 Marks			60 Marks		100
20 Marks (Best 2 out of Three CTs) (From Unit-I, III, IV & V)	10 Marks (Oral Assignments) (Unit –II)	10 Marks (Attendance)	40 Marks (External Written Examination) (From Unit- I, III, IV & V)	20 Marks (External Viva)* (Unit –II)	

***Parameters of External Viva**

Content	Body Language	Communication Skills	Confidence	TOTAL
05 Marks	05 Marks	05 Marks	05 Marks	20 Marks

Note: External Viva will be conducted by 2-member committee comprising

a) One Faculty teaching the class

b) One examiner nominated by University Examination cell.

Each member will evaluate on a scale of 20 marks and the average of two would be the 20 marks obtained by the students.



Crop Production Technology-I (Kharif Crops) Practical

Course Type	Course Code	L T P C
Core course	BAG 358	0 0 2 1

The Course outcomes(Cos):

On completion of the course the students will

CO – 1	Applying scientific methods of nursery preparation, transplanting and sowing of Kharif crops.
CO – 2	Applying the modern agricultural practices for maximizing the productivity of Kharif crops

List of Practicals

1. Rice nursery preparation, transplanting of Rice,
2. Sowing of soybean, pigeonpea and mungbean. maize, groundnut and cotton,
3. Effect of seed size on germination and seedling vigour of kharif season crops,
4. Effect of sowing depth on germination of kharif crops,
5. Identification of weeds in kharif season crops, top dressing and foliar feeding of nutrients,
6. Study of yield contributing characters and yield calculation of kharif season crops,
7. Study of crop varieties and important agronomic experiments at experimental farm.
8. Study of forage experiments, morphological description of kharif season crops, visit to research centres of related crops.

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3 point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks 50
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	

External Evaluation (50 marks)

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks



Fundamentals of Plant Breeding Practical

Course Type	Course Code	L T P C
Core course	BAG 359	0 0 2 1

The Course outcomes (Cos).

On completion of the practical course the students will be

CO – 1	Applying the various methods and approaches of classical and modern plant breeding to strengthen the genetic level of crops.
CO – 2	Analyzing the data in resolving the various problems related to crop production
CO – 3	Evaluating the productiveness of different procedures used in plant breeding.

Practical

1. Plant Breeder's kit, Study of germplasm of various crops.
2. Study of floral structure of self-pollinated and cross pollinated crops.
3. Emasculation and hybridization techniques in self & cross pollinated crops.
4. Consequences of inbreeding on genetic structure of resulting populations.
5. Study of male sterility system.
6. Handling of segregation populations.
7. Methods of calculating mean, range, variance, standard deviation, heritability.
8. Designs used in plant breeding experiments, analysis of Randomized Block Design.
9. To work out the mode of pollination in a given crop and extent of natural out-crossing.
10. Prediction of performance of double cross hybrids.

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3 point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks 50
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	

External Evaluation (50 marks)

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks



Agricultural Finance and Co-Operation Practical

Course Type	Course Code	L	T	P	C
Core course	BAG 360	0	0	2	1

The Course Outcomes (COs):

On completion of the course the students will be

CO – 1	Analysing the utilization, allocation of capital and performance of financial institution.
CO – 2	Estimating the credit requirement and appraisal of loan and preparation of financial and farm business project report.
CO – 3	Applying the statistical and ICT tools for data analysis.

List of Practicals:

1. Determination of most profitable level of capital use. Optimum allocation of limited amount of capital among different enterprise.
2. Analysis of progress and performance of cooperatives using published data. Analysis of progress and performance of commercial banks and RRBs using published data.
3. Visit to a commercial bank, cooperative bank and cooperative society to acquire firsthand knowledge of their management,
4. 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.
5. Appraisal of a loan proposal – A case study. Techno-economic parameters for preparation of projects. Preparation of Bankable projects for various agricultural products and its value added products. Seminar on selected topics.

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3 point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks 50
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	

External Evaluation (50 marks)

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks



Production Technology for Vegetable and Spices Practical

Course Type	Course Code	L	T	P	C
Core course	BAG 362	0	0	2	1

The Course outcomes (COs)

On completion of the course the students will be

CO-1	Understanding the identification of vegetables & spice crops and their seeds.
CO-2	Applying the fertilizers and other agri-inputs in proper doses
CO-3	Evaluating the economics of vegetables and spices cultivation.

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

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3 point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks 50
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	

External Evaluation (50 marks)

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks



Statistical Methods Practical

Course Type	Course Code	L T P C
Core course	BAG 364	0 0 2 1

The Course Outcomes (Cos).

On completion of the course the students will be

CO-1:	Applying & analyzing the concepts of diagrammatic & graphical representation of data.
CO-2:	Applying & analyzing the concepts of central tendency & dispersion.
CO-3:	Applying, analyzing & evaluating the concepts of correlation & regression.

1. Collection of data from primary / secondary sources related with agriculture.
2. Classification & tabulation of the collected data.
3. Diagrammatic / graphical presentation of the tabulated data.
4. Find the suitable average of the collected data.
5. Find the suitable measure of dispersion of the collected data.
6. Find the correlation coefficient of the collected data related with agriculture.
7. Find the regression lines of the collected data related with agriculture.

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3 point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks 50
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	

External Evaluation (50 marks)

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks



Livestock & Poultry Management Practical

Course Type	Course Code	L T P C
Core course	BAG 365	0 0 2 1

The Course Outcomes (COs).

On completion of the course the students will be

CO-1	Identifying the body parts, and markers of good quality livestock
CO-2	Describing animal housing and clean milk production
CO-3	Applying the economics of farm animal production

1. External body parts of cattle, buffalo, sheep, goat, swine and poultry.
2. Handling and restraining of livestock. Identification methods of farm animals and poultry.
3. Visit to IDF and IPF to study breeds of livestock and poultry and daily routine farm operations and farm records.
4. Judging of cattle, buffalo and poultry.
5. Culling of livestock and poultry.
6. Planning and layout of housing for different types of livestock.
7. Computation of rations for livestock.
8. Formulation of concentrate mixtures. Clean milk production, milking methods.
9. Hatchery operations, incubation and hatching equipments. Management of chicks, growers and layers. Debeaking, dusting and vaccination.
10. Economics of cattle, buffalo, sheep, goat, swine and poultry production.

Evaluation of Practical Examination:

Internal Evaluation

(50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3 point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks 50
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	

External Evaluation

(50 marks)

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks



Agri-Informatics Practical

Course Type	Course Code	L	T	P	C
Core course	BAG 367	0	0	2	1

Practical

1. Study of Computer Components, accessories, practice of important DOS Commands.
2. Introduction of different operating systems such as windows, Unix/ Linux, Creating, Files & Folders, File Management.
3. Use of MS-WORD and MS Power-point for creating, editing and presenting a scientific Document.
4. 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.
5. Introduction to World Wide Web (WWW). Introduction of programming languages. Hands on Crop Simulation Models (CSM) such as DSSAT/Crop-Info/CropSyst/ Wofost
6. Computation of water and nutrient requirements of crop using CSM and IT tools.
7. Introduction of Geospatial Technology for generating valuable information for Agriculture. Hands on Decision Support System. Preparation of contingent crop planning.

Evaluation of Practical Examination:

Internal Evaluation

(50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3 point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks 50
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	

External Evaluation

(50 marks)

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks



Environmental Studies & Disaster Management Practical

Course Type	Course Code	L T P C
Ability Enhancement Course	BAG 368	0 0 2 1

The Course Outcomes (COs).

On completion of the practical course the students will be

CO – 1	Applying the various methods in the field study
CO – 2	Analyzing the environmental condition based on visits of local areas-river, forest, rural, urban and industrial sites
CO – 3	Evaluating the impact of climate change on agriculture production, natural resources, economy and mitigation strategies

List of Practicals

1. Case Studies and Field work.
2. Visit to a local area to document environmental assets river/forest/grassland/hill/mountain, Visit to a local polluted site-Urban/ Rural/ Industrial/
3. Agricultural, study of common plants, insects, birds and study of simple ecosystems-pond, river,hill slopes, etc.
4. Expected impact of climate change on agricultural production and water resources, Mitigation Strategies, Economics of climate change.
5. Disaster Management introduction, Natural and Manmade Disaster Studies, Informatics for Disaster Management, Quantitative Techniques for Disaster Management
6. Environmental Impact Assessment (EIA) and Disaster Management
7. Disaster Management Policy Environmental Modelling.

Evaluation of Practical Examination:

Internal Evaluation

(50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3 point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks 50
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	

External Evaluation

(50 marks)

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks



Farm Machinery and Power Practical

Course Type	Course Code	L	T	P	C
Core course	BAG 369	0	0	2	1

Practical

1. Study of different components of I.C. engine. To study air cleaning and cooling system of engine
2. Familiarization with clutch, transmission, differential and final drive of a tractor, Familiarization with lubrication and fuel supply system of engine
3. Familiarization with brake, steering, hydraulic control system of engine, Learning of tractor driving, Familiarization with operation of power tiller, Implements for hill agriculture
4. Familiarization with different types of primary and secondary tillage implements: mould plough, disc plough and disc harrow.
5. Familiarization with seed cum- fertilizer drills their seed metering mechanism and calibration, planters and transplanter.
6. Familiarization with different types of sprayers and dusters Familiarization with different inter cultivation equipment, Familiarization with harvesting and threshing machinery.



Physical Education and Yoga Practices

Course Type	Course Code	L	T	P	C
Ability Enhancement Course	BAG 370	0	0	2	1

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

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.



Crop Production Technology-II (Rabi crops)

Course Type	Course Code	L T P C
Core course	BAG- 410	1 0 0 1

Course Outcomes (COs).

On completion of the course the students will be

CO – 1	Understanding and applying the cultivation practices of major cereals, pulses, oil seed, forage medicinal and aromatic rabi season crops
--------	--

Unit 1 (4 Hours)

Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of *Rabi* crops; cereals –wheat and barley,

Unit 2 (4 Hours)

Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of *Rabi* crops;pulses-chickpea, lentil, peas,

Unit 3 (4 Hours)

Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of *Rabi* crops;oilseeds-rapeseed, mustard and sunflower;

Unit 4 (4 Hours)

Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of *Rabi* crops; sugar crops-sugarcane;

Unit 5 (4 Hours)

Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of *Rabi* crops; medicinal and aromatic crops-mentha, lemon grass and citronella, Forage crops-berseem, lucerne and oat.

Text books:

1. Handbook of Agriculture: Indian Council of Agricultural Research, New Delhi.6th edition.

Reference books:

1. Principles of Agronomy - S. R. Reddy. Kalyani Publisher
- 2.Manures and Fertilizers - K. S. Yawalkar, J.P. Agrawal and S. Bokde Agri-Horticultural Pub. House
3. Fundamentals of Agronomy Gopal Chandra De. Oxford and IBH Publishing Co. PVT. LTD.



Production Technology for Ornamental Crops, MAPs and Landscaping

Course Type	Course Code	L	T	P	C
Core course	BAG- 411	1	0	0	1

Course Outcomes (COs).

On completion of the course the students will be

CO-1	Understanding the scope and importance of ornamental crops and their use in landscaping
CO-2	Analyzing various production technologies of important medicinal, aromatic and ornamental crops.
CO-3	Evaluating different packages of practices for loose flowers

Unit 1

(4 Hours)

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

Unit 2

(4 Hours)

Production technology of important cut flowers like rose, gerbera, carnation, liliun and orchids under protected conditions and gladiolus, tuberose, chrysanthemum under open conditions.

Unit 3

(4 Hours)

Package of practices for loose flowers like marigold and jasmine under open conditions.

Unit 4

(4 Hours)

Production technology of important medicinal plants like ashwagandha, asparagus, aloe, costus, Cinnamomum, periwinkle, isabgol and aromatic plants like mint, lemongrass, citronella, palmarosa, ocimum, rose, geranium, vetiver.

Unit 5

(4 Hours)

Processing and value addition in ornamental crops and MAPs produce.

Text Books:

1. Terminology of Horticulture by Neeraj Pratap Singh. International Book Distributing Co (IBDC Publishers)

Reference Books:

4. Postharvest Management and Value Addition Ashwai K. Goel, Rajinder Kumar, Satwinder S. Mann Daya Books.
5. Handbook of Agriculture. ICAR.
6. Basics of Horticulture by K.V. Peter. New India Publishing Agency, New Delhi
7. Principles of Horticulture by C.R. Adams, M.P. Early. Routledge
8. Basic Concepts of Vegetable Science Singh N. P. International Book Distributing Company,



Agricultural Marketing Trade & Prices

Course Type	Course Code	L	T	P	C
Core course	BAG 412	2	0	0	2

Course Outcomes (COs).

On completion of the course the students will be

CO-1	Understanding markets, marketing functions, procedures and policies.
CO-2	Recognizing efficient marketing channels for farmers for maximizing their economic gains
CO-3	Explaining international trade and IPR in agriculture

Unit 1

(4 Hours)

Agricultural Marketing: Concepts and definitions of market, marketing, agricultural marketing, market structure, marketing mix and market segmentation, classification and characteristics of agricultural markets; demand, supply and producer's surplus of agri-commodities: nature and determinants of demand and supply of farm products, producer's surplus – meaning and its types,

Unit 2

(4 Hours)

Marketable and marketed surplus, factors affecting marketable surplus of agri-commodities; product life cycle (PLC) and competitive strategies: Meaning and stages in PLC; characteristics of PLC; strategies in different stages of PLC; pricing and promotion strategies: pricing considerations and approaches – cost based and competition based pricing; market promotion – advertising, personal selling, sales promotion and publicity – their meaning and merits & demerits; marketing process and functions: Marketing process-concentration, dispersion and equalization;

Unit 3

(4 Hours)

Exchange functions – buying and selling; physical functions – storage, transport and processing; facilitating functions – packaging, branding, grading, quality control and labeling (Agmark); Market functionaries and marketing channels: Types and importance of agencies involved in agricultural marketing; meaning and definition of marketing channel; number of channel levels; marketing channels for different farm products; Integration, efficiency, costs and price spread:

Unit 4

(4 Hours)

Meaning, definition and types of market integration; marketing efficiency; marketing costs, margins and price spread; factors affecting cost of marketing; reasons for higher marketing costs of farm commodities; ways of reducing marketing costs; Role of Govt. in agricultural marketing: Public sector institutions- CWC, SWC, FCI, CACP & DMI – their objectives and functions;

Unit 5

(4 Hours)

Cooperative marketing in India; Risk in marketing: Types of risk in marketing; speculation & hedging; an overview of futures trading; Agricultural prices and policy: Meaning and functions of price; administered prices; need for agricultural price policy; Trade: Concept of International Trade and its need, theories of absolute and comparative advantage. Present status and prospects of international trade in agri-commodities; GATT and WTO; Agreement on Agriculture (AoA) and its implications on Indian agriculture; IPR.

Text books:

1. Acharya, S.S. and Agarwal, N.L. Agricultural Marketing in India. Oxford and IBH Publishers Co. Pvt. Ltd., New Delhi.

Reference books: 1. Kahlon, A.S. and Tyagi, S.D. Agricultural Price Policy in India. Allied Publishers Co Pvt Ltd., Bombay.

2. Mamoria, C.B. Principles and Practices of Marketing in India. Kitab Mahal, Allahabad.
3. Dutta, R. Sundaram K.P.M. Indian Economy. S.Chand & Company Ltd., New Delhi.



Introductory Agro-meteorology & Climate Change

Course Type	Course Code	L T P C
Core course	BAG 413	1 0 0 1

Course Outcomes (COs).

On completion of the course the students will be

CO-1:	Understanding and applying the agricultural meteorology on weather forecast
CO-2:	Understanding the characteristic, behavior and phenomenon of the atmosphere.
CO-3:	Applying the tools of agro meteorology in agriculture.

Unit 1

(4 Hours)

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

Unit 2

(4 Hours)

Nature and properties of solar radiation, solar constant, depletion of solar radiation, short wave, longwave and thermal radiation, net radiation, albedo; Atmospheric temperature, temperature inversion, lapse rate, daily and seasonal variations of temperature, vertical profile of temperature, Energy balance of earth;

Unit 3

(4 Hours)

Atmospheric humidity, concept of saturation, vapor pressure, process of condensation, formation of dew, fog, mist, frost, cloud; Precipitation, process of precipitation, types of precipitation such as rain, snow, sleet, and hail, cloud formation and classification;

Unit 4

(4 Hours)

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

Unit 5

(4 Hours)

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

Text Books:

1.Varshneya, M.C. and Pillai, P.B. 2003. Text book of Agricultural Meteorology, ICAR Pusa, New Delhi.

Reference Books:

- 1.Seeman. J., Chiskov, Y.Z., Lomsa, J. and Primault, B. 1979. Agrometeorology, Springer Verlag, berlin.
- 2.Sunith, C.P. 1975. Methods in Agriculture Meteorology, Elsevier Sc. Co., Amsterdam.
- 3.Prasad Rao, G.S.L.H.V. 2003. Agricultural Meteorology, Kerala Agricultural University, Thrissur, Kerala.



Farming System & Sustainable Agriculture

Course Type	Course Code	L	T	P	C
Core course	BAG 414	1	0	0	1

Course Outcomes (COs).

On completion of the course the students will be

CO – 1	Understanding the types, scope and importance of farming system
CO – 2	Applying the cropping and farming system for sustainable agriculture.
CO – 4	Evaluating the efficiency of different cropping systems.

Unit 1

(4 Hours)

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

Unit 2

(4 Hours)

Efficient cropping system and their evaluation, Allied enterprises and their importance, Tools for determining production and efficiencies in cropping and farming system; Sustainable agriculture-problems and its impact on agriculture, indicators of sustainability, adaptation and mitigation,

Unit 3

(4 Hours)

Conservation agriculture strategies in agriculture, HEIA, LEIA and LEISA and its techniques for sustainability, Integrated farming system-historical background, objectives and characteristics,

Unit 4

(4 Hours)

Components of IFS and its advantages, Site specific development of IFS model for different agro-climatic zones, resource use efficiency and optimization techniques,

Unit 5

(4 Hours)

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

Text books:

1. Handbook of Agriculture: Indian Council of Agricultural Research, New Delhi. 6th edition.

Reference books:

1. Palaniappan, S.P. and Sivaraman, K. 1996. Cropping Systems in the Tropics: Principles and Management. New Age Publ.
2. Fundamentals of Agronomy Gopal Chandra De. Oxford and IBH Publishing Co. Pvt. Ltd.
3. Panda, S.C. 2004. Cropping Systems and Farming Systems. Agribios.



Renewable Energy and Green Technology

Course Type	Course Code	L T P C
Core Course	BAG 415	1 0 0 1

Course Outcomes (COs).

On completion of the course the students will be

CO – 1	Understanding the relative importance of different sources of energy for agriculture sector and their sustainability.
CO – 2	Understanding various technological aspects of sustainable utilization of bio- and solar energy
CO – 3	Applying the above knowledge for evaluating the different sources of sustainable energy for agriculture sector.

Unit 1

(4 Hours)

Classification of energy sources, contribution of these of sources in agricultural sector,

Unit 2

(4 Hours)

Familiarization with biomass utilization for biofuel production and their application,

Unit 3

(4 Hours)

Familiarization with types of biogas plants and gasifiers, biogas, bioalcohol, biodiesel and biooil production and their utilization as bioenergy resource,

Unit 4

(4 Hours)

Introduction of solar energy, collection and their application, Familiarization with solar energy gadgets: solar cooker, solar water heater, application of solar energy:

Unit 5

(4 Hours)

Solar drying, solar pond, solar distillation, solar photovoltaic system and their application, introduction of wind energy and their application.

Text books:

1. Renewable Energy Sources and Emerging Technologies, by Kothari D.P. , Singal K. C. , Ranjan Rakesh , New Arrivals.

Reference books:

1. Non-Conventional Energy Sources and Utilisation (Energy Engineering), by R.K. Rajput, S. Chand Publishing.

2. Renewable Energy Technologies: A Practical Guide for Beginners, Solanki Chetan Singh, PHI School Books.
3. Renewable Energy Technologies: A Practical guide for beginners, Chetan Singh Solanki



Problematic Soils and their Management

Course Type	Course Code	L	T	P	C
Core Course	BAG 416	2	0	0	2

Course Outcomes (COs).

On completion of the course the students will be

CO-1	Understanding the soil forming processes and the current scenario of problematic soils in India and world
CO-2	Applying remote sensing and GIS in identifying, diagnosing and management to reclaim problematic soils
CO-3	Analyzing the irrigation water quality and use of saline water in agriculture

Unit 1

(4 Hours)

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

Unit 2

(4 Hours)

Reclamation and management of Saline and sodic soils, Acid soils, Acid Sulphate soils, Eroded and Compacted soils, Flooded soils, Polluted soils.

Unit 3

(4 Hours)

Irrigation water – quality and standards, utilization of saline water in agriculture. Remote sensing and GIS in diagnosis and management of problem soils.

Unit 4

(4 Hours)

Multipurpose tree species, bio remediation through MPTs of soils, land capability

Unit 5

(4 Hours)

Classification, land suitability classification. Problematic soils under different Agro-ecosystems.

Text Books:

1. Introductory Soil Science- D.K. Das. Kalyani Publisher.

Reference Books:

1. Soil Fertility and Fertilizer Use- Samuel L. Tisdale and Werner L. Nelson Macmillan Coll Div.
2. Nature and Property of Soil- N. C. Braby. Macmillan Publishing Company Incorporated
3. Soil Science- Mangat Rai Anmol Publications Pvt. Ltd.



Production Technology for Fruit and Plantation Crops

Course Type	Course Code	L	T	P	C
Core Course	BAG 417	1	0	0	1

The Course Outcomes (COs).

On completion of the course the students will be

CO-1	Understanding the scope and importance of fruit and plantation crops industries in India
CO-2	Demonstrating the effective production technologies for the cultivation of important fruit and plantation crops
CO-3	Analyzing various production technologies for the cultivation of fruit and plantation crops

Unit 1 (4 Hours)

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

Unit 2 (4 Hours)

Production technologies for the cultivation of major fruits-mango, banana, citrus, grape, guava

Unit 3 (4 Hours)

Production technologies for the cultivation of major fruits-litchi, papaya, sapota, apple, pear, peach, walnut, almond

Unit 4 (4 Hours)

Production technologies for the cultivation of minor fruits- date, ber, pineapple, pomegranate, jackfruit, strawberry

Unit 5 (4 Hours)

Production technologies for the cultivation of plantation crops-coconut, arecanut, cashew, tea, coffee & rubber

Text Books:

1. Production Technology of Plantation Crops, Spices, Aromatic and Medicinal Plants. L.K. Dashora, S.S. Lakhawat, Abhay Dashora. Agrotech Publishing Academy.

Reference Books:

1. Handbook of Agriculture. ICAR.
2. Production Technology Of Plantation Crops, Spices, Aromatic And Medicinal Plants, L K Dashora, Abhay Dashora, S S Lakhawat, Agrotech Publishing Academy
3. Basics of Horticulture by K.V. Peter. New India Publishing Agency, New Delhi
4. Principles of Horticulture by C.R. Adams, M.P. Early. Routledge
5. Basic Concepts of Vegetable Science Singh N. P. International Book Distributing Company,



Principles of Seed Technology

Course Type	Course Code	L	T	P	C
Core Course	BAG 418	1	0	0	1

The Course outcomes (Cos).

On completion of the course the students will be

CO – 1	Understanding the history, type and importance of seed and seed technology.
CO – 2	Understanding the duties and powers of seed inspector.
CO – 3	Explaining common pests, diseases and their management in seed storage.
CO – 4	Evaluating the characteristics of good quality seeds of cereals, pulses, fodder and vegetables.

Unit 1

(4 Hours)

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;

Unit 2

(4 Hours)

Definition, Characters of good quality seed, different classes of seed. Foundation and certified seed production of important cereals, pulses, oilseeds, fodder and vegetables. Seed certification, phases of certification, procedure for seed certification, field inspection. Seed Act and Seed Act enforcement.

Unit 3

(4 Hours)

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

Unit 4

(4 Hours)

Seed drying, processing and their steps, seed testing for quality assessment, seed treatment, its importance, method of application and seed packing. Seed storage; general principles, stages and factors affecting seed longevity during storage.

Unit 5

(4 Hours)

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

Text books:

1. Seed Technology, Agarwal, Oxford and IBH Publishing

Reference books:

1. Seed Technology, Agarwal Rattan Lal, Oxford and IBH Publishing Company Pvt. Ltd.
2. Seed Production Technology, J. P. Srivastava, L. T. Simarski, International Center for Agricultural Research in the Dry Areas,
3. Status of the rights of farmers and plant breeders in Asia, Ujjwal Kumar, Gene Campaign



Human Values and Ethics

Course Type	Course Code	L	T	P	C
Ability Enhanced Course	BAG 419	1	0	0	1

The Course Outcomes (COs)

On completion of the course the students will be

CO-1	Understanding the significance of value inputs, distinguish between values and skills, the need, content and process of value education,
CO-2	Understanding the meaning of Harmony in the Self the Co-existence of Self and Body, the value of harmonious relationship based on trust, respect and other naturally acceptable feelings in human-human relationships and explore their role in ensuring a harmonious society
CO-3	Exploring the meaning of happiness and prosperity and do a correct appraisal of the current scenario in the society
CO-4	Applying the harmonious relationship in nature and existence, and work out their mutually fulfilling participation in the nature.

Unit-I (4Hours)

Values and Ethics-An Introduction. Goal and Mission of Life. Vision of Life. Principles and Philosophy.

Unit-II (4Hours)

Understanding harmony in the Self- Self-Exploration. Self Awareness. Self Satisfaction, Positive Spirit. Body, Mind and Soul.

Unit-III (4Hours)

Understanding harmony in the Family and the society, Motivation. Sensitivity. Success. Selfless Service.

Unit-1V (4Hours)

Understanding the harmony in the Nature, Case Study of Ethical Lives.

Unit-V (4Hours)

Attachment and Detachment, Decision Making.

Text Book :

1.Gaur RR, Sangal R & Bagaria GP. 2011. A Foundation Course in Human Values and Professional Ethics, Ethics. Excel Books.

Reference Books:

1. Mathur SS. 2010. Education for Values, Environment and Human Rights. RSA International.
2. Sharma RA. 2011. Human Values and Education -Axiology, Incultation and Research. R. Lall Book Depot.
3. Sharma RP & Sharma M. 2011. Value Education and Professional Ethics. Kanishka Publishers.
4. Srivastava S. 2011. Human Values and Professional Ethics. S K Kataria & Sons.
5. Srivastava S. 2011. Environmental Science. S K Kataria & Sons.
6. Tripathi A.N. 2009. Human Values. New Age International (P) Ltd Publishers.



English Communication-IV

Course Type	Course Code	L	T	P	C
Ability Enhancement Compulsory Course	TMUGE 414	2	0	0	2

The Course Outcomes (COs).

On completion of the course the students will be

CO – 1	Understanding the correct use listening and speaking skills.
CO – 2	Applying job oriented skills.
CO – 3	Understanding strategies of oral presentation.
CO – 4	Applying professional writing skills.

Course Contents:

Unit – I Vocabulary & Grammar

(12 hours)

- Homophones and Homonyms
- Correction of Common Errors (with recap of English Grammar with its usage in practical context.)
- Transformation of sentences

Unit – II Essence of Effective listening & speaking

(05 hours)

- Listening short conversation/ recording (TED talks / Speeches by eminent personalities) *Critical Review of these abovementioned*
- Impromptu

Unit – III: Professional Writing

(08 Hours)

- Proposal: Significance, Types, Structure & AIDA
- Report Writing: Significance, Types, Structure & Steps towards Report writing

Unit – IV: Job Oriented Skills

(10Hours)

- Cover Letter
- Preparing R  sum   and Curriculum-Vitae
- Interview: Types of Interview, Tips for preparing for Interview and Mock Interview
- Corporate Expectation & Professional ethics: Skills expected in corporate world

Unit – V Value based text reading: Short story

(05 hours)

- A Bookish Topic – R.K. Narayan

Text Books:

- 1.Singh R.P., An Anthology of Short stories, O.U.P. New Delhi.

Reference Books:

1. Raman Meenakshi & Sharma Sangeeta, “Technical Communication-Principles & Practice” Oxford University Press, New Delhi.
2. Mohan K. & Sharma R.C., “Business Correspondence of Report Writing”, TMH, New Delhi.
3. Chaudhary, Sarla “Basic Concept of Professional Communication” Dhanpat Rai Publication, New Delhi.
4. Kumar Sanjay & Pushplata “Communication Skills” Oxford University Press, New Delhi.
5. Agrawal, Malti “Professional Communication” Krishana Prakashan Media (P) Ltd. Meerut.

Methodology:

1. The content will be conveyed through Real life situations, Pair Conversation, Group Talk and Class Discussion.
2. Language Lab software.
3. Sentence transformation on daily activities and conversations.
4. Conversational Practice will be effectively carried out by Face to Face & Via Media(Audio Video Clips)
5. Modern Teaching tools (PPT Presentation & Motivational videos with sub-titles) will be utilized.

Note:

- Class (above 30 students) will be divided in to two groups for effective teaching.
- For effective conversation practice, groups will be changed weekly.

Evaluation Scheme

Internal Evaluation			External Evaluation		Total
					Marks
40 Marks			60 Marks		100
20 Marks (Best 2 out of Three CTs) (From Unit – I, III, IV & V)	10 Marks (Oral Assignments) (From Unit –II & IV)	10 Marks (Attendance)	40 Marks (External Written Examination) (From Unit –I, III, IV & V)	20 Marks (External Viva)* (From Unit –II & IV)	

***Parameters of External Viva**

Content	Body Language	Communication Skills	Confidence	TOTAL
05 Marks	05 Marks	05 Marks	05 Marks	20 Marks

Note: External Viva will be conducted by 2-member committee comprising

a) One Faculty teaching the class

b) One examiner nominated by University Examination cell.

Each member will evaluate on a scale of 20 marks and the average of two would be the 20 marks obtained by the students.



Crop Production Technology –II (*Rabi Crops*) Practical

Course Type	Course Code	L T P C
Core course	BAG 455	0 0 2 1

The Course Outcomes (COs).

On completion of the course the students will be

CO-1	Identification of weeds in <i>rabi</i> season crops
CO-2	Understanding and applying the sowing methods of wheat and sugarcane
CO-3	Understanding and analysing yield contributing characters of <i>rabi</i> season crops and juice quality analysis of sugarcane
CO-4	Applying the oil extraction of medicinal crops

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

Evaluation of Practical Examination:

Internal Evaluation

(50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3 point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks 50
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	

External Evaluation

(50 marks)

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks



Production Technology for Ornamental Crops, MAPs and Landscaping Practical

Course Type	Course Code	L	T	P	C
Core course	BAG 456	0	0	2	1

The Course outcomes (COs).

On completion of the course the students will be

CO-1	Understanding the propagation, scarification and stratification of seeds.
Co-2	Applying the preparation of plant bio-regulators and their uses.
CO-3	Analyzing the propagation methods for fruit and plantation crops.

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 layout of 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 and loose flowers.
- Processing of MAP.
- Visit to commercial flower/MAP unit.

Evaluation of Practical Examination:

Internal Evaluation

(50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3 point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks 50
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	

External Evaluation

(50 marks)

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks



Agricultural Marketing Trade & Prices Practical

Course Type	Course Code	L	T	P	C
Core course	BAG 458	0	0	2	1

The Course outcomes (COs):

On completion of the course the students will be

CO – 1	Understanding the calculation of demand and supply and projection of producer surplus of agricultural commodities.
CO – 2	Understanding of identification of marketing channels and functions and projection of marketing cost, marketing margin, and price spread.

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

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3 point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks 50
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	

External Evaluation (50 marks)

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks



Introductory Agro-meteorology & Climate Change Practical

Course Type	Course Code	L	T	P	C
Core course	BAG 459	0	0	2	1

Course Outcomes (COs):

On completion of the course the students will be

CO – 1	Describing the shortwave and longwave radiation, and its estimation using Planck's intensity law.
CO – 2	Describing the wind speed and wind direction, sunshine duration, albedo and computation of radiation intensity using BSS.
CO – 3	Applying the tabulation and analysis of rain through open pan evaporation methods.

1. Visit of Agrometeorological Observatory, site selection of observatory, exposure of instruments and weather data recording.
2. Measurement of total, shortwave and longwave radiation, and its estimation using Planck's intensity law.
3. Measurement of albedo and sunshine duration, computation of Radiation Intensity using BSS.
4. Measurement of maximum and minimum air temperatures, its tabulation, trend and variation analysis.
5. Measurement of soil temperature and computation of soil heat flux.
6. Determination of vapor pressure and relative humidity. Determination of dew point temperature. Measurement of atmospheric pressure and analysis of atmospheric conditions.
7. Measurement of wind speed and wind direction, preparation of windrose.
8. Measurement, tabulation and analysis of rain.
9. Measurement of open pan evaporation and evapotranspiration. Computation of PET and AET.

Evaluation of Practical Examination:

Internal Evaluation

(50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3 point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks 50
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	

External Evaluation

(50 marks)

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks



Renewable Energy and Green Technology Practical

Course Type	Course Code	L	T	P	C
Core course	BAG 460	0	0	2	1

The Course Outcomes (COs)

On completion of the course the students will be

CO-1	Understanding various technological aspects of sustainable utilization of renewable energy.
CO-2	Applying the above knowledge for evaluating the different sources of sustainable energy for agriculture sector

1. Familiarization with renewable energy gadgets.
2. To study biogas plants, To study gasifier,
3. To study the production process of biodiesel, To study briquetting machine,
4. To study the production process of bio-fuels.
5. Familiarization with different solar energy gadgets.
6. To study solar photovoltaic system: solar light, solar pumping, solar fencing.
7. To study solar cooker, To study solar drying system.
8. To study solar distillation and solar pond.

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3 point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks 50
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	

External Evaluation (50 marks)

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks



Production Technology for Fruit and Plantation Crops Practical

Course Type	Course Code	L	T	P	C
Core course	BAG 461	0	0	2	1

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.



Principles of Seed Technology Practical

Course Type	Course Code	L T P C
Core course	BAG 462	0 0 4 2

The Course outcomes (COs)

On completion of the course the students will be

CO – 1	Applying the seed production techniques in major cereal, pulses, oil seed and vegetable crops
CO – 2	Analyzing the seed sampling and seed testing tools for measuring the physical purity, germination, vigour and viability of seeds.
CO – 3	Evaluating the certification and genetic purity of seeds

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

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3 point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks 50
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	

External Evaluation (50 marks)

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks



Physical Education and Yoga Practices

Course Type	Course Code	L	T	P	C
Ability Enhancement Course	BAG 470	0	0	2	1

1. Teaching of skills of Hockey – demonstration practice of the skills and correction. Involvement of skills in games situation
2. 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
3. Teaching of skills of Kho-Kho – demonstration practice of the skills and correction.
4. Teaching of skills of Kho-Kho – demonstration practice of the skills and correction. Involvement of the skills in games situation
5. 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
6. Teaching of different track events – demonstration practice of the skills and correction.
7. Teaching of different track events – demonstration practice of the skills and correction with competition among them.
8. Teaching of different field events – demonstration practice of the skills and correction.
9. Teaching of different field events – demonstration practice of the skills and correction with competition among them.
10. Teaching of different asanas – demonstration practice and correction.
11. Teaching of weight training – demonstration practice and correction.
12. Teaching of circuit training – demonstration practice and correction.
13. 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.



Agribusiness Management

Course Type	Course Code	L	T	P	C
Discipline specific Elective course	BAGE 401	2	0	0	2

Course Outcomes (COs).

On completion of the course the students will be

CO-1	Understanding the importance of agribusiness in Indian economy and in new agricultural policy.
CO-2	Understanding the procedure of setting up new agro based industries
CO-3	Understanding the management functions and carrying out SWOT analysis of any business environment.

Unit 1

(4 Hours)

Transformation of agriculture into agribusiness, various stakeholders and components of agribusiness systems. Importance of agribusiness in the Indian economy and New Agricultural Policy.

Unit 2

(4 Hours)

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:

Unit 3

(4 Hours)

Understanding primary and support activities and their linkages. Business environment: PEST & SWOT analysis. Management functions: Roles & activities, Organization culture. Planning, meaning, definition, types of plans. Purpose or mission, goals or objectives, Strategies, policies procedures, rules, programs and budget. Components of a business plan, Steps in planning and implementation.

Unit 4

(4 Hours)

Organization staffing, directing and motivation. Ordering, leading, supervision, communications, control. Capital Management and Financial management of Agribusiness. Financial statements and their importance. Marketing Management: Segmentation, targeting & positioning. Marketing mix and marketing strategies.

Unit 5

(4 Hours)

Consumer behavior analysis, Product Life Cycle (PLC). Sales & Distribution Management. Pricing policy, various pricing methods. Project Management definition, project cycle, identification, formulation, appraisal, implementation, monitoring and evaluation. Project Appraisal and evaluation techniques.

Text books:

1. Personality Development, Swami Vivekanand, Advaita Ashram.

Reference books:

1. Personality Development and soft Skills, Barun K. Mitra, Oxfors University.
2. Communication Skills, Sanjay Kumar and Pushp Lata, Oxford University.



Agrochemicals

Course Type	Course Code	L	T	P	C
Discipline specific Elective course	BAGE 402	2	0	0	2

Course Outcomes (COs).

On completion of the course the students will be

CO – 1	Understanding the basics of different agrochemicals
CO – 2	Application of various methods and techniques of different agrochemicals
CO – 4	Analyzing various methodologies and techniques used for the development of ecological agriculture

Unit 1

(4 Hours)

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.

Unit 2

(4 Hours)

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,

Unit 3

(4 Hours)

Biorationals, Insecticide Act and rules, Insecticides banned, withdrawn and restricted use, Fate of insecticides in soil & plant. IGRs Biopesticides, Reduced risk insecticides, Botanicals, plant and animal systemic insecticides their characteristics and uses.

Unit 4

(4 Hours)

Fertilizers and their importance. Nitrogenous fertilizers: Feedstocks and Manufacturing of ammonium sulphate, ammonium nitrate, ammonium chloride, urea. Slow release N-fertilizers. Phosphatic fertilizers: feedstock and manufacturing of single superphosphate. Preparation of bone meal and basic slag. Potassic fertilizers: Natural sources of potash, manufacturing of potassium chloride, potassium sulphate and potassium nitrate.

Unit 5

(4 Hours)

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.

Text Books:

1. Roy, N.K. 2002. Chemistry of Pesticides. CBS Publishers, New Delhi

Reference Books:

1. Integrated Pest Management. G.S.Dhaliwal and Ramesh Arora. Kalyani Publisher
2. Organic Farming for Sustainable Agriculture- S.C. Panda. Kalyani publishers.



Commercial Plant Breeding

Course Type	Course Code	L	T	P	C
Discipline specific Elective course	BAGE 403	2	0	0	2

Course Outcomes (COs).

On completion of the course the students will be

CO – 1	Understanding basic concepts, theories and principles of plant breeding for improving yield and other traits in crops.
CO – 2	Applying various methods and approaches of traditional and advanced plant breeding to enhance the crop yield.
CO – 3	Analyzing various procedures, techniques and strategies for quality seed production to ensure the food security.
CO – 4	Evaluating different methodologies and procedures used to intensify the crop productivity.

Unit 1

(4 Hours)

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

Unit 2

(4 Hours)

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.

Unit 3

(4 Hours)

Alternative strategies for the development of the line and cultivars: haploid inducer, tissue culture techniques and biotechnological tools.

Unit 4

(4 Hours)

IPR issues in commercial plant breeding: DUS testing and registration of varieties under PPV & FR Act.

Unit 5

(4 Hours)

Variety testing, release and notification systems in India. Principles and techniques of seed production, types of seeds, quality testing in self and cross pollinated crops.

Text Books:

1. Principles of Plant Breeding. Robert Wayne Allard, John Wiley and Sons

Reference Books:

1. Elementary Principles of Plant Breeding, Choudhary H.K. IBH Publication

2. Breeding of field crops, D.N. Bhardwaj, Agrobios

3. Breeding of Horticultural crops: Principles and Practices, N. Kumar, New India Publishing

B.Sc. Agriculture Syllabus Applicable w.e.f. Academic Year 2014-15



Landscaping

Course Type	Course Code	L	T	P	C
Discipline specific Elective course	BAGE 404	2	0	0	2

Course Outcomes (COs).

On completion of the course the students will be

CO-1:	Understanding the basic concepts and principles of landscaping
CO-2:	Understanding and analyzing the beneficial trees, climbers and creepers used in different landscapes
CO-3:	Analyzing the propagation, planting, and canopy management in horticulture crops

Unit 1

(4 Hours)

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.

Unit 2

(4 Hours)

Trees: selection, propagation, planting schemes, canopy management, shrubs and herbaceous perennials: selection, propagation, planting schemes, architecture. Climber and creepers: importance, selection, propagation, planting,

Unit 3

(4 Hours)

Trees: selection, propagation, planting schemes, canopy management, shrubs and herbaceous Annuals: selection, propagation, planting scheme, Other garden plants: palms, ferns, grasses and cacti succulents. Pot plants: selection, arrangement, management.

Unit 4

(4 Hours)

Bio-aesthetic planning: definition, need, planning; landscaping of urban and rural areas, Peri-urban landscaping, Landscaping of schools, public places like bus station, railway station, townships,

Unit 5

(4 Hours)

Landscaping of river banks, hospitals, play grounds, airports, industries, institutions. Bonsai: principles and management, lawn: establishment and maintenance. CAD application.

Text Books:

1. Basic Horticulture-Jitendra Singh. Kalyani Publisher

Reference Books:

1. Basics of Horticulture by K.V. Peter. New India Publishing Agency, New Delhi
2. Principles of Horticulture by C.R. Adams, M.P. Early. Routledge
3. Terminology of Horticulture by Neeraj Pratap Singh. International Book Distributing Co (IBDC Publishers)



Agribusiness Management Practical

Course Type	Course Code	L	T	P	C
Discipline specific Elective course	BAGE 451	0	0	2	1

The Course Outcomes (COs):

On completion of the course the students will be

CO – 1	Understanding of Agri – inputs outputs market financial institutions.
CO – 2	Understanding of preparation, analysis and writing of project

1. Study of agri-input markets: Seed, fertilizers, pesticides.
2. Study of output markets: grains, fruits, vegetables, flowers. Study of product markets, retails trade commodity trading, and value added products.
3. Study of financing institutions- Cooperative, Commercial banks, RRBs,
4. Agribusiness Finance Limited, NABARD. Preparations of projects and Feasibility reports for agribusiness entrepreneur. Appraisal/evaluation techniques of identifying viable project- Non-discounting techniques.
5. Case study of agro-based industries.
6. Trend and growth rate of prices of agricultural commodities.
7. Net present worth technique for selection of viable project. Internal rate of return.

Evaluation of Practical Examination:

Internal Evaluation

(50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3 point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks 50
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	

External Evaluation

(50 marks)

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks



Agrochemicals Practical

Course Type	Course Code	L	T	P	C
Discipline specific Elective course	BAGE 452	0	0	2	1

The Course Outcomes (COs).

On completion of the course the students will be

CO – 1	Studying the various methods of pesticides application
CO – 2	Applying various fertilizers to improve soil fertility.

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

Evaluation of Practical Examination:

Internal Evaluation

(50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3 point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks 50
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	

External Evaluation

(50 marks)

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks



Commercial Plant Breeding Practical

Course Type	Course Code	L	T	P	C
Discipline specific Elective course	BAGE453	0	0	2	1

The Course outcomes (Cos).

On completion of the course the students will be

CO – 1	Understanding the selfing and crossing techniques in self and cross pollinated species,
CO – 2	Understanding and applying the tools and techniques for hybrid seed production
CO – 3	Analysing the role of pollinators in hybrid seed production

1. Floral biology in self and cross pollinated species, selfing and crossing techniques.
2. Techniques of seed production in self and cross pollinated crops using A/B/R and two line system.
3. Learning techniques in hybrid seed production using male-sterility in field crops. Understanding the difficulties in hybrid seed production,
4. 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.
5. Role of pollinators in hybrid seed production. Hybrid seed production techniques in sorghum, pearl millet, maize, rice, rapeseed-mustard, sunflower, castor, pigeon pea, cotton and vegetable crops.
6. Sampling and analytical procedures for purity testing and detection of spurious seed.
7. Seed drying and storage structure in quality seed management.
8. Screening techniques during seed processing viz., grading and packaging. Visit to public private seed production and processing plants.

Evaluation of Practical Examination:

Internal Evaluation

(50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3 point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks 50
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	

External Evaluation

(50 marks)

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks



Landscaping Practical

Course Type	Course Code	L	T	P	C
Discipline specific Elective course	BAGE454	0	0	2	1

The course Outcomes (COs)

On completion of the course the students will be

CO-1	Understanding the tools for identification of trees, annuals, pot plants and shrubs in different landscapes.
Co-2	Preparing and applying the layout of formal and informal garden.

1. Identification of trees, shrubs, annuals, pot plants; Propagation of trees, shrubs and annuals, care and maintenance of plants, potting and repotting,
2. Identification of tools and implements used in landscape design, training and pruning of plants for special effects, lawn establishment and maintenance,
3. Layout of formal gardens, informal gardens, special type of gardens (sunken garden, terrace garden, rock garden)
4. Designing of conservatory and lathe house. Use of computer software,
5. Visit to important gardens/ parks/ institutes.

Evaluation of Practical Examination:

Internal Evaluation

(50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3 point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks 50
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	

External Evaluation

(50 marks)

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks



Principles of Integrated Pest and Disease Management

Course Type	Course Code	L T P C
Core course	BAG 509	2 0 0 2

Course Outcomes (COs).

On completion of the course the students will be

CO-1	Understanding the various categories of insect pest and diseases.
CO-2	Explaining the application of integrated pest and disease management
CO-3	Applying the tools of integrated pest and disease management: cultural, mechanical, physical, biological, legislative and chemical control.
CO-4	Evaluating insect pest and diseases through survey surveillance and forecasting

Unit 1

(4 Hours)

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

Unit 2

(4 Hours)

Calculation and dynamics of economic injury level and importance of Economic threshold level. Methods of control: Host plant resistance, cultural, mechanical, physical, legislative, biological and chemical control.

Unit 3

(4 Hours)

Ecological management of crop environment. Introduction to conventional pesticides for the insect pests and disease management. Survey surveillance and forecasting of Insect pest and diseases.

Unit 4

(4 Hours)

Development and validation of IPM module. Implementation and impact of IPM (IPM module for Insect pest and disease. Safety issues in pesticide uses.

Unit 5

(4 Hours)

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

Text Books:

1. Integrated Pest Management. G.S.Dhaliwal and Ramesh Arora. Kalyani 3. Elements of Entomology: Rajendra Singh. Rastogi Publications

Reference Books:

- 1 Integrated Pest Management: D. Dent, N.C. Elliott. Springer Science & Business Media
2. Introductory Plant Pathology by M. N. Kamat, Prakash Publ, Jaipur (1967).
3. Flint, M.C. and Brosch, R.V. 1981. Introduction to Integrated Pest Management. 1st ED., Springer, New York.



Manures, Fertilizers and Soil Fertility Management

Course Type	Course Code	L T P C
Core course	BAG 510	2 0 0 2

Course Outcomes (COs).

On completion of the course the students will be

CO-1	Understanding the types and importance of organic and inorganic fertilizers
CO-2	Understanding the mechanism of nutrient transport and uptake in soil and in plant
CO-3	Analyzing the doses of micro and macronutrients in various fertilizers.

Unit 1

(4 Hours)

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.

Unit 2

(4 Hours)

Chemical fertilizers: classification, composition and properties of major nitrogenous, phosphatic, potassic fertilizers, secondary & micronutrient fertilizers, Complex fertilizers, nano fertilizers Soil amendments, Fertilizer Storage, Fertilizer Control Order.

Unit 3

(4 Hours)

History of soil fertility and plant nutrition. criteria of essentiality. role, deficiency and toxicity symptoms of essential plant nutrients, Mechanisms of nutrient transport to plants, factors affecting nutrient availability to plants.

Unit 4

(4 Hours)

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.

Unit 5

(4 Hours)

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

Text Books:

1. Introductory Soil Science- D.K. Das. Kalyani Publisher.

Reference Books:

1. Soil Fertility and Fertilizer Use- Samuel L. Tisdale and Werner L. Nelson Macmillan Coll Div.
2. Nature and Property of Soil-N. C. Braby. Macmillan Publishing Company Incorporated
3. Soil Science- Mangat Rai Anmol Publications Pvt. Ltd.



Pests of Crops and Stored Grains and their Management

Course Type	Course Code	L T P C
Core course	BAG 511	2 0 0 2

The Course Outcomes (COs).

On completion of the course the students will be

CO -1	Understanding the classification of different arthropods pests and importance of beneficial insects.
CO-2	Identifying the different insect pest of field and stored grains
CO -3	Applying various procedures and approaches for insect-pests management.

Unit 1

(4 Hours)

General account on nature and type of damage by different arthropods pests. Scientific name, order, family, host range, distribution, biology and bionomics, nature of damage, and management of major pests and scientific name, order, family, host range, distribution, nature of damage and control practice other important arthropod pests of various field crop, vegetable crops

Unit 2

(4 Hours)

General account on nature and type of damage by different arthropods pests. Scientific name, order, family, host range, distribution, biology and bionomics, nature of damage, and management of major pests and scientific name, order, family, host range, distribution, nature of damage and control practice other important arthropod pests of various fruit crop, plantation crops

Unit 3

(4 Hours)

General account on nature and type of damage by different arthropods pests. Scientific name, order, family, host range, distribution, biology and bionomics, nature of damage, and management of major pests and scientific name, order, family, host range, distribution, nature of damage and control practice other important arthropod pests of various ornamental crops, spices and condiments

Unit 4

(4 Hours)

Factors affecting losses of stored grain and role of physical, biological, mechanical and chemical factors in deterioration of grain. Insect pests, mites, rodents, birds and microorganisms associated with stored grain and their management.

Unit 5

(4 Hours)

Storage structure and methods of grain storage and fundamental principles of grain store management.

Text books:

1. Stored Grain Pests and Their Management, B.P. Khare. Kalyani Publisher.

Reference books:

1. Pests of Stored grains and Their management. M.C. Bhargava, and K.C. Kumawat

2. Agricultural Pests of South Asia and Their Management. G.S.Dhaliwal and Ramesh Arora. Kalyani Publisher
3. Integrated Pest Management. G.S.Dhaliwal and Ramesh Arora. Kalyani Publisher
4. Agricultural Pests of South Asia and Their Management. G.S.Dhaliwal and Ramesh Arora. Kalyani Publisher
5. Principles of Insect Morphology. R. E. Snodgrass. Cornell University Press.



Diseases of Field & Horticultural Crops & their Management-I

Course Type	Course Code	L T P C
Core course	BAG 512	2 0 0 2

The Course Outcomes (COs)

On completion of the course the students will be

CO-1	Understanding of the symptoms, etiology, disease cycle and management of major diseases of field and horticultural crop
CO-2	Demonstrating the analysis and management of diseased field

Unit 1

(4 Hours)

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 and tungro; Maize: stalk rots, downy mildew, leaf spots; Sorghum: smuts, grain mold and anthracnose, Bajra :downy mildew and ergot; Groundnut: early and late leaf spots, wilt

Unit 2

(4 Hours)

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

Soybean: Rhizoctonia blight, bacterial spot, seed and seedling rot and mosaic; Pigeonpea: Phytophthora blight, wilt and sterility mosaic; Finger millet: Blast and leaf spot; black & green gram: Cercospora leaf spot and anthracnose, web blight and yellow mosaic;

Unit 3

(4 Hours)

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

Castor: Phytophthora blight; Tobacco: black shank, black root rot and mosaic. Horticultural Crops: Guava: wilt and anthracnose; Banana: Panama wilt, bacterial wilt, Sigatoka and bunchy top; Papaya: foot rot, leaf curl and mosaic, Pomegranate: bacterial blight;

Unit 4

(4 Hour)

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

Cruciferous vegetables: Alternaria leaf spot and black rot; Brinjal: Phomopsis blight and fruit rot and Sclerotinia blight; Tomato: damping off, wilt, early and late blight, buck eye rot and leaf curl and mosaic;

Unit 5

(4 Hours)

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

Okra: Yellow Vein Mosaic; Beans: anthracnose and bacterial blight; Ginger: soft rot; Colocasia: Phytophthora blight; Coconut: wilt and bud rot; Tea: blister blight; Coffee: rust

Text Books:

1. Plant Pathology – P.D. Sharma. Rastogi Publications.

Reference Books:

1. Plant pathology by G. N. Agrios 4th edition, Academ. Press, New york (1997).
2. Introductory Plant Pathology by M. N. Kamat, Prakash Publ, Jaipur (1967).
3. Plant diseases by R. S. Singh. Oxford and IBH Publishing.



Crop Improvement – I (*Kharif*)

Course Type	Course Code	L T P C
Core course	BAG 513	1 0 0 1

Course Outcomes (COs).

On completion of the course the students will be

CO 1	Remembering centers of origins and diversity of different kharif crop species with their wild species and wild relatives.
CO2	Understanding the basic floral biology, breeding behavior, hybridization and population handling methods.
CO3	Applying emasculation and hybridization techniques in our planted kharif field crops.
CO4	Analyzing the potential of various hybridization methods and techniques in different crops.
CO5	Evaluation of the overall understanding of the concepts and methods based on their application in field.

Unit 1

(4 Hours)

Centers of origin, distribution of species, wild relatives in different cereals; pulses; oilseeds; fibres; fodders and cash crops; vegetable and horticultural crops;

Unit 2

(4 Hours)

Plant genetic resources, its utilization and conservation, study of genetics of qualitative and quantitative characters;

Unit 3

(4 Hours)

Important concepts of breeding self pollinated, cross pollinated and vegetatively propagated crops;

Unit 4

(4 Hours)

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);

Unit 5

(4 Hours)

Hybrid seed production technology in Maize, Rice, Sorghum, Pearl millet and Pigeonpea, etc. Ideotype concept and climate resilient crop varieties for future.

Text books:

1. Plant breeding, Principles and Methods, B. D. Singh, Kalyani Publication.

Reference books:

1. Principles and procedure of Plant Breeding, G. S. Chahal, S. S. Gosal, CRC Press.

2. Breeding of field crops, D.N. Bhardwaj, Agrobios
3. Breeding of Horticultural crops: Principles and Practices, N. Kumar, New India Publishing
4. Plant Breeding: Principles and Prospects, M.D. Hayward, N. O. Bosemark, T. Romagosa



Entrepreneurship Development and Business Communication

Course Type	Course Code	L T P C
Core course	BAG 514	1 0 0 1

Course Outcomes (COs).

On completion of the course the students will be

CO-1	Understanding the concepts and government policies for entrepreneurship development.
CO-2	Explaining the business development and managerial skill.
CO-3	Applying the management techniques in production and marketing management.
CO4	Analyzing the financial feasibility of Agricultural Projects.

Unit 1

(4 Hours)

Concept of Entrepreneur, Entrepreneurship Development, Characteristics of entrepreneurs; SWOT Analysis & achievement motivation,

Unit 2

(4 Hours)

Government policy and programs and institutions for entrepreneurship development, Impact of economic reforms on Agribusiness/ Agrienterprises, Entrepreneurial Development Process;

Unit 3

(4 Hours)

Business Leadership Skills; Developing organizational skill (controlling, supervising, problem solving, monitoring & evaluation), Developing Managerial skills,

Unit 4

(4 Hours)

Business Leadership Skills (Communication, direction and motivation Skills), Problem solving skill, Supply chain management and Total quality management,

Unit 5

(4 Hours)

Project Planning Formulation and report preparation; Financing of enterprise, Opportunities for agri-entrepreneurship and rural enterprise.

Text books:

2. Personality Development, Swami Vivekanand, Advaita Ashram

Reference books:

3. Personality Development and soft Skills, Barun K. Mitra, Oxfors University
4. Communication Skills, Sanjay Kumar and Pushp Lata, Oxford University
5. Attitude is everything, Jeff Keller, Collins



Geoinformatics, Nano-technology and Precision Farming

Course Type	Course Code	L T P C
Core course	BAG 515	1 0 01

Course Outcomes (COs).

On completion of the course the students will be

CO 1	Understanding the basic concepts, tools and techniques of remote sensing and geoinformatics.
CO 2	Demonstrating use of nanotechnology for scaling up farm productivity.
CO3	Analyzing crop simulation models and their uses for optimization of agricultural inputs.
CO4	Evaluating the role of geoinformatics in precision agriculture.

Unit 1

(4 Hours)

Precision agriculture: concepts and techniques; their issues and concerns for Indian agriculture; Geo-informatics-definition, concepts, tool and techniques; their use in Precision Agriculture.

Unit 2

(4 Hours)

Crop discrimination and Yield monitoring, soil mapping; fertilizer recommendation using geospatial technologies; Spatial data and their management in GIS;

Unit 3

(4 Hours)

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

Unit 4

(4 Hours)

Introduction to crop Simulation Models and their uses for optimization of Agricultural Inputs; STCR approach for precision agriculture; Nanotechnology, definition, concepts and techniques,

Unit 5

(4 Hours)

Brief introduction about nanoscale effects, nano-particles, nano-pesticides, nano-fertilizers, nano-sensors, Use of nanotechnology in seed, water, fertilizer, plant protection for scaling-up farm productivity.

Text books:

1. Geoinformatics application in Agriculture, A.K. Singh and U.K. Chopra, New India Publishing Agency.

Reference books:

1. Textbook of nanoscience and Technology, B. S. Murthy, P. Shankar,, Baldev Raj,B.B. Rath, JamesMurday, Springer and Univ. Press
2. Nanotechnology Fundamentals and Application, Manasi Karkare, I.K. International Publishing House Pvt. Ltd.
3. Nanotechnology: Principles and Practices, Kulkarni, Sulabha K.,Springer



Intellectual Property Rights

Course Type	Course Code	L T P C
Core course	BAG 516	1 0 0 1

Course Outcomes (COs).

On completion of the course the students will be

CO 1	Understanding the history, concept and role of national and international IPRs regulatory bodies
CO 2	Recognizing the history of UPOV for protection of plant varieties in India.
CO3	Applying the Plant Breeder's Rights for registration of plant varieties under PPV&FRs act.
CO4	Analyzing Indian Biological Diversity Acts and their salient features with work plan.

Unit 1

(4 Hours)

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,

Unit 2

(4 Hours)

Trademark, Industrial design, Geographical indications, Integrated circuits, Trade secrets. Patents Act 1970 and Patent system in India, patentability, process and product patent, filing of patent, patent specification, patent claims, Patent opposition and revocation, infringement, Compulsory licensing, Patent Cooperation Treaty, Patent search and patent database.

Unit 3

(4 Hours)

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,

Unit 4

(4 Hours)

Plant breeders rights, Registration of plant varieties under PPV&FR Act 2001, breeders, researcher and farmers rights. Traditional knowledge-meaning and rights of TK holders.

Unit 5

(4 Hours)

Convention on Biological Diversity, International treaty on plant genetic resources for food and agriculture (ITPGRFA). Indian Biological Diversity Act, 2002 and its salient features, access and benefit sharing.

Text Books:

1. Status of the rights of farmers and plant breeders in Asia, Ujjwal Kumar, Gene Campaign

Reference Books:

1. Intellectual Property Rights Related Issues in Plant Breeding, Mangala Rai, S. Mauria Narosa Publishing House, New Delhi,
2. IPR & Plant Breeders' Rights Paperback, Phundan Singh (Author), New Vishal Publications;
3. Essentials of Plant Breeding, by Mohanan K.V (Author), Prentice Hall India Learning Private Limited



Principles of Integrated Pest and Disease Management Practical

Course Type	Course Code	L T P C
Core course	BAG 555	0 0 2 1

The Course outcomes (COs).

On completion of the course the students will be

CO-1	Understanding various methods of diagnosis and detection of various insect pests, and plant diseases
CO-2	Applying the methods of mass multiplication and production of <i>Trichoderma</i> , <i>Pseudomonas</i> , <i>Trichogramma</i> , NPV etc. in laboratory for plant protection
CO-3	Applying the preventive strategies and IPM module for management of insect pests and diseases in field

1. Methods of diagnosis and detection of various insect pests, and plant diseases, Methods of insect pests and plant disease measurement,
2. Assessment of crop yield losses, calculations based on economics of IPM,
3. Identification of biocontrol agents, different predators and natural enemies.
4. Mass multiplication of *Trichoderma*, *Pseudomonas*, *Trichogramma*, NPV etc.
5. Identification and nature of damage of important insect pests and diseases and their management.
6. Crop (agro-ecosystem) dynamics of a selected insect pest and diseases.
7. Plan & assess preventive strategies (IPM module) and decision making.
8. crop monitoring attacked by insect, pest and diseases . Awareness campaign at farmers fields.

Evaluation of Practical Examination:

Internal Evaluation

(50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3 point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks 50
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	

External Evaluation

(50 marks)

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks



Manures, Fertilizers and Soil Fertility Management Practical

Course Type	Course Code	L T P C
Core course	BAG 556	0 0 2 1

The Course outcomes (COs).

On completion of the course the students will be

CO-1	Understanding the role of nitrogen, phosphorus and potassium in plant health and productivity
CO-2	Applying bio fertilizers in different crops
CO-3	Evaluating the availability of nutrients in soil and fertilizers

1. Introduction of analytical instruments and their principles, calibration and applications,
2. Colorimetry and flame photometry.
3. Estimation of soil organic carbon,
4. Estimation of alkaline hydrolysable N in soils.
5. Estimation of soil extractable P in soils.
6. Estimation of exchangeable K; Ca and Mg in soils .
7. Estimation of soil extractable S in soils.
8. Estimation of DTPA extractable Zn in soils.
9. Estimation of N in plants. Estimation of P in plants.
10. Estimation of K in plants. Estimation of S in plants.

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3 point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks 50
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	

External Evaluation (50 marks)

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks



Pests of Crops and Stored Grain and their Management Practical

Course Type	Course Code	L T P C
Core course	BAG 557	0 0 2 1

The Course outcomes (COs).

On completion of the course the students will be

CO – 1	Applying various procedures of pest management in field crops and stored grains.
CO – 2	Applying various methods of managing the beneficial insects

1. 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;
2. Identification and study of life cycle and seasonal history of various insect pests attacking crops and their produce: (c) Fruit Crops; (d) Plantation, gardens, Narcotics, spices & condiments. Identification of insect pests and Mites associated with stored grain.
3. 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.
4. 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.
5. Visit to Indian Storage Management and Research Institute, Hapur and Quality Laboratory, Department of Food., Delhi. Visit to nearest FCI godowns.

Evaluation of Practical Examination:

Internal Evaluation

(50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3 point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks 50
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	

External Evaluation

(50 marks)

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks



Diseases of Field & Horticultural Crops & their Management-I Practical

Course Type	Course Code	L T P C
Core course	BAG 558	0 0 2 1

The Course outcomes (COs):

On completion of the course the students will be

CO-1	Diagnosing the occurrence of various diseases in field
CO-2	Applying the management practices for different disease of agricultural crops.

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

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3 point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks 50
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	

External Evaluation (50 marks)

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks



Crop Improvement – I (*Kharif Crops*) Practical

Course Type	Course Code	L T P C
Core course	BAG 559	0 0 2 1

The course Outcomes (COs)

On completion of the course the students will be

CO 1	Remembering the basic floral structure of various kharif crops
CO2	Understanding the basic floral biology, breeding behaviour, various emasculation and hybridization techniques applied to kharif crops.
CO 3	Evaluation various concepts and methods of crop Improvement based on their application in field.

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

Evaluation of Practical Examination:

Internal Evaluation

(50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3 point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks 50
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	

External Evaluation

(50 marks)

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks



Entrepreneurship Development and Business Communication Practical

Course Type	Course Code	L T P C
Core course	BAG 560	0 0 2 1

The Course Outcomes (COs).

On completion of the course the students will be

CO – 1	Understanding the business development ideas and management skills.
CO – 2	Preparing the business plan and proposal for entrepreneurship development

1. Assessing entrepreneurial traits, problem solving skills, managerial skills and achievement motivation,
2. Exercise in creativity, time audit through planning, monitoring and supervision,
3. Identification and selection of business idea,
4. Preparation of business plan and proposal writing,
5. Visit to entrepreneurship development institute and entrepreneurs.

Evaluation of Practical Examination:

Internal Evaluation

(50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3 point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks 50
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	

External Evaluation

(50 marks)

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks



Geoinformatics, Nano-technology and Precision Farming Practical

Course Type	Course Code	L T P C
Core course	BAG 561	0 0 2 1

The Course outcomes (COs).

On completion of the course the students will be

CO-1	Understanding the working and uses of different advance scanning methods of crop data collection using satellite and precise computer software.
CO-2	Applying the knowledge of data classification of crop field according to its characteristics.
CO-3	Evaluating the real time crop pattern by utilizing latest available scanning techniques and softwares.
CO-4	Creating appropriate methods for precise prediction of crop productivity

1. Introduction to GIS software, spatial data creation and editing. Introduction to image processing software.
2. Visual and digital interpretation of remote sensing images. Generation of spectral profiles of different objects.
3. Supervised and unsupervised classification and acreage estimation. Multispectral remote sensing for soil mapping.
4. Creation of thematic layers of soil fertility based on GIS. Creation of productivity and management zones.
5. Fertilizers recommendations based of VRT and STCR techniques.
6. Crop stress (biotic/abiotic) monitoring using geospatial technology.
7. Use of GPS for agricultural survey.
8. Formulation, characterization and applications of nanoparticles in agriculture. Projects formulation and execution related to precision farming.

Evaluation of Practical Examination:

Internal Evaluation

(50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3 point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks 50
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	

External Evaluation**(50 marks)**

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks



Practical Crop Production-I (Kharif Crops)

Course Type	Course Code	L T P C
Skill Enhancement course	BAG 562	0 0 4 2

The Course outcomes (Cos)

On completion of the course the students will be

CO – 1	Understanding and applying crop planning and raising field crops in multiple cropping systems
CO – 2	Understanding the seed production, mechanization, resource conservation, integrated nutrient, insect-pest and disease management technologies.
CO – 3	Applying field preparation, seed treatment, nursery raising, sowing, weeding, irrigation and management of insect-pests diseases of crops.
CO – 4	Evaluating the methods of harvesting, threshing, drying, winnowing, storage and marketing of produce.
CO – 5	Preparing the balance sheet including cost of cultivation and net returns.

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

Evaluation of Field Work:

Internal Evaluation

(100 marks)

The above mentioned field work shall be conducted under the supervision of one faculty member and would be evaluated by the two internal faculty members on a 4 point scale as mentioned below.

Field work 40 marks	File work 20 marks	Viva 30 marks	Attendance 10marks	Total internal 100 marks
------------------------	-----------------------	------------------	-----------------------	-----------------------------



Managing Self

Course Type	Course Code	L T P C
Value Added Course	TMUGS-501	2 1 0 0

A. Course Perspective

This value-added course will be taught in odd semester of the pre-final year.

This course will focus on concepts of 'Managing Self' like perception, positive attitude right value and vision. Students will also learn goal setting, action planning, self-motivation and confidence building. Students will also be taught methods becoming good and assertive communicators. This will enable them to perform better during job interviews and group discussion.

This course will also concentrate on techniques of facing interviews, Group Discussion and Resume building, etc.

B. Course Outcomes (COs)

On completion of the course, the student will be:

CO - 1 Utilizing effective verbal and non-verbal communication techniques in formal and informal settings

CO - 2 Understanding and analyzing self and devising a strategy for self growth and development.

CO - 3 Adapting a positive mindset conducive for growth through optimism and constructive thinking.

CO - 4 Utilizing time in the most effective manner and avoiding procrastination.

CO - 5 Making appropriate and responsible decisions through various techniques like SWOT, Simulation and Decision Tree.

CO - 6 Formulating strategies of avoiding time wasters and preparing to-do list to manage priorities and achieve SMART goals.

C. Lesson Plan

Session No.	Topics	Pedagogy	References	Session outcome (Bloom's Taxonomy)	Course Outcome (COs)
1.	Personal growth and improvement in personality	<ul style="list-style-type: none">LectureExampleExercise	R1	L4	CO-2, CO-3, CO-5, CO-6
2.	Perception	<ul style="list-style-type: none">LectureExampleExercise	R1	L5	CO-3, CO-5

3.	Positive Attitude	<ul style="list-style-type: none"> • Lecture • Example • Exercise 	R1, R3	L4	CO-2, CO-3
4.	Values and Morals	<ul style="list-style-type: none"> • Lecture • Example • Exercise 	R1	L5	CO-5
5.	High self motivation and confidence	<ul style="list-style-type: none"> • Lecture • Example • Exercise 	R1	L4	CO-2, CO-3, CO-6
6.	Grooming	<ul style="list-style-type: none"> • Lecture • Example • Exercise 	R8	L3	CO-1, CO-2
7.	Goal setting and Action Planning	<ul style="list-style-type: none"> • Lecture • Example • Exercise 	R4	L6	CO-2, CO-5, CO-6
8.	Effective and assertive Communication	<ul style="list-style-type: none"> • Lecture • Example • Exercise 	R8	L4	CO-1, CO-3
9.	Decision making	<ul style="list-style-type: none"> • Lecture • Example 	R1	L5	CO-3, CO-5
10.	Time Management	<ul style="list-style-type: none"> • Lecture • Example • Exercise 	R2	L6	CO-6
11.	Presentation Skills	<ul style="list-style-type: none"> • Lecture • Example • Exercise 	R1, R8	L4	CO-1
12.	Happiness, risk taking and facing unknown	<ul style="list-style-type: none"> • Example • Exercise 	R7, R1	L5	CO-3, CO-5
13.	Resume Building	<ul style="list-style-type: none"> • Example • Exercise 	R5	L6	CO-1
14.	Occupational Research	<ul style="list-style-type: none"> • Lecture • Example • Exercise 	R1, R5, R6, R9	L5	CO-2, CO-5, CO-6
15.	Group Discussion (GD)	<ul style="list-style-type: none"> • Lecture • Example • Exercise 	R6	L5	CO-1, CO-3, CO-5
16.	Personal Interviews (PI)	<ul style="list-style-type: none"> • Lecture • Example • Exercise 	R9	L5	CO-1, CO-2

L1= Remember, L2= Understand, L3= Apply, L4= Analyze, L5= Evaluate and L6= Create

D. References:

- R1:** Robbins, Stephen P., Judge, Timothy A., Vohra, Neharika, Organizational Behaviour (2018), 18th ed., Pearson Education
- R2:** Tracy, Brian, Time Management (2018), Manjul Publishing House
- R3:** Hill, Napoleon, Think and grow rich (2014), Amazing Reads
- R4:** Scott, S.J., SMART goals made simple (2014), Createspace Independent Pub
- R5:** <https://www.hloom.com/resumes/creative-templates/>
- R6:** <https://www.mbauniverse.com/group-discussion/topic.php>
- R7:** Rathgeber, Holger, Kotter, John, Our Iceberg is melting (2017), Macmillan
- R8:** Burne, Eric, Games People Play (2010), Penguin UK
- R9:** <https://www.indeed.com/career-advice/interviewing/job-interview-tips-how-to-make-a-great-impression>



Food Safety and Standards

Course Type	Course Code	L T P C
Discipline Specific Elective Course	BAGE 501	2 0 0 2

Course Outcomes (COs).

On completion of the course the students will be

CO – 1	Understanding the basic concepts of food safety management.
CO – 2	Applying effective storage and hygienic methods to control the contamination.

Unit 1

(4 Hours)

Food Safety – Definition, Importance, Scope and Factors affecting Food Safety. Hazards and Risks, Types of hazards - Biological, Chemical, Physical hazards. Management of hazards - Need. Control of parameters. Temperature control.

Unit 2

(4 Hours)

Food storage. Product design. Hygiene and Sanitation in Food Service Establishments- Introduction. Sources of contamination and their control. Waste Disposal.

Unit 3

(4 Hours)

Pest and Rodent Control. Personnel Hygiene. Food Safety Measures. Food Safety Management Tools- Basic concepts. PRPs, GHPs, GMPs, SSOPs etc. HACCP.

Unit 4

(4 Hours)

ISO series. TQM - concept and need for quality, components of TQM, Kaizen.
Risk Analysis. Accreditation and Auditing, Water Analysis, Surface Sanitation and Personal Hygiene.

Food laws and Standards- Indian Food Regulatory Regime, FSSAI. Global Scenario CAC. Other laws and standards related to food.

Unit 5

(4 Hours)

Recent concerns- New and Emerging Pathogens. Packaging, Product labeling and Nutritional labeling. Genetically modified foods\ transgenics. Organic foods. Newer approaches to food safety. Recent Outbreaks. Indian and International Standards for food products.

Text books:

1. Food Safety Management: Implementing a Food Safety Program in a Food Retail Business, King, Hal, Springer-Verlag New York

Reference books:

1. A Practical Guide to Food Laws and Regulations, Kiron Prabhakar, Bloomsbury Publishing
2. Food Processing: Recent Developments, Anilkumar G. Gaonkar Elsevier,
3. Fundamentals of Food Process Engineering, Romeo T. Toledo Springer Science & Business Media.
4. Food Technology an introduction, Anita Tull, Oxford University Press



Biopesticides & Biofertilizers

Course Type	Course Code	L T P C
Discipline Specific Elective Course	BAGE 502	2 0 0 2

Course Outcomes (COs).

On completion of the course the students will be

CO – 1	Understanding the basics of bio-pesticide and bio-fertilizers.
CO – 2	Explaining the application of mass production technology of bio-pesticides.
CO – 3	Describing the quality control and marketing of bio-fertilizers.

Unit 1

(4 Hours)

History and concept of biopesticides. Importance, scope and potential of biopesticide. Definitions, concepts and classification of biopesticides viz. pathogen, botanical pesticides, and biorationals. Botanicals and their uses.

Unit 2

(4 Hours)

Mass production technology of bio-pesticides. Virulence, pathogenicity and symptoms of entomopathogenic pathogens and nematodes. Methods of application of biopesticides. Methods of quality control and Techniques of biopesticides. Impediments and limitation in production and use of biopesticide.

Unit 3

(4 Hours)

Biofertilizers - Introduction, status and scope. Structure and characteristic features of bacterial biofertilizers- *Azospirillum*, *Azotobacter*, *Bacillus*, *Pseudomonas*, *Rhizobium* and *Frankia*; Cyanobacterial biofertilizers- *Anabaena*, *Nostoc*, *Hapalosiphon* and fungal biofertilizers- AM mycorrhiza and ectomycorrhiza.

Unit 4

(4 Hours)

Nitrogen fixation -Free living and symbiotic nitrogen fixation. Mechanism of phosphate solubilization and phosphate mobilization, K solubilization. Production technology: Strain selection, sterilization, growth and fermentation,

Unit 5

(4 Hours)

Mass production of carrier based and liquid biofertilizers. FCO specifications and quality control of biofertilizers. Application technology for seeds, seedlings, tubers, sets etc. Biofertilizers -Storage, shelf life, quality control and marketing. Factors influencing the efficacy of biofertilizers.

Text Books:

1. Integrated Pest Management. G.S.Dhaliwal and Ramesh Arora. Kalyani
3. Elements of Entomology: Rajendra Singh. Rastogi Publications

Reference books:

1. The complete technology book on Bio-fertilizer and organic farming, NIIR Board of National Institute of Industrial Technology
2. Principles of Agronomy - S. R. Reddy. Kalyani Publisher
3. Manures and Fertilizers - K. S. Yawalkar, J.P. Agrawal and S. Bokde Agri- Horticultural Pub. House
4. Fundamentals of Agronomy Gopal Chandra De. Oxford and IBH Publishing Co. PVT



Protected Cultivation

Course Type	Course Code	L T P C
Discipline Specific Elective Course	BAGE 503	2 0 0 2

Course Outcomes (COs).

On completion of the course the students will be

CO-1:	Understanding importance and scope of protected cultivation.
CO-2:	Understanding greenhouse technology and its application in cultivation of important horticultural crops
CO-3:	Analyzing the propagation and production of quality planting material of horticultural crops.

Unit 1

Objectives: The main objectives of protected cultivation are to protect the crops from harmful temperatures, wind, rain, hail and snow, and from pests, diseases and predators, creating a microclimate that allows for the improvement of their productivity and quality contributing to a better use of resources

(4 Hours)

Protected cultivation- importance and scope, Status of protected cultivation in India and World types of protected structure based on site and climate. Cladding material involved in greenhouse/ poly house.

Unit 2

(4 Hours)

Greenhouse design, environment control, artificial lights, Automation. Soil preparation and management, Substrate management. Types of benches and containers.

Unit 3

(4 Hours)

Irrigation and fertigation management. Propagation and production of quality planting material of horticultural crops.

Unit 4

(4 Hours)

Greenhouse cultivation of important horticultural crops – rose, carnation, chrysanthemum, gerbera, orchid, anthurium, liliun, tulip, tomato, bell pepper, cucumber, strawberry, pot plants, etc.

Unit 5

(4 Hours)

Cultivation of economically important medicinal and aromatic plants. Off-season production of flowers and vegetables. Insect pest and disease management.

Text Books

1. Greenhouse Technology and Management, Nicolas Castilla, CABI,

Reference Books

1. Postharvest Management and Value Addition, Ashwai K. Goel, Rajinder Kumar, Satwinder S. Mann
Daya Books,

2. Postharvest Technology of Fruits and Vegetables: General concepts and principles L. R. Verma, Dr. V. K. Joshi
Indus Publishing Company.

3. Greenhouse Technology and Management, Nicolas Castilla, CABI



Micro propagation Technologies

Course Type	Course Code	L T P C
Discipline Specific Elective Course	BAGE 504	1 0 0 1

Course Outcomes (COs).

On completion of the course the students will be

CO-1	Understanding the concepts and principles of micropropagation
CO-2	Recognizing the different pathways of plant regeneration under in vitro conditions
CO-3	Applying various micro propagation methods to conserve germplasm and vitro, production of secondary metabolites.

Unit 1 (4 Hours)

Introduction, History, Advantages and limitations; Types of cultures (seed, embryo, organ, callus, cell),

Unit 2 (4 Hours)

Stages of micropropagation, Axillary bud proliferation (Shoot tip and meristem culture, bud culture),

Unit 3 (4 Hours)

Organogenesis (callus and direct organ formation),

Unit 4 (4 Hours)

Somatic embryogenesis, cell suspension cultures,

Unit 5 (4 Hours)

Production of secondary metabolites , Somaclonal variation, Cryopreservation

Text Books:

1. Basic Horticulture-Jitendra Singh. Kalyani Publisher

Reference Books:

1. Basics of Horticulture by K.V. Peter. New India Publishing Agency, New Delhi
2. Principles of Horticulture by C.R. Adams, M.P. Early. Routledge
3. Terminology of Horticulture by Neeraj Pratap Singh. International Book Distributing Co (IBDC Publishers)



Food Safety and Standards Practical

Course Type	Course Code	L T P C
Discipline Specific Elective Course	BAGE 551	0 0 2 1

The Course Outcomes (COs)

On completion of the course the students will be

CO-1	Understanding the various methods and techniques for the microbial and chemical assessment of fresh / processed food
CO-2	Applying different methodologies and regulation for implementing HACCP, FSMS to ensure food safety

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

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3 point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks 50
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	

External Evaluation (50 marks)

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks



Biopesticides & Biofertilizers Practical

Course Type	Course Code	L T P C
Discipline Specific Elective Course	BAGE 552	0 0 2 1

The course outcomes (COs)

On completion of the course the students will be

CO – 1	Understanding the Isolation , purification of important agents of biopesticides and biofertilizers
CO – 2	Applying the mass multiplication and inoculums production of biofertilizers

1. Isolation and purification of important biopesticides: *Trichoderma Pseudomonas, Bacillus, Metarhizium* etc. and its production.
2. Identification of important botanicals.
3. Visit to biopesticide laboratory in nearby area.
4. Field visit to explore naturally infected cadavers.
5. Identification of entomopathogenic entities in field condition.
6. Quality control of biopesticides.
7. Isolation and purification of *Azospirillum , Azotobacter, Rhizobium*, P-solubilizers and cyanobacteria.
8. Mass multiplication and inoculums production of biofertilizers.
9. Isolation of AM fungi -Wet sieving method and sucrose gradient method.
10. Mass production of AM inoculants.

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3 point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks 50
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	

External Evaluation (50 marks)

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks



Protected Cultivation Practical

Course Type	Course Code	L T P C
Discipline Specific Elective Course	BAGE 553	0 0 2 1

The Course Outcomes (Cos)

On completion of the course the students will be

CO-1	Understanding the use of protrays in quality planting material production.
Co-2	Applying the bed preparation and planting of crop.
CO-3	Analyzing the methods of raising of seedlings and saplings under protected conditions.

1. Raising of seedlings and saplings under protected conditions,
2. Use of protrays in quality planting material production,
3. Bed preparation and planting of crop for production,
4. Inter cultural operations,
5. Soil EC and pH measurement, Regulation of irrigation and fertilizers through drip,
6. Fogging and misting.

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3 point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks 50
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	

External Evaluation (50 marks)

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks



Micro propagation Technologies Practical

Course Type	Course Code	L T P C
Discipline Specific Elective Course	BAGE 554	0 0 2 1

The Course outcomes (COs):

On completion of the course the students will be

CO – 1	Applying the approaches of biotechnology in micro-propagation
CO – 2	Analyzing the different sterilization techniques in plant tissue culture
CO – 3	Evaluating the optimum nutrient composition required for growth of explant

1. Identification and use of equipments in tissue culture Laboratory,
2. Nutrition media composition, sterilization techniques for media,
3. containers and small instruments, sterilization techniques for explants,
4. Preparation of stocks and working solution,
5. Preparation of working medium, Culturing of explants :Seeds, shoot tip and single node,
6. Callus induction, Induction of somatic embryos regeneration of whole plants from different explants, Hardening procedures.

Evaluation of Practical Examination:

Internal Evaluation

(50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3 point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks 50
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	

External Evaluation

(50 marks)

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks



Rainfed Agriculture & Watershed Management

Course Type	Course Code	L	T	P	C
Core Course	BAG 607	1	0	0	1

Course Outcomes (COs).

On completion of the course the students will be

CO-1	Understanding the history and prospects of rainfed agriculture and watershed in India
CO-2	Explaining the water harvesting technique to mitigate drought.

Unit 1 (4 Hours)

Rainfed agriculture: Introduction, types, History of rainfed agriculture and watershed in India; Problems and prospects of rainfed agriculture in India

Unit 2 (4 Hours)

Soil and climatic conditions prevalent in rainfed areas; Soil and water conservation techniques, Drought: types, Effect of water deficit on physio- morphological characteristics of the plants, Crop adaptation and mitigation to drought

Unit 3 (4 Hours)

Water harvesting: importance, its techniques, Efficient utilization of water through soil and crop management practices

Unit 4 (4 Hours)

Management of crops in rainfed areas, Contingent crop planning for aberrant weather conditions

Unit 5 (4 Hours)

Concept, objective, principles and components of watershed management, factors affecting watershed management.

Text Books:

1. Principles of soil conservation and water management Hanumappa Ramappa Arakeri, Roy Luther Donahue Rowman & Allanheld

Reference Books:

1. Principles of Soil Conservation and Management, Humberto Blanco-Canqui, Rattan Lal Springer,
2. Advances in Soil and Water Conservation Francis J. Pierce CRC Press.
3. Integrated Watershed Management in Rainfed Agriculture, Suhas P. Wani, Johan Rockstrom, Kanwar Lal Sahrawat, CRC Press.
4. Handbook of Agriculture: Indian Council of Agricultural Research, New Delhi. 6th edition
5. Fundamentals of Agriculture-Arun Katayyan- Kushal Publication



Protected Cultivation and Secondary Agriculture

Course Type	Course Code	L	T	P	C
Core Course	BAG 608	1	0	0	1

Course Outcomes (COs).

On completion of the course the students will be

CO-1:	Understanding the concepts of green house.
CO-2:	Application of effective materials and equipments used in green house.
CO-3:	Analyzing the cost estimation and economic analysis of green house.
CO-4:	Evaluating the different methodologies and technologies adopted for green house.

Unit 1

(4 Hours)

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.

Unit 2

(4 Hours)

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.

Unit 3

(4 Hours)

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.

Unit 4

(4 Hours)

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,

Unit 5

(4 Hours)

Recirculatory dryer and solar dryer). Material handling equipment; conveyer and elevators, their principle, working and selection.

Text Books

1. Greenhouse Technology and Management, Nicolas Castilla, CABI,

Reference Books

1. Postharvest Management and Value Addition, Ashwai K. Goel, Rajinder Kumar, Satwinder S. Mann
Daya Books,
2. Postharvest Technology of Fruits and Vegetables: General concepts and principles L. R. Verma, Dr. V. K. Joshi
Indus Publishing Company.
3. Greenhouse Technology and Management, Nicolas Castilla, CABI,



Diseases of Field & Horticultural Crops & their Management-II

Course Type	Course Code	L	T	P	C
Core Course	BAG 609	2	0	0	2

Course Outcomes (COs).

On completion of the course the students will be

CO – 1	Understanding of the symptoms, etiology, disease cycle and management of major diseases of field and horticultural crops
CO – 2	Analyzing the diseased field and their management practices

Unit 1 (4 Hours)

Symptoms, etiology, disease cycle and management of following diseases in wheat- rusts, loose smut, karnal bunt, powdery mildew, alternaria blight, and ear cockle;

Unit 2 (4 Hours)

Symptoms, etiology, disease cycle and management of following diseases in Sugarcane: red rot, smut, wilt, grassy shoot, ratoon stunting and Pokkah Boeng;

Unit 3 (4 Hours)

Symptoms, etiology, disease cycle and management of following diseases in 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: rust and wilt; Cotton: anthracnose, vascular wilt, and black arm; Pea: downy mildew, powdery mildew and rust.

Unit 4 (4 Hours)

Symptoms, etiology, disease cycle and management of following diseases in mango anthracnose, malformation, bacterial blight and powdery mildew; Citrus: canker and gummosis; Grape vine: downy mildew, Powdery mildew and anthracnose; Apple: scab, powdery mildew, fire blight and crown gall; Peach: leaf curl. Strawberry: leaf spot Potato: early and late blight, black scurf, leaf roll, and mosaic;

Unit 5 (4 Hours)

Symptoms, etiology, disease cycle and management of following diseases in mango in Cucurbits: downy mildew, powdery mildew, wilt; Onion and garlic: purple blotch, and Stemphylium 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.

Text Books:

1. Plant Pathology – P.D. Sharma. Rastogi Publications.

Reference Books:

1. Plant pathology by G. N. Agrios 4th edition, Academ. Press, New york (1997).
2. Introductory Plant Pathology by M. N. Kamat, Prakash Publ, Jaipur (1967).
3. Plant diseases by R. S. Singh. Oxford and IBH Publishing.



Post-harvest Management and Value Addition of Fruits and Vegetables

Course Type	Course Code	L	T	P	C
Core Course	BAG 610	1	0	0	1

Course Outcomes (COs).

On completion of the course the students will be

CO – 1	Understanding the importance of pre and post-harvest processing and factors affecting the productivity of horticultural crops
CO – 2	Explaining the principles, concept and methods of preservation.
CO – 3	Applying various methods and principles of post harvesting and field handling.

Unit 1 (4 Hours)

Importance of post-harvest processing of fruits and vegetables, extent and possible causes of post harvest losses;

Unit 2 (4 Hours)

Pre-harvest factors affecting postharvest quality, maturity, ripening and changes occurring during ripening;

Unit 3 (4 Hours)

Respiration and factors affecting respiration rate; Harvesting and field handling; Storage (ZECC, cold storage, CA, MA, and hypobaric); Value addition concept;

Unit 4 (4 Hours)

Principles and methods of preservation; Intermediate moisture food- Jam, jelly, marmalade, preserve, candy – Concepts and Standards; Fermented and non-fermented beverages.

Unit 5 (4 Hours)

Tomato products- Concepts and Standards; Drying/ Dehydration of fruits and vegetables – Concept and methods, osmotic drying. Canning — Concepts and Standards, packaging of products.

Text Books:

1. Postharvest Technology of Fruits and Vegetables: Handling, Processing, Fermentation, and Waste Management, L. R. Verma, Dr. V. K. Joshi Indus Publishing

Reference Books:

1. Postharvest Management and Value Addition, Ashwai K. Goel, Rajinder Kumar, Satwinder S. Mann Daya Books.
2. Postharvest Technology of Fruits and Vegetables: General concepts and principles L. R. Verma, Dr. V. K. Joshi Indus Publishing Company.
3. Postharvest: an introduction to the physiology & handling of fruit, vegetables & ornamentals, R. B. H. Wills, UNSW Press,



Crop Improvement – II (*Rabi crops*)

Course Type	Course Code	L	T	P	C
Core Course	BAG 611	1	0	0	1

Course Outcomes (COs).

On completion of the course the students will be

CO-1	Remembering centers of origins and diversity of different kharif crop species with their wild species and wild relatives.
CO2	Understanding floral biology, breeding behavior, hybridization and population handling methods.
CO3	Applying hybridization techniques in crops for better understanding of hybrid development
CO4	Analyzing the potential of various hybridization and selection methods
CO5	Evaluation of the overall understanding of the concepts and methods based on their application in field.

Unit 1

(4 Hours)

Centers of origin, distribution of species, wild relatives in different cereals; pulses; oilseeds; fodder crops and cash crops; vegetable and horticultural crops;

Unit 2

(4 Hours)

Centers of origin, distribution of species, wild relatives in different cash crops; vegetable and horticultural crops;

Unit 3

(4 Hours)

Plant genetic resources, its utilization and conservation; study of genetics of qualitative and quantitative characters;

Unit 4

(4 Hours)

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);

Unit 5

(4 Hours)

Hybrid seed production technology of *rabi* crops. Ideotype concept and climate resilient crop varieties for future.

Text books:

Plant breeding, Principles and Methods, B. D. Singh, Kalyani Publication.

Reference books:

1. Principles and procedure of Plant Breeding, G. S. Chahal, S. S. Gosal, CRC Press.
2. Breeding of field crops, D.N. Bhardwaj, Agrobios
3. Breeding of Horticultural crops: Principles and Practices, N. Kumar, New India Publishing

4. Plant Breeding: Principles and Prospects, M.D.Hayward, N. O. Bosemark,T. Romagosa



Farm Management, Production and Resource Economics

Course Type	Course Code	L	T	P	C
Core Course	BAG 612	1	0	0	1

Course Outcomes (COs).

On completion of the course the students will be

CO-1	Understanding the various principles of farm management
CO-2	Discussing maintenance of farm records and accounts
CO-3	Explaining natural resource economics and their optimal use.

Unit 1

(4 Hours)

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 product-product relationship, law of equi-marginal/or principles of opportunity cost and law of comparative advantage.

Unit 2

(4 Hours)

Meaning and concept of cost, types of costs and their interrelationship, importance of cost in managing farm business and estimation of gross farm income, net farm income, family labor income and farm business income. Farm business analysis: meaning and concept of farm income and profitability, technical and economic efficiency measures in crop and livestock enterprises.

Unit 3

(4 Hours)

Importance of farm records and accounts in managing a farm, various types of farm records needed to maintain on farm, farm inventory, balance sheet, profit and loss accounts. Meaning and importance of farm planning and budgeting, partial and complete budgeting,

Unit 4

(4 Hours)

steps in farm planning and budgeting-linear programming, appraisal of farm resources, selection of crops 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.

Unit 5

(4 Hours)

Concepts of resource economics, differences between NRE and agricultural economics, unique properties of natural resources. 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.

Text Books

- 1.Principles of Agricultural Economics, David Colman and Trevor Young, Cambridge University Press
2. A Textbook of Agricultural Economics. C.B. Singh and R.K. Singh (Author)
- 3.Agricultural Economy of India by S.Sankaran

Reference Books

1. Handbook of Agriculture: Indian Council of Agricultural Research, New Delhi. 6th edition.
2. Agricultural Finance And Management Subba Reddy
3. Modern Economic Theory” by Dewett K.K.



Principles of Food Science and Nutrition

Course Type	Course Code	L	T	P	C
Core Course	BAG 614	2	0	0	2

Course Outcomes (COs).

On completion of the course the students will be

CO – 1	Understanding the principles of food science and nutrition.
CO – 2	Applying effective methods and practices for nutritional management.
CO – 3	Analyzing various procedures, methods and techniques for microbial and chemical assessment of fresh and processed foods.
CO – 4	Evaluating the different methodologies and technologies adopted for food processing and preservation to ensure national food security.

Unit 1

(4 Hours)

Concepts of Food Science (definitions, measurements, density, phase change, pH, osmosis, surface tension, colloidal systems etc.);

Unit 2

(4 Hours)

Food composition and chemistry (water, carbohydrates, proteins, fats, vitamins, minerals, flavours, colours, miscellaneous bioactives,

Unit 3

(4 Hours)

Important reactions); Food microbiology (bacteria, yeast, moulds, spoilage of fresh & processed foods, Production of fermented foods);

Unit 4

(4 Hours)

Principles and methods of food processing and preservation (use of heat, low temperature, chemicals, radiation, drying etc.);

Unit 5

(4 Hours)

Food and nutrition, Malnutrition (over and under nutrition), nutritional disorders; Energy metabolism (carbohydrate, fat, proteins); Balanced/ modified diets, Menu planning, New trends in food science and nutrition.

Text books:

1. Food Processing Technology: Principles and Practice, P.J. FellowsCRC Press,

Reference books:

1. Food Processing: Recent Developments, Anilkumar G. Gaonkar Elsevier,
2. Fundamentals of Food Process Engineering, Romeo T. Toledo Springer Science & Business Media.
3. Food Technology an introduction, Anita Tull, Oxford University Press



Principles of Organic Farming

Course Type	Course Code	L	T	P	C
Core Course	BAG 615	1	0	0	1

The Course outcomes (COs).

On completion of the course the students will be:

CO – 1	Describing the principles and scope of organic farming
CO – 2	Applying fundamentals of plant protection measures under organic mode of production.
CO – 3	Evaluating the measures of organic farming, marketing process and export potential of organic products.

Unit 1 (4 Hours)

Organic farming, principles and its scope in India; Initiatives taken by Government (central/state); NGOs and other organizations for promotion of organic agriculture;

Unit 2 (4 Hours)

Organic ecosystem and their concepts; Organic nutrient resources and its fortification

Unit 3 (4 Hours)

Restrictions to nutrient use in organic farming; Choice of crops and varieties in organic farming; Fundamentals of insect, pest, disease and weed management under organic mode of production

Unit 4 (4 Hours)

Operational structure of NPOP; Certification process and standards of organic farming

Unit 5 (4 Hours)

Processing, leveling, economic considerations and viability, marketing and export potential of organic products.



Management of Beneficial Insects

Course Type	Course Code	L	T	P	C
Core Course	BAG 616	1	0	0	1

The Course Outcomes (COs).

On completion of the course the students will be

CO – 1	Understanding the importance of beneficial insects for human society
CO – 2	Understanding the tools and techniques for beekeeping ,silk and lac production
CO – 3	Applying various predators and parasitoids in managing the insect pests of various crops

Unit 1 (4 Hours)

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.

Unit 2 (4 Hours)

Types of silkworm, voltinism and biology of silkworm. Mulberry cultivation, mulberry varieties and methods of harvesting and preservation of leaves. Rearing, mounting and harvesting of cocoons.

Unit 3 (4 Hours)

Pest and diseases of silkworm, management, rearing appliances of mulberry silkworm and methods of disinfection.

Unit 4 (4 Hours)

Species of lac insect, morphology, biology, host plant, lac production – seed lac, button lac, shellac, lac- products. Identification of major parasitoids and predators commonly being used in biological control.

Unit 5 (4 Hours)

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.

Text book:

1. Elements of Economic Entomology, B. Vasantharaj David and V.V. Ramamurthy, Brillion publishing.



Rainfed Agriculture and Watershed Management and Organic Farming Practical

Course Type	Course Code	L	T	P	C
Core Course	BAG 657	0	0	2	1

Course Outcomes (COs).

On completion of the course the students will be

CO – 1	Understanding the meteorological tools for different areas of country.
CO – 2	Applying and the cropping pattern of different rainfed areas of the country.

1. Studies on climate classification, studies on rainfall pattern in rainfed areas of the country and pattern of onset and withdrawal of monsoons.
2. Studies on cropping pattern of different rainfed areas in the country and demarcation of rainfed area on map of India.
3. Interpretation of meteorological data and scheduling of supplemental irrigation on the basis of evapo-transpiration demand of crops.
4. Critical analysis of rainfall and possible drought period in the country, effective rainfall and its calculation.
5. Studies on cultural practices for mitigating moisture stress. Characterization and delineation of model watershed.
6. Field demonstration on soil & moisture conservation measures.
7. Field demonstration on construction of water harvesting structures. Visit to rainfed research station/watershed.
8. Visit of organic farms to study the various components and their utilization; Preparation of enrich compost, vermicompost,
9. Bio-fertilizers/bio-inoculants and their quality analysis; Indigenous technology knowledge (ITK) for nutrient, insect, pest disease and weed management;
10. Cost of organic production system; Post harvest management; Quality aspect, grading, packaging and handling.

Evaluation of Practical Examination:

Internal Evaluation

(50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3 point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks 50
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	

External Evaluation**(50 marks)**

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks



Protected Cultivation and Secondary Agriculture Practical

Course Type	Course Code	L	T	P	C
Core Course	BAG 658	0	0	2	1

The Course Outcomes (COs)

On completion of the course the students will be

CO-1	Understanding the different type of green houses based on shape
Co-2	Applying the concept of rate of air exchange in an active summer winter cooling system.
CO-3	Analyzing the moisture content of various grains by oven drying & infrared moisture methods.

List of Practicals

1. Study of different type of green houses based on shape.
2. Determine the rate of air exchange in an active summer winter cooling system.
3. Determination of drying rate of agricultural products inside green house.
4. Study of green house equipments.
5. Visit to various Post Harvest Laboratories.
6. Determination of Moisture content of various grains by oven drying & infrared moisture methods.
7. Determination of engineering properties (shape and size, bulk density and porosity of biomaterials).
8. Determination of Moisture content of various grains by moisture meter.
9. Field visit to seed processing plant.

Evaluation of Practical Examination:

Internal Evaluation

(50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3 point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks 50
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	

External Evaluation

(50 marks)

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks



Diseases of Field & Horticultural Crops & their Management-II Practical

Course Type	Course Code	L	T	P	C
Core Course	BAG 659	0	0	2	1

The Course Outcomes (Cos)

On completion of the course the students will be

CO – 1	Understanding the importance of field visits and herbarium
CO-2	Identifying and diagnosing the diseases in field crops
CO-3	Applying management practices on diseased field.

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

Evaluation of Practical Examination:

Internal Evaluation

(50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3 point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks 50
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	

External Evaluation

(50 marks)

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks



Post-harvest Management and Value Addition of Fruits and Vegetables Practical

Course Type	Course Code	L	T	P	C
Core Course	BAG 660	0	0	2	1

The Course Outcomes (Cos)

On completion of the course the students will be

CO-1	Understanding the different types of packaging for shelf life extension.
CO-2	Applying the methods for preventing chilling and freezing injury in vegetables and fruits.
CO-3	Evaluating the quality of horticultural products.

1. Applications of different types of packaging, containers for shelf life extension.
2. Effect of temperature on shelf life and quality of produce.
3. Demonstration of chilling and freezing injury in vegetables and fruits.
4. 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.
5. Quality evaluation of products -- physico-chemical and sensory.
6. Visit to processing unit/ industry.

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3 point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks 50
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	

External Evaluation (50 marks)

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks



Crop Improvement – II (*Rabi crops*) Practical

Course Type	Course Code	L	T	P	C
Core Course	BAG 661	0	0	2	1

The course Outcomes (COs)

On completion of the course the students will be

CO 1	Remembering basic floral structure, parts, floral diagram and floral formula of various rabi crops
CO2	Understanding the basic floral biology, breeding behaviour, emasculation and hybridization techniques applied to different rabi crops.
CO 3	Evaluation of the concepts and methods based on their application in field.

1. Floral biology, emasculation and hybridization techniques in different crop species namely Wheat, Oat, Barley, Chickpea, Lentil, Field pea, Rajma, Horse gram,
2. Floral biology, emasculation and hybridization techniques in different crop species namely Rapeseed Mustard, Sunflower, Safflower, Potato, Berseem. Sugarcane, Tomato, Chilli, Onion;
3. Handling of germplasm and segregating populations by different methods like pedigree, bulk and single seed decent methods;
4. Study of field techniques for seed production and hybrid seeds production in *Rabi* crops;
5. Estimation of heterosis, inbreeding depression and heritability;
6. Layout of field experiments; Study of quality characters, study of donor parents for different characters;
7. Visit to seed production plots; Visit to AICRP plots of different field crops

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3 point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks 50
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	

External Evaluation (50 marks)

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks



Farm Management, Production and Resource Economics Practical

Course Type	Course Code	L	T	P	C
Core Course	BAG 662	0	0	2	1

The course Outcomes (COs)

On completion of the course the students will be

CO – 1	Understanding the farm lay out, cost and depreciation in farm management.
CO – 2	Preparing the farm plan, budget, record and accounting

1. Preparation of farm layout.
2. Determination of cost of fencing of a farm.
3. Computation of depreciation cost of farm assets.
4. Application of equi-marginal returns/opportunity cost principle in allocation of farm resources.
5. Determination of most profitable level of inputs use in a farm production process.
6. Determination of least cost combination of inputs.
7. Selection of most profitable enterprise combination.
8. Application of cost principles including CACP concepts in the estimation of cost of crop and livestock enterprises.
9. Preparation of farm plan and budget, farm records and accounts and profit & loss accounts.
10. Collection and analysis of data on various resources in India.

Evaluation of Practical Examination:

Internal Evaluation

(50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3 point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks 50
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	

External Evaluation (50 marks)

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks



Practical Crop Production-II (*Rabi Crops*)

Course Type	Course Code	L	T	P	C
Skill Enhancement Course	BAG 663	0	0	4	2

The Course Outcomes (Cos).

On completion of the course the students will be

CO – 1	Understanding the crop planning and raising field crops in multiple cropping systems
CO – 2	Understanding the seed production, mechanization, resource conservation, integrated nutrient, insect-pest and disease management technologies.
CO – 3	Applying and evaluating the harvesting, threshing, drying, winnowing, storage and marketing of produce.
CO – 4	Preparing the balance sheet including cost of cultivation and net returns

1. Crop planning, raising field crops in multiple cropping systems:
2. Field preparation, seed, treatment, nursery raising, sowing, nutrient, water and weed management
3. Management of insect-pests diseases of crops,
4. harvesting, threshing, drying winnowing, storage and marketing of produce.
5. The emphasis will be given to seed production, mechanization, resource conservation
6. Integrated nutrient, insect-pest and disease management technologies.
7. Preparation of balance sheet including cost of cultivation, net returns per student as well as per team of 8-10 students.

Evaluation of Field Work:

Internal Evaluation

(100 marks)

The above mentioned field work shall be conducted under the supervision of one faculty member and would be evaluated by the two internal faculty members on a 4 point scale as mentioned below.

Field work 40 marks	File work 20 marks	Viva 30 marks	Attendance 10marks	Total internal 100 marks
------------------------	-----------------------	------------------	-----------------------	-----------------------------



Principles of Organic Farming Practical

Course Type	Course Code	L	T	P	C
Core course	BAG 665	0	0	2	1

The Course Outcomes (COs).

On completion of the course the students will be

CO – 1	Demonstrating the process of composting, vermicomposting and their quality parameters.
CO – 3	Evaluating various components of organic production processes

Practical

- Visit of organic farms to study the various components and their utilization
- Preparation of enrich compost, vermin compost, 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

Evaluation of Practical Examination:

Internal Evaluation

(50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3 point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks 50
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	

External Evaluation (50 marks)

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks



Management of Beneficial Insects Practical

Course Type	Course Code	L	T	P	C
Core course	BAG 666	0	0	2	1

The Course Outcomes (COs).

On completion of the course the students will be

CO-1	Understanding the different species of honey bee, Silk worm and Lac insect.
CO-2	Applying the beekeeping, sericulture and lac culture
CO-3	Identifying and applying the techniques for mass multiplication of predators and parasitoids
CO-4	Analyzing the impacts of beneficial insects.

Practical

- Honey bee species, castes of bees.
- Beekeeping appliances and seasonal management, bee enemies and disease. Bee pasturage, bee foraging and communication.
- Types of silkworm, voltinism and biology of silkworm. Mulberry cultivation, mulberry varieties and methods of harvesting and preservation of leaves.
- Species of lac insect, host plant identification. Identification of other important pollinators, weed killers and scavengers.
- Visit to research and training institutions devoted to beekeeping, sericulture, lac culture and natural enemies.
- Identification and techniques for mass multiplication of natural enemies.

Evaluation of Practical Examination:

Internal Evaluation

(50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3 point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks 50
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	

External Evaluation (50 marks)

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks



Managing Work and Others

Course Type	Course Code	L	T	P	C
Value Added Course	TMUGS-601	2	1	0	0

A. Course Perspective

This value-added course will be taught in even semester of pre-final year.

In this course, students will be taught to develop and become team player for creativity and innovation in organization they work. Students will be taught methods to develop cordial relation using “Johari Window”, which will help them in managing change in their organizations. Since they would be entering in the world of work, Special emphasis is also given to manners, etiquettes, negotiation, stress and conflict management. Finally, students will be rigorously prepared facing various selection tools like – GD, PI and resume preparation.

B. Course Outcomes (COs)

On completion of the course, the student will be:

CO - 1	Communicating effectively in a variety of public and interpersonal settings.
CO - 1	Applying concepts of change management for growth and development by understanding inertia of change and mastering the Laws of Change.
CO - 3	Analyzing scenarios, synthesizing alternatives and thinking critically to negotiate, resolve conflicts and develop cordial interpersonal relationships.
CO - 4	Functioning in a team and enabling other people to act while encouraging growth and creating mutual respect and trust.
CO - 5	Handling difficult situations with grace, style, and professionalism.

C. Lesson Plan

Session No.	Topics	Pedagogy	References	Session outcome (Bloom's Taxonomy)	Course Outcome (COs)
1.	Creativity and Innovation	<ul style="list-style-type: none"> Lecture Example Exercise 	R1	L3	CO1

2.	Understanding Self and Others (Johari Window)	<ul style="list-style-type: none"> • Lecture • Example • Exercise 	R1, R3	L5	CO3, CO4
3.	Stress Management	<ul style="list-style-type: none"> • Lecture • Example • Exercise 	R1	L5	CO5

4.	Managing change for competitive success	<ul style="list-style-type: none"> • Lecture • Example • Exercise 	R1, R4	L6	CO2
5.	Handling feedback and criticism	<ul style="list-style-type: none"> • Lecture • Example • Exercise 	R1	L4	CO1, CO4, CO5
6.	Conflict Management	<ul style="list-style-type: none"> • Lecture • Example • Exercise 	R2	L5	CO3, CO4
7.	Development of cordial interpersonal relationships	<ul style="list-style-type: none"> • Lecture • Example • Exercise 	R3	L5	CO3
8.	Negotiation	<ul style="list-style-type: none"> • Lecture • Example • Exercise 	R1, R3, R2	L4	CO3, CO4
9.	Working in teams	<ul style="list-style-type: none"> • Lecture • Example • Exercise 	R1	L4	CO3, CO4
10.	Manners, Etiquettes and Netiquettes	<ul style="list-style-type: none"> • Lecture • Example • Exercise 	Rsd5	L3	CO1, CO5
11.	Job seeking	<ul style="list-style-type: none"> • Lecture • Example • Exercise 	R6, R7, R8	L5	CO1, CO3
12.	Group Discussion	<ul style="list-style-type: none"> • Lecture • Example • Exercise 	R7	L5	CO1, CO3
13.	Personal Interview	<ul style="list-style-type: none"> • Lecture • Example • Exercise 	R8	L5	CO1, CO3, CO5

L1= Remember, L2= Understand, L3= Apply, L4= Analyze, L5= Evaluate and L6= Create

D. References

R1: Robbins, Stephen P., Judge, Timothy A., Vohra, Neharika, Organizational Behaviour (2018), 18th ed., Pearson Education

R2: Burne, Eric, Games People Play (2010), Penguin UK

R3: Carnegie, Dale, How to win friends and influence people (2004), RHUK

R4: Rathgeber, Holger, Kotter, John, Our Iceberg is melting (2017), Macmillan

R5: Steinburg, Scott, Netiquette Essentials (2013), Lulu.com

R6: <https://www.hloom.com/resumes/creative-templates/>

R7: <https://www.mbauniverse.com/group-discussion/topic.php>

R8: <https://www.indeed.com/career-advice/interviewing/job-interview-tips-how-to-make-a-great-impression>



Hi-tech. Horticulture

Course Type	Course Code	L	T	P	C
Discipline Specific Elective Course	BAGE 601	2	0	0	2

Course Outcomes (COs).

On completion of the course the students will be

CO – 1	Understanding the importance of Hi-tech Horticulture and protected cultivation.
CO – 2	Describing the Differential Geo-positioning System (DGPS). .
CO – 3	Applying the high density orcharding, precision farming and micro propagation in horticultural crops

Unit 1 (4 Hours)

Introduction & importance; Nursery management and mechanization; micro propagation of horticultural crops; Modern field preparation and planting methods,

Unit 2 (4 Hours)

Protected cultivation: advantages, controlled conditions, method and techniques, Micro irrigation systems and its components; EC, pH based fertilizer scheduling, canopy management,

Unit 3 (4 Hours)

High density orcharding, Components of precision farming: Remote sensing, Geographical Information System (GIS),

Unit 4 (4 Hours)

Differential Geo-positioning System (DGPS), Variable Rate applicator (VRA),

Unit 5 (4 Hours)

Application of precision farming in horticultural crops (fruits, vegetables and ornamental crops); mechanized harvesting of produce.

Text Books:

1. Basic Horticulture-Jitendra Singh. Kalyani Publisher

Reference Books:

1. Basics of Horticulture by K.V. Peter. New India Publishing Agency, New Delhi
2. Principles of Horticulture by C.R. Adams, M.P. Early. Routledge
3. Terminology of Horticulture by Neeraj Pratap Singh. International Book Distributing Co (IBDC Publishers)



Weed Management

Course Type	Course Code	L	T	P	C
Discipline Specific Elective Course	BAGE 602	2	0	0	2

The Course Outcomes (Cos).

On completion of the course the students will be

CO – 1	Understanding the principles of weed management
CO – 2	Applying different tools and techniques for weed management.

Unit 1 (4 Hours)

Introduction to weeds, characteristics of weeds their harmful and beneficial effects on ecosystem. Classification, reproduction and dissemination of weeds.

Unit 2 (4 Hours)

Herbicide classification, concept of adjuvant, surfactant, herbicide formulation and their use. Introduction to mode of action of herbicides and selectivity.

Unit 3 (4 Hours)

Allelopathy and its application for weed management. Bio-herbicides and their application in agriculture.

Unit 4 (4 Hours)

Concept of herbicide mixture and utility in agriculture. Herbicide compatibility with agro-chemicals and their application.

Unit 5 (4 Hours)

Integration of herbicides with non chemical methods of weed management. Herbicide Resistance and its management.

Text books:

1. Handbook of Agriculture: Indian Council of Agricultural Research, New Delhi
- 2.

Reference books:

- 1.Principles of Agronomy - S. R. Reddy. Kalyani Publisher
- 2.Manures and Fertilizers -K. S.Yawalkar, J.P. Agrawal and S. Bokde Agri-Horticultural Pub. House
- 3.Fundamentals of Agronomy Gopal Chandra De. Oxford and IBH Publishing Co. PVT. LTD.



System Simulation and Agroadvisory

Course Type	Course Code	L	T	P	C
Discipline Specific Elective Course	BAGE 603	2	0	0	2

The Course Outcomes (COs).

On completion of the course the students will be able

CO – 1	Understanding the system approach for representing soil-plant-atmospheric continuum
CO – 2	Demonstrating the crop responses to weather elements for crop growth and development
CO – 3	Analyzing the tools & techniques for weather forecasting and ITK
CO – 4	Creating agro-advisory bulletin based on weather forecast.

Unit 1

(4 Hours)

System Approach for representing soil-plant-atmospheric continuum, system boundaries, Crop models, concepts & techniques, types of crop models, data requirements, relational diagrams.

Unit 2

(4 Hours)

Evaluation of crop responses to weather elements; Elementary crop growth models; calibration, validation, verification and sensitivity analysis. Potential and achievable crop production- concept and modelling techniques for their estimation.

Unit 3

(4 Hours)

Crop production in moisture and nutrients limited conditions; components of soil water and nutrients balance. Weather forecasting, types, methods, tools & techniques, forecast verification;

Unit 4

(4 Hours)

Value added weather forecast, ITK for weather forecast and its validity; Crop-Weather Calendars;

Unit 5

(4 Hours)

Preparation of agro-advisory bulletin based on weather forecast. Use of crop simulation model for preparation of Agro-advisory and its effective dissemination.

Text Books:

1. Varshneya, M.C. and Pillai, P.B. 2003. Text book of Agricultural Meteorology, ICAR Pusa, New Delhi.

Reference Books:

1. Seaman, J., Chiskov, Y.Z., Lomsa, J. and Primault, B. 1979. Agrometeorology, Springer Verlag, Berlin.
2. Sunith, C.P. 1975. Methods in Agriculture Meteorology, Elsevier Sc. Co., Amsterdam.
3. Prasad Rao, G.S.L.H.V. 2003. Agricultural Meteorology, Kerala Agricultural University, Thrissur, Kerala.



Agricultural Journalism

Course Type	Course Code	L	T	P	C
Discipline Specific Elective Course	BAGE 604	2	0	0	2

The Course Outcomes (COs).

On completion of the course the students will be able

CO – 1	Understanding the agriculture journalism, newspaper and magazine as communication media.
CO – 2	Demonstrating the writing of agriculture stories using photographs and artwork.

Unit 1

(4 Hours)

Agricultural Journalism: The nature and scope of agricultural journalism characteristics and training of the agricultural journalist, how agricultural journalism is similar to and different from other types of journalism.

Unit 2

(4 Hours)

Newspapers and magazines as communication media: Characteristics; kinds and functions of newspapers and magazines, characteristics of newspaper and magazine readers. Form and content of newspapers and magazines: Style and language of newspapers and magazines, parts of newspapers and magazines.

Unit 3

(4 Hours)

The agricultural story: Types of agricultural stories, subject matter of the agricultural story, structure of the agricultural story. Gathering agricultural information:

Unit 4

(4 Hours)

Sources of agricultural information, interviews, coverage of events, abstracting from research and scientific materials, wire services, other agricultural news sources.

Unit 5

(4 Hours)

Writing the story: Organizing the material, treatment of the story, writing the news lead and the body, readability measures. 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, layouting.

Text Books

1. Mass Communication and Journalism in India, D.S. Mehta, Allied Publishers Private Limited

Reference Books:

1. Style in Journalism, P.V.L. Narasimha Rao, Readworth Publication

2. Agricultural Extension: Worldwide Innovations R. Saravanan New India Publishing

3. Agricultural Extension Systems: Issues and Approaches B.S. Hansra (ed.) Concept Publishing Company.



Hi-tech. Horticulture Practical

Course Type	Course Code	L	T	P	C
Discipline Specific Elective Course	BAGE 651	0	0	2	1

The Course Outcomes (Cos)

On completion of the course the students will be

CO-1	Understanding the types of polyhouses and shade net houses.
CO-2	Applying the tools and equipments of intercultural operations.
CO-3	Applying the concepts of canopy management in horticultural crops.

1. Types of polyhouses and shade net houses,
2. Intercultural operations, tools and equipments
3. Identification and application,
4. Micro propagation,
5. Nursery-protrays, micro-irrigation, EC, pH based fertilizer scheduling,
6. Canopy management,
7. Visit to hi-tech orchard/nursery.

Evaluation of Practical Examination:

Internal Evaluation

(50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3 point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks 50
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	

External Evaluation

(50 marks)

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks



Weed Management Practical

Course Type	Course Code	L	T	P	C
Discipline Specific Elective Course	BAGE 652	0	0	2	1

The Course Outcomes(Cos)

On completion of the course the students will be

CO –1	Understanding the scheme of weed identification
CO-2	Applying the techniques of weed eradication.
CO –3	Analyzing the yield losses due to weeds.

1. Techniques of weed preservation.
2. Weed identification and their losses study.
3. Biology of important weeds.
4. Study of herbicide formulations and mixture of herbicide.
5. Herbicide and agro-chemicals study.
6. Shift of weed flora study in long term experiments.
7. Study of methods of herbicide application,
8. Spraying equipments.
9. Calculations of herbicide doses
10. weed control efficiency and weed index.

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3 point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks 50
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	

External Evaluation (50 marks)

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks



System Simulation and Agro-advisory Practical

Course Type	Course Code	L	T	P	C
Discipline Specific Elective Course	BAGE 653	0	0	2	1

The Course Outcomes (COs)

On completion of the course the students will be

CO-1	Developing skills for using the computer softwares for the preparation of crop growth models and agro-advisory bulletin
CO-2	Creating knowledge of weather forecast for preplanning of agricultural practices

1. Preparation of crop weather calendars.
2. Preparation of agro-advisories based on weather forecast using various approaches and synoptic charts.
3. Working with statistical and simulation models for crop growth.
4. Potential & achievable production; yield forecasting, insect & disease forecasting models.
5. Simulation with limitations of water and nutrient management options.
6. Sensitivity analysis of varying weather and crop management practices.
7. Use of statistical approaches in data analysis and preparation of historical,
8. Past and present meteorological data for medium range weather forecast.
9. Feedback from farmers about the agro-advisory.

Evaluation of Practical Examination:

Internal Evaluation

(50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3 point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks 50
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	

External Evaluation

(50 marks)

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks



Agricultural Journalism Practical

Course Type	Course Code	L	T	P	C
Discipline Specific Elective Course	BAGE 654	0	0	2	1

The Course Outcomes (COs).

On completion of the course the students will be

CO-1	Understanding and writing agricultural stories
CO-2	Applying practices of interviewing and covering agricultural events
CO-3	Applying the artwork for developing the agricultural story

1. Practice in interviewing. Covering agricultural events.
2. Abstracting stories from research and scientific materials and from wire services.
3. Writing different types of agricultural stories.
4. Selecting pictures and artwork for the agricultural story.
5. Practice in editing, copy reading, headline and title writing, proofreading, layouting.
6. Testing copy with a readability formula. Visit to a publishing office.

Evaluation of Practical Examination:

Internal Evaluation

(50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3 point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks 50
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	

External Evaluation

(50 marks)

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks



Rural Agriculture Work Experience

Course Type	Course Code	L T P C
READY	BAG-754	0 0 40 20

The course Outcomes (COs)

On completion of the course the students will be

CO – 1	Understanding the functioning of various industries of agriculture sector
CO – 2	Describing the different aspects of agriculture in association of farmers and allied agencies
CO – 3	Analyzing the opportunities and challenges of agricultural industry
CO – 4	Identifying the problems in field due to prevalent agricultural practices
CO – 5	Evaluating the impact of plant diseases and pests on agricultural productivity and the efficacy of prevalent measures of management

SN.	Rural Agricultural Work Experience and Agro-industrial Attachment (RAWE & AIA) BAG 754		
	Activities	No. of weeks	Credit Hours
1	General orientation & On campus training by different faculties	1	14
2	Village attachment	8	
	Unit attachment in Univ./ College. KVK/ Research Station Attachment	5	
3	Plant clinic	2	02
	Agro-Industrial Attachment	3	04
4	Project Report Preparation, Presentation and Evaluation	1	
Total weeks for RAWE & AIA		20	20

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

RAWE Component-I
Village Attachment Training Programme

Sl. 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	
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, Post harvest-processing-value addition, 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

Evaluation**Internal Evaluation (100 marks)**

The above mentioned RAWE programme conducted under the supervision of concerned faculty members and would be evaluated by the 3 internal faculty members on a 8 point scale as mentioned below.

Plant Health Clinic	Field Visits	Unit attachment in Univ./ College. KVK/ Research Station Attachment	Agro-industrial Attachment	Village Attachment	Report/Presentation	Viva	Attendance	Total Internal
10 marks	10 marks	10 marks	10 marks	30 marks	10 marks	10 marks	10 marks	100 marks



Production Technology for Bioagent and Biofertilizer

Course Type	Course Code	L T P C
Experience Learning Programme	BAG 852	0 0 10 10

The Course Outcomes (COs).

On completion of the course the students will be

CO-1	Understanding the basic principles and techniques of applied agricultural microbiology
CO-2	Analyzing the effect of various microbial formulations on crop productivity and ecological benefits
CO-3	Developing novel microbial formulations and demonstrating their potential at farmers' fields
CO-4	Evaluating the potential of microbes in laboratory, green house and field
CO-5	Evaluating the different methods of microbial formulations, storage and application in fields

Syllabus

- Project planning and writing, market- industry- and field survey, business-networking skills
- Familiarization with lab etiquettes and safety, maintenance of lab equipment and space
- Preparation of different media, reagents and buffers. Maintenance of aseptic practices and sterilization techniques
- Isolation, maintenance, characterization, sub-culturing, preservation and mass multiplication of agriculturally important bacteria, fungi, pathogens, and biocontrol agents from diverse sources
- Evaluation of plant growth promoting and biocontrol potential of microbes in laboratory, green house and fields
- Formulations of microbial agents for storage, transportation and application (seed coating, drenching, spraying etc.)
- Developing, employing and evaluating different business models
- Writing report and presentation of observations and findings

Reference Books:

Aneja KR (2017). Experiments in Microbiology, Plant Pathology and Biotechnology. New Age International Publishers; Fifth edition

Kannaiyan S (2002). Biotechnology of Biofertilizers. Springer Science & Business Media

Board N (2012). The Complete Technology Book On Bio-Fertilizer And Organic Farming. NIIR Project Consultancy Services.



Mushroom Cultivation Technology

Course Type	Course Code	L T P C
Experience Learning Programme	BAG 854	0 0 10 10

The Course Outcomes (COs).

On completion of the course the students will be

CO-1	Understanding the principles and methods of mushroom cultivation
CO-2	Demonstrating the production technology of oyster and button mushroom
CO-3	Developing entrepreneurship in mushroom cultivation

- Introduction and Identification of edible and poisonous mushroom.
History, Importance, Scope, General morphology of edible mushroom, Nutritive value (protein, vitamins, minerals, carbohydrates and fats), medicinal importance and present status of the edible mushroom.
Classification of mushrooms, Poisonous mushrooms
- Preparation of Cultural media (PDA, Oat meal agar, Wheat meal agar and Yeast Potato dextrose agar)
Preparation of different media required to obtain the pure culture of the fungus (mushroom).
- Culturing of the mushroom can be done with spore print and tissue culture methods. It includes obtaining pure culture, sub culturing, slant preparation for maintaining the culture.
 - ✓ Preparation of mother culture by spore print.
 - ✓ Preparation of mother culture by tissue culture method.
- Preparation of master culture and Spawn: *Agaricus*, *Pleurotus*
Preparation of mother spawn by mixing the pure mushroom culture with grain based medium.
- Preparation of Substrate for cultivation: Composted substrate
- Spawning (Mixing of spawn to the compost)
- Preparation of Casing soil.
- Casing of the beds.
- After care of beds, harvesting and packing and marketing
Harvesting and weighing of mushrooms. Packaging with polythene and marketing by organizing stalls, exhibition, or visiting markets.

Reference Books:

- Singh R.P. and Chaube H.S. (1995) Mushroom Production Technologies. GBPUAT, Pantnagar. 104p
- Upadhyay R.C., Singh S.K. and Rai R.D. (2003) Current Vistas in Mushroom Biology and production. MSI. Solan. 289p
- Chang S.T. and Miles P.G. (2004) Mushroom cultivation, nutritional value, medicinal effect and environmental impact. CRC Press London. 451p.



Commercial Horticulture

Course Type	Course Code	L T P C
Experience Learning Programme	BAG- 858	0 0 10 10

The Course Outcomes (COs).

On completion of the course the students will be

CO-1	Understanding the importance of commercial horticulture and protected cultivation
CO-2	Applying the propagation and various sowing methods
CO-3	Applying and analyzing the food safety methods

- To study the different propagation methods, garden tools, morphological characters, layout, planting, different types of gardens and green house.
- Quality parameters and post-harvest practices of various horticulture crops.
- Food safety standard, FSMS, HACCP and various other methods of food safety at food related industry.
- Introduction and identification of bacteria in different food sample, quality analysis and detection of food borne pathogens.
- Nursery management, potting mixture, identification, different sowing methods, intercultural operations of horticultural crops.
- Visual analysis of commercial nurseries/orchard, gardens, processing industries and hi-tech nursery/orchard.
- Food processing industry to experience hand on training.

Reference Books:

1. Commercial Horticulture by N.L. Patel, S.L Chawala and T.R. Ahlawat. New India Publishing Agency New Delhi.
2. Commercial Production of Horticultural Crops by H.N. Samaddar. Naya Udyog. Kolkata.



Food Processing

Course Type	Course Code	L T P C
Experience Learning Programme	BAG-860	0 0 10 10

The Course Outcomes (COs)

On completion of the course the students will be

CO-1	Understanding the concepts, principles and techniques of food processing
CO-2	Explaining the concept of successful entrepreneur in the field of food processing.
CO-3	Applying principles and various food processing technique to develop product from a variety of food crops and utilization of waste food byproduct to prepare value added product

- Understanding of course and the basic concepts of food and food processing
- Methods of Food Processing and evaluation--Drying, Baking, Freezing, Fermentation, Pasteurization, Germination, Irradiation, Sensory Evaluation, keeping quality, preservation and Storage
- Processing and product development from Fruit Crop –Jam, Jellies, Squash, RTS, etc
- Processing and product development from vegetable Crop – Drying, Pickling, RTS beverages etc.
- Processing and product development from medicinal Crop –Candy, Jam, Dry Powder, RTS, Squash
- Processing and product development from Spices Crops –Drying, grading etc
- Fermentation, Germination, Malting, Baking of food products
- Processing of Milk and Milk Product- Fermented and non fermented product development
- Product Development by Utilizing Food Waste
- Industrial visit and expert lecture to enhance and promote the entrepreneurial skill

Reference Books:

- 1.Sivasankar, B. (2002). Food Processing and Preservation. Prentice Hall India Learning Private Limited. 372p
- 2.Subbhalakshmi, G and Udipi, S. A. (2005) Food Processing and Preservation New Age International Pvt Ltd Publishers
3. Sinha S. (2012) Principles of Food Processing. Adhyayan Publishers & Distributors. 272p

