FACULTY OF AGRICULTURE

SYLLABUS

For

B.Sc. AGRICULTURE (Hons.)

(Semester: I–VIII)

Session: 2019-20

KHALSA COLLEGE AMRITSAR-143001

B.Sc. Agriculture (Hons.)
SEMESTER-I

Sr. No.	Course Code	Subject	Periods per Week		Marks		Int. Assessment **	*** Grand Total
			Th	Prac	Th	Prac		
1.	MBL- 111	Agricultural Microbiology	3	3	25	12	13	**50**
2.	PBG-112	Fundamentals of Genetics	4	3	37	19	19	**75**
3.	SSC-113	Fundamentals of Soil Science	4	3	37	19	19	**75**
4.	FOR-114	Introduction to Forestry	3	3	25	12	13	**50**
5.	AGR-115	Fundamentals of Agronomy	6	3	50	25	25	**100**
6.	EXT-116	Rural Sociology and Educational Psychology	4	0	37	0	13	**50**
7.	BOT-117 MAT-117	Introductory Biology/ Elementary Mathematics	3 4	3 0	25 37	12	13 13	**50**
8.	AGH-118	Agricultural Heritage	1	0	19	0	6	**25**
9.	ENG-119	Communication Skills in English	4	0	37	0	13	**50**
10.	GPB-1110/ BPB-1110	Punjabi (Compulsory) / Basic Punjabi (Mudhli Punjabi)	4	0	37	0	13	**50**
11.	SOA-101*	*Drug Abuse: Problem, Management and Prevention (Compulsory)	2	0	37	0	13	**(NC)**
		Total	**40/41**	**18**	**329/ 341**	**99**	**147**	**575**

Note:

1. Mathematics for those students who have passed 10+2 (Medical)
2. Biology for those students who have passed 10 +2 (Non Medical)
3. Basic Punjabi (Mudhli Punjabi) for those students who have not passed 10 or +2 with Punjabi subject.

*NC- Non Credited.

** Total Internal Assessment to be given = 25% (House Test - 10%; Attendance - 10%; Conduct & Academic,Extra Curricular Activities - 5%).

*** Allotment of marks of each course is on the basis of credit hours specified by ICAR (5th Deans' Committee Report, 2016)

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SEMESTER-II

Sr. No	Course Code	Subject	Periods per Week		Marks		Int. Assessment **	*** Grand Total
			Th.	Prac.	Th.	Prac.		
1.	BCT-121	Fundamentals of Plant Biochemistry and Biotechnology	4	3	37	19	19	**75**
2.	FSC-122	Fundamentals of Horticulture	3	3	25	12	13	**50**
3.	SWE-123	Soil and Water Conservation Engineering	3	3	25	12	13	**50**
4.	BOT-124	Fundamentals of Crop Physiology	3	3	25	12	13	**50**
5.	AGE-125	Fundamentals of Agricultural Economics	4	0	37	0	13	**50**
6.	PPL-126	Fundamentals of Plant Pathology	6	3	50	25	25	**100**
7.	ENT-127	Fundamentals of Entomology	6	3	50	25	25	**100**
8.	EXT-128	Fundamentals of Agricultural Extension Education	4	3	37	19	19	**75**
9.	ENG-129	Communication Skills in English	4	0	37	0	13	**50**
10.	GPB-1210 /BPB-1210	Punjabi (Compulsory) / Basic Punjabi (Mudhli Punjabi)	4	0	37	0	13	**50**
11.	SOA-102*	Drug Abuse: Problem, Management and Prevention (Compulsory)	2	0	37	0	13	**(NC)**
		TOTAL	**43**	**21**	**360**	**124**	**166**	**650**

Note: Basic Punjabi(Mudhli Punjabi) for those students who have not passed 10 or +2 with Punjabi subject.

***Note: The marks of Drug Abuse: Problem, Management and Prevention (Compulsory) will not be added in the total marks.**

** Total Internal Assessment to be given = 25% (House Test - 10%; Attendance - 10%; Conduct & Academic,Extra Curricular Activities - 5%).

*** Allotment of marks of each subject is on the basis of credit hours specified by ICAR (5th Deans' Committee Report, 2016).

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SEMESTER-III

Sr. No.	Course Code	Subject	Periods per Week		Marks		Int. Assessment**	Grand Total
			Th	Prac.	Th.	Prac.		
1.	AGR-211	Crop Production Technology-I (Kharif Crops)	3	3	25	12	13	**50**
2.	AGE-212	Agricultural Marketing, Trade and Prices	4	3	37	19	19	**75**
3.	AGE-213	Agricultural finance and Co-operation	4	3	37	19	19	**75**
4.	AGI-214	Agricultural Informatics	3	3	25	12	13	**50**
5.	AEN-215	Farm Machinery and Power	3	3	25	12	13	**50**
6.	VSC-216	Production Technology for Vegetables and Spices	3	3	25	12	13	**50**
7.	LPM-217	Livestock and Poultry Management	6	3	50	25	25	**100**
8.	STA-218	Statistical Methods	3	3	25	12	13	**50**
9.	DMT-219	Disaster Management	3	0	37	0	13	**50**
10.	ESL-220	Environmental Studies	6	3	50	25	25	**100**
		Total	**38**	**27**	**336**	**148**	**166**	**650**

** Total Internal Assessment to be given = 25% (House Test - 10%; Attendance - 10%; Conduct & Academic,Extra Curricular Activities - 5%).

Allotment of marks of each subject is on the basis of credit hours specified by I.C.A.R (5th Dean's Committee.

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SEMESTER-IV

Sr. No	Course Code	Subject	Periods per Week		Marks		Int. Assessment **	Grand Total
			Th	Prac	Th.	Prac		
1.	AGR-221	Crop Production Technology-II (Rabi Crops)	3	3	25	12	13	**50**
2.	FSC-222	Production technology for Ornamental Crops, MAP and Landscaping	3	3	25	12	13	**50**
3.	AEN-223	Renewable energy & Green Technology	3	3	25	12	13	**50**
4.	SSC- 224	Problamatic Soils and their Management	4	-	37	-	13	**50**
5.	FSC-225	Production Technology for Fruits and Plantation crops	3	3	25	12	13	**50**
6.	PBG-226	Principles of Seed Technology	3	3	25	12	13	**50**
7.	AGR-227	Farming System and Sustainable Agriculture	3	0	18	--	07	**25**
8.	PBG-228	Fundamentals of Plant Breeding	4	3	37	19	19	**75**
9.	AGM-229	Introductory Agro-meteorology and Climate Change	3	3	25	12	13	**50**
10.	(Elective-I) ACH-2210 WMG-2210 BPF-2210 SSA-2210	(Any one option) Agrochemicals Weed Management Biopesticides & Biofertilizers System Simulation and Agro-Advisory	4	3	37	19	19	**75**
	Total		**33**	**24**	**279**	**110**	**136**	**525**

** Total Internal Assessment to be given = 25% (House Test - 10%; Attendance - 10%; Conduct & Academic, Extra Curricular Activities - 5%).

Allotment of marks of each subject is on the basis of credit hours specified by I.C.A.R (5th Dean's Committee.

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SEMESTER-V

Sr. No.	Course	Subject	Period Per week		Marks		Internal assessment**	Grand Total
			Th.	Prt.	Th.	Prt.		
1.	AGR-311	Practical Crop Production-I *(Kharif Crops)*	0	4	0	40	10	**50**
2.	PPL-312	Principles of Integrated Pest and Disease Management	4	3	40	20	15	**75**
3.	SSC-313	Manure, Fertilizer and Soil Fertility Management	4	3	40	20	15	**75**
4.	ENT-314	Pests of crops and Stored Grain and Their Management	4	3	40	20	15	**75**
5.	PPL-315	Diseases of Field and Horticulture Crops and their Management-I	4	3	40	20	15	**75**
6.	PBG-316	Crop Improvement (Kharif)	3	3	40	20	15	**75**
7.	AGE-317	Entrepreneurship Development and Business Communication	3	3	40	20	15	**75**
8.	AGR-318	Geoinformatics and Nano-Technology and Precision Farming	3	3	40	20	15	**75**
9.	IPR-319	Intellectual Property Rights	3	0	40	--	10	**50**
10.	(Elective-I) PCV-3110 MPT-3110 LSP-3110 HTH-3110	(Any one option) Protected Cultivation Micro Propagation Technique Landscaping Hi-Tech Horticulture	4	3	40	20	15	**75**
		Total	**32**	**28**	**360**	**200**	**140**	**700**

** Total Internal Assessment to be given = 20% (House Test - 10%; Attendance - 6%; Conduct & Academic Activities, Extra Curricular Activities - 4%).

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SEMESTER-VI

Sr. No.	Course	Subject	Period Per week		Marks		Int. Assessment **	Grand Total
			Th.	Prt.	Th.	Prt.		
1.	AGR-321	Practical Crop Production-II *(Rabi)*	0	4	0	40	10	**50**
2.	AGR-322	Rainfed Agriculture and Watershed Management	3	3	40	20	15	**75**
3.	AEN-323	Protected Cultivation and Secondary Agriculture	3	3	40	20	15	**75**
4.	PPL-324	Diseases of Field and Horticulture Crops and their Management-II	4	3	40	20	15	**75**
5.	FSC-325	Post Harvest Management and Value Addition of Fruits and Vegetables	3	3	40	20	15	**75**
6.	ENT-326	Management of Beneficial Insects	3	3	40	20	15	**75**
7.	PBG-327	Crop Improvement (Rabi)	3	3	40	20	15	**75**
8.	AGR-328	Principles of Organic Farming	3	3	40	20	15	**75**
9.	AGE-329	Farm Management, Production and Resource Economics	3	3	40	20	15	**75**
10.	FST-3210	Principles of Food Science and Nutrition	4	0	40	0	10	**50**
11.	(Elective-III) ABM-3211 CPB-3211 FSS-3211 ACJ-3211	(Any one option) Agri-business Management Commercial Plant Breeding Food Safety and Standards Agricultural Journalism	4	3	40	20	15	**75**
	Total		**33**	**31**	**400**	**220**	**155**	**775**

** Total Internal Assessment to be given = 20% (House Test - 10%; Attendance - 06%; Conduct & Academic Activities,Extra Curricular Activities - 4%).

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SEMESTER VII

Rural Agricultural Work Experience and Agro-Industrial Attachment (RAWE & AIA)

Sr. No.	Course Code	Training Components	Number of weeks	M.Marks
1.	RAWE-411	General Orientation & On campus Training by different faculties	3	75
2.	RAWE-412	Plant Clinic	3	75
3.	RAWE-413	Village Attachment	8	200
4.	AIA-414	Agro-Industrial Attachment-I	3	75
5.	AIA-415	Agro-Industrial Attachment-II	3	75
		Total	**20**	**500**

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SEMESTER VIII

Experiential Learning Programmes

Modules for skill development and entrepreneurship. A student has to register for two modules from the following package of modules: (Any two)

Sr. No.	Course Code	Experiential Learning Modules/	Number of weeks	M.Marks
		Any two of the following options: -		
	ELM-421	Production Technology Bio-agents and Bio-fertilizer	10	250
	ELM-422	Mushroom Cultivation Technology		
	ELM-423	Soil, Plant, Water and Seed Testing		
	ELM-424	Commercial Beekeeping		
	ELM-425	Floriculture and Landscaping	10	250
	ELM-426	Commercial Horticulture		
	ELM-427	Food Processing		
	ELM-428	Organic Production Technology		
		Total		**500**

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SEMESTER -I

MBL-111: Agricultural Microbiology

Time: 3 Hours **Max. Marks: 50**

Theory: 25

Practical: 12

Internal Assessment 13

Periods per week 3+3

Instructions for the Paper Setters:

1. Question paper should be set strictly according to the syllabus.
2. The language of questions should be straight & simple.
3. There will be total of nine questions, out of which first question (comprising of 5 short answer type questions of 1 marks each) covering the whole syllabus will be compulsory.
4. Of the remaining 8 questions, two questions will be asked from each section (A,B,C,D) and the candidate will attempt 4 questions (one from each section). All questions will carry equal marks (5).

Theory:

Section-A: Introduction. Microbial world: Prokaryotic and eukaryotic microbes. Bacteria: cell structure, chemoautotrophy, photoautotrophy, growth. Genetic recombination-transformation, conjugation and transduction, plasmids, transposons.

Section-B: Role of microbes in soil fertility and crop production: Carbon, Nitrogen, Phosphorus and sulphur cycles.

Section-C: Biological nitrogen fixation- symbiotic, associative and aysmbiotic. *Azolla*, blue green algae and mycorrhiza. Rhizosphere and phyllosphere.

Section-D: Microbes in human welfare: silage production, biofertilizers, biopesticides, biofuel production and biodegradation.

Practical

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

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PBG-112 **Fundamentals of Genetics**

Time: 3 Hours **Max. Marks: 75**

Theory: 37

Practical: 19

Internal Assessment 19

Periods per week 4+3

Instructions for the Paper Setters:

1. Question paper should be set strictly according to the syllabus.
2. The language of questions should be straight & simple.
3. There will be total of nine questions, out of which first question (comprising of 9 short answer type questions) covering the whole syllabus will be compulsory. This will comprise of 9 marks.
4. Of the remaining 8 questions, two questions will be asked from each section (A,B,C,D) and the candidate will attempt 4 questions (one from each section). All questions will carry equal marks (7).

Theory

Section-A: Pre and Post Mendelian concepts of heredity, Mendelian principles of heredity. Architecture of chromosome; chromonemata, chromomeres, centromere, secondary constriction and telomere; special types of chromosomes. Chromosomal theory of inheritance. Cell cycle and cell division- mitosis and meiosis. Probability and Chi-square. Dominance relationships, Epistatic interactions with example

Section-B: Multiple alleles, pleiotropism and pseudoalleles. Sex determination and sex linkage, sex limited and sex influenced traits, Blood group genetics, Linkage and its estimation, crossing over mechanisms, chromosome mapping.

Section-C: Structural and numerical variations in chromosomes and their implications, 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. Genetic disorders.

Section-D: 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.

Practical

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

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SSC-113: **Fundamentals of Soil Science**

Time: 3 Hours **Max. Marks: 75**

Theory: 37

Practical: 19

Internal Assessment 19

Periods per week 4+3

Instructions for the Paper Setters:

1. Question paper should be set strictly according to the syllabus.
2. The language of questions should be straight & simple.
3. There will be total of nine questions, out of which first question (comprising of 9 short answer type questions) covering the whole syllabus will be compulsory. This will comprise of 9 marks.
4. Of the remaining 8 questions, two questions will be asked from each section (A,B,C,D) and the candidate will attempt 4 questions (one from each section). All questions will carry equal marks (7).

Theory:

Section-A: Soil as a natural body, Pedological and edaphological concepts of soil; Soil genesis: soil forming rocks and minerals; weathering, processes and factors of soil formation; Soil Profile, components of soil;

Section-B: Soil physical properties: soil-texture, structure, density and porosity, soil colour, consistence and plasticity; soils of India; Soil water retention, movement and availability;

Section-C: Soil air, composition, gaseous exchange, problem and plant growth; source, amount and flow of heat in soil; soil temperature and plant growth; Soil reaction-pH, soil acidity and alkalinity, buffering, effect of pH on nutrient availability;

Section-D: Soil colloids - inorganic and organic; silicate clays: constitution and properties; soil organic matter: composition, properties and its influence on soil properties; soil organisms: macro and micro organisms, their beneficial and harmful effects;.

Practical:

Study of soil profile in field.Study of soil sampling tools, collection of representative soil sample, its processing and storage.Study of soil forming rocks and minerals.Determination of soil density, moisture content and porosity.Determination of soil pH and electrical conductivity.Study of soil map.Determination of soil colour.Estimation of organic matter content of soil.

B.Sc. AGRICULTURE (HONS.)

FOR-114: Introduction to Forestry

Time: 3 Hours **Max. Marks: 50**

Theory: 25

Practical: 12

Internal Assessment 13

Periods per week 3+3

Instructions for the Paper Setters:

1. Question paper should be set strictly according to the syllabus.
2. The language of questions should be straight & simple.
3. There will be total of nine questions, out of which first question (comprising of 5 short answer type questions of 1 mark each) covering the whole syllabus will be compulsory.
4. Of the remaining 8 questions, two questions will be asked from each section (A,B,C,D) and the candidate will attempt 4 questions (one from each section). All questions will carry equal marks (5).

Theory:

Section-A: Introduction – definitions of basic terms related to forestry, objectives of silviculture, forest classification, salient features of Indian Forest Policies. Forest regeneration, Natural regeneration - natural regeneration from seed and vegetative parts, coppicing, pollarding, root suckers;

Section-B: Artificial regeneration – objectives, choice between natural and artificial regeneration, essential preliminary considerations. Crown classification. Tending operations – weeding, cleaning, thinning – mechanical, ordinary, crown and advance thinning. Forest mensuration – objectives, diameter measurement, instruments used in diameter measurement; Non instrumental methods of height measurement - shadow and single pole method;

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

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

Practical

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

B.Sc. AGRICULTURE (HONS.)

AGR-115: Fundamentals of Agronomy

Time: 3 Hours **Max. Marks: 100**

Theory: 50

Practical: 25

Internal Assessment 25

Periods per Week 6+3

Instructions for the Paper Setters:

1. Question paper should be set strictly according to the syllabus.
2. The language of questions should be straight & simple.
3. There will be total of nine questions, out of which first question (comprising of 10 short answer type questions) covering the whole syllabus will be compulsory.
4. Of the remaining 8 questions, two questions will be asked from each section (A,B,C,D) and the candidate will attempt 4 questions (one from each section). All questions will carry equal marks (10).

Theory:

Section-A: Agronomy and its scope, seeds and sowing, tillage and tilth, crop density and geometry, Crop nutrition, manures and fertilizers, nutrient use efficiency,

Section-B: Water resources, soil plant water relationship, crop water requirement, water use efficiency, irrigation- scheduling criteria and methods, quality of irrigation water, water logging.

Section-C: Weeds- importance, classification, crop weed competition, concepts of weed management-principles and methods, herbicides- classification, selectivity and resistance, allelopathy.

Section-D: Growth and development of crops, factors affecting growth and development, plant ideotypes, crop rotation and its principles, adaptation and distribution of crops, crop management technologies in problematic areas, harvesting and threshing of crops.

Practical:

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

B.Sc. AGRICULTURE (HONS.)

EXT-116: Rural Sociology & Educational Psychology

Time: 3 Hours **Max. Marks: 50**

Theory: 37

Internal Assessment= 13

Periods per week 4+0

Instructions for the Paper Setters:

1. Question paper should be set strictly according to the syllabus.
2. The language of questions should be straight & simple.
3. There will be total of nine questions, out of which first question (comprising of 9 short answer type questions) covering the whole syllabus will be compulsory.
4. Of the remaining 8 questions, two questions will be asked from each section (A,B,C,D) and the candidate will attempt 4 questions (one from each section). All questions will carry equal marks (7).

Theory:

Section-A: Sociology and Rural sociology: Definition and scope, its significance in agriculture extension.

Section-B: Rural society, Social Groups, Social Stratification, Culture concept, Social Institution, Social Change & Development.

Section-C: Educational psychology: Meaning & its importance in agriculture extension. Behavior: Cognitive, affective, psychomotor domain.

Section-D: Personality, Learning, Motivation, Theories of Motivation, Intelligence

B.Sc. AGRICULTURE (HONS.)

BOT-117: **Introductory Biology**

Time: 3 Hours **Max. Marks: 50**
Theory: 25
Practical: 12
Internal Assessment 13
Periods per week 3+3

Instructions for the Paper Setters:

1. Question paper should be set strictly according to the syllabus.
2. The language of questions should be straight & simple.
3. There will be total of nine questions, out of which first question (comprising of 5 short answer type questions of 1 mark each) covering the whole syllabus will be compulsory.
4. Of the remaining 8 questions, two questions will be asked from each section (A,B,C,D) and the candidate will attempt 4 questions (one from each section). All questions will carry equal marks (5).

Theory:

Section-A: Introduction to the living world, diversity and characteristics of life, origin of life, Evolution and Eugenics.

Section-B: Binomial nomenclature and classification Cell and cell division.

Section-C: Morphology of flowering plants. Seed and seed germination.

Section-D: Plant systematics- viz; Brassicaceae, Fabaceae and Poaceae. Role of animals in agriculture.

Practical

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

B.Sc. AGRICULTURE (HONS.)

MAT-117 **Elementary Mathematics**

Time: 3 Hours **Max. Marks: 50**
Theory: 37
Internal Assessment =13
Periods per week 4+0

Instructions for the Paper Setters:

1. The question paper will consists of two units namely A and B.
2. Unit-A will consist of 7(seven) compulsory questions and each of 1 mark from entire syllabus.
3. Unit-B will consist of 8 (eight) questions, each should set from eight sections and will carry 6 (six) marks each. Students are to attempt any five questions.

Theory:

Sec-A: Straight lines : Distance formula, section formula (internal and external division), Equation of co-ordinate axes, Equation of lines parallel to axes, Slope-intercept form of equation of line, Slope-point form of equation of line, Two point form of equation of line,

Sec-B: Intercept form of equation of line, Normal form of equation of line, General form of equation of line, Point of intersection of two straight lines, Angles between two straight lines, Parallel lines, Perpendicular lines.

Sec-C: Circle: Equation of circle whose centre and radius is known, General equation of a circle, Equation of circle passing through three given points, Equation of circle whose diameters is line joining two points (x_1, y_1) & (x_2, y_2).

Sec-D: Definition of function, limit and continuity(of algebraic functions)

Sec-E: Differential Calculus: Differentiation of algebraic functions, exponential functions and logarithmic differentiation (excluding trigonometric functions). Derivative of sum, difference, product and quotient of two functions.

Sec-F: Integral Calculus : Integration of Product of two functions, Integration by substitution method, Definite Integrals (of algebraic functions).

Sec-G: Matrix: Definition of Matrices, Addition, Subtraction, Multiplication, Transpose of matrix up to 3^{rd} order.

Sec-H: Determinants: Properties of determinants and their evaluation, Inverse of matrix up to 3^{rd} order. Matrix method.

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AGH-118 **Agricultural Heritage**

Time: 3 Hours **Max. Marks: 25**

Theory: 19

Internal Assessment=6

Periods per week 1+0

Instructions for the Paper Setters:

1. Question paper should be set strictly according to the syllabus.
2. The language of questions should be straight & simple.
3. There will be total of nine questions, out of which first question (comprising of 3 short answer type questions) covering the whole syllabus will be compulsory.
4. Of the remaining 8 questions, two questions will be asked from each section (A,B,C,D) and the candidate will attempt 4 questions (one from each section). All questions will carry equal marks (4).

Theory

Section-A: Introduction of Indian agricultural heritage; Ancient agricultural practices, Relevance of heritage to present day agriculture;

Section-B: Past and present status of agriculture and farmers in society; Journey of Indian agriculture and its development from past to modern era; Plant production and protection through indigenous traditional knowledge;

Section-C: Crop voyage in India and world; Agriculture scope; Importance of agriculture and agricultural resources available in India; Crop significance and classifications;

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

B.Sc. Agriculture (Hons.)

ENG-119 **Communication Skills in English**

Time: 3 Hours

Max. Marks: 50
Theory: 37
Internal Assessment:13
Periods per week: 4+0

1. Reading Skills: Reading Tactics and strategies; Reading purposes–kinds of purposes and associated comprehension; Reading for direct meanings; Reading for understanding concepts, details, coherence, logical progression and meanings of phrases/ expressions.

Activities:

a) Active reading of passages on general topics,
b) Reading newspaper. Articles, Editorials etc.
c) Short questions based on content and development of ideas of a given paragraph.

2. Writing Skills: Guidelines for effective writing; writing styles for application, resume, personal letter, official/ business letter, memo, notices etc.

Activities:

a) Personal and business letters.
b) Converting a biographical note into a sequenced resume.
c) Writing notices for circulation/ boards.
d) Making notes of given passage with headings and sub-headings.
e) Writing newspaper reports based on given heading.

Suggested Pattern of Question Paper:

The question paper will consist of Seven skill-oriented questions from Reading and Writing Skills. The first 6 Questions carry 5 marks each. The 7^{th} Question carries 7 marks. The questions shall be phrased in a manner that students know clearly what is expected of them. There will be internal choice wherever possible.

i. Comprehension questions of an unseen passage.
ii. Personal letter Official/Business Letters.
iii. Writing notices/agenda/resolution/ minutes for public circulation on topics of professional interest
iv. Writing resume of converting a biographical note into resume
v. Writing news report based on a given heading
vi. Do as directed Articles Units 69-81
Conjuction Unit 113-120 (6x5=30Marks)

vii. Translation from English to Vernacular (Punjabi/Hindi) (Isolated Sentences) (1x7=7 Marks)

Recommended Books:

1. Oxford Guide to Effective Writing and Speaking by John Seely.
2. The Written Word by Vandana R Singh, Oxford University Press.
3. Murphy's English Grammer (by Raymond Murphy) CUP.

B.Sc. Agriculture (Hons.)

GPB-1110 **Punjabi (Compulsory)**

Time: 3 Hours **Max. Marks: 50**

Theory: 37

Internal Assessment 13

Periods per Week 4+0

ਪਾਠ-ਕ੍ਰਮ ਅਤੇ ਪਾਠ-ਪੁਸਤਕਾਂ

1. **ਸਾਹਿਤ ਦੇ ਰੰਗ** (ਸੰਪਾ. ਡਾ. ਮਹਿਲ ਸਿੰਘ), ਭਾਗ ਪਹਿਲਾ (ਕਵਿਤਾ ਅਤੇ ਕਹਾਣੀ), ਰਵੀ ਸਾਹਿਤ ਪ੍ਰਕਾਸ਼ਨ, ਅੰਮ੍ਰਿਤਸਰ।
2. **ਪੰਜਾਬ ਦੇ ਮਹਾਨ ਕਲਾਕਾਰ** (ਬਲਵੰਤ ਗਾਰਗੀ), ਗੁਰੂ ਨਾਨਕ ਦੇਵ ਯੂਨੀਵਰਸਿਟੀ, ਅੰਮ੍ਰਿਤਸਰ।
   ਲੇਖ : ਕੇ. ਐਲ.ਸਹਿਗਲ, ਬੜੇ ਗ਼ੁਲਾਮ ਅਲੀ ਖਾਂ, ਸੋਭਾ ਸਿੰਘ, ਪ੍ਰਿਥਵੀਰਾਜ ਕਪੂਰ, ਭਾਈ ਸਮੁੰਦ ਸਿੰਘ।
3. **ਪੈਰ੍ਹਾ ਰਚਨਾ**
4. **ਪੈਰ੍ਹਾ ਪੜ੍ਹ ਕੇ ਪ੍ਰਸ਼ਨਾਂ ਦੇ ਉੱਤਰ**।
5. (ੳ) **ਪੰਜਾਬੀ ਧੁਨੀ ਵਿਉਂਤ :** ਉਚਾਰਨ ਅੰਗ, ਉਚਾਰਨ ਸਥਾਨ ਤੇ ਵਿਧੀਆਂ, ਸਵਰ, ਵਿਅੰਜਨ, ਸੁਰ।
   (ਅ) **ਭਾਸ਼ਾ ਵੰਨਗੀਆਂ** : ਭਾਸ਼ਾ ਦਾ ਟਕਸਾਲੀ ਰੂਪ, ਭਾਸ਼ਾ ਅਤੇ ਉਪ-ਭਾਸ਼ਾ ਦਾ ਅੰਤਰ, ਪੰਜਾਬੀ ਉਪਭਾਸ਼ਾਵਾਂ ਦੇ ਪਛਾਣ-ਚਿੰਨ੍ਹ।
6. **ਮਾਤ ਭਾਸ਼ਾ ਦਾ ਅਧਿਆਪਨ**
   (ੳ) ਪਹਿਲੀ ਭਾਸ਼ਾ ਦੇ ਤੌਰ ਉੱਤੇ
   (ਅ) ਦੂਜੀ ਭਾਸ਼ਾ ਦੇ ਤੌਰ ਉੱਤੇ

ਅੰਕ-ਵੰਡ ਅਤੇ ਪਰੀਖਿਅਕ ਲਈ ਹਦਾਇਤਾਂ

1. ਕਿਸੇ ਕਵਿਤਾ ਦਾ ਸਾਰ ਜਾਂ ਉਸਦਾ ਵਿਸ਼ਾ ਵਸਤੂ (ਦੋ ਵਿਚੋਂ ਇਕ) **7 ਅੰਕ**
2. ਕਿਸੇ ਕਹਾਣੀ ਦਾ ਸਾਰ, ਉਸਦਾ ਵਿਸ਼ਾ ਵਸਤੂ, ਕਹਾਣੀ ਕਲਾ ਜਾਂ ਪਾਤਰ ਉਸਾਰੀ (ਦੋ ਵਿਚੋਂ ਇਕ) **7 ਅੰਕ**
3. ਪੈਰ੍ਹਾ ਰਚਨਾ : ਤਿੰਨ ਵਿਸ਼ਿਆਂ ਵਿਚੋਂ ਕਿਸੇ ਇਕ ਉਤੇ ਪੈਰ੍ਹਾ ਲਿਖਣ ਲਈ ਕਿਹਾ ਜਾਵੇ । **4 ਅੰਕ**
4. ਪੈਰ੍ਹਾ ਦੇ ਕੇ ਉਸ ਬਾਰੇ ਪੰਜ ਪ੍ਰਸ਼ਨਾਂ ਦੇ ਉੱਤਰ **4 ਅੰਕ**
5. ਨੰਬਰ 5 ਉਤੇ ਦਿੱਤੀ ਵਿਆਕਰਣ ਦੇ ਆਧਾਰ ...ਤੇ ਵਰਣਨਾਤਮਕ ਪ੍ਰਸ਼ਨ **7 ਅੰਕ**
6. ਨੰਬਰ 6 ਵਿਚ ਮਾਤ ਭਾਸ਼ਾ ਦੇ ਪਹਿਲੀ ਭਾਸ਼ਾ ਅਤੇ ਦੂਜੀ ਭਾਸ਼ਾ ਵਜੋਂ ਅਧਿਆਪਨ, ਮਹੱਤਵ ਅਤੇ ਸਮੱਸਿਆਵਾਂ ਬਾਰੇ ਚਾਰ ਪ੍ਰਸ਼ਨ ਪੁੱਛੇ ਜਾਣਗੇ, ਜਿਨ੍ਹਾਂ ਵਿਚੋ ਵਿਦਿਆਰਥੀ ਨੇ ਦੋ ਦਾ ਉੱਤਰ ਦੇਣਾ ਹੋਵੇਗਾ।

(4×2)=8 **ਅੰਕ**

ਨੋਟ: ਇੰਟਰਨਲ ਅਸੈੱਸਮੈਂਟ 13 ਅੰਕਾਂ ਦੀ ਹੈ, ਜ਼ੋ ਕਾਲਜ ਵਲੋਂ ਨਿਰਧਾਰਿਤ ਦਿਸ਼ਾ ਨਿਰਦੇਸ਼ਾ ਅਨੁਸਾਰ ਇਨ੍ਹਾਂ ਅੰਕਾਂ ਤੋਂ ਵੱਖਰੀ ਹੋਵੇਗੀ। ਇਸ ਪੇਪਰ ਦੇ ਕੁਲ ਅੰਕ 37+13=50 ਹਨ।

B.Sc. Agriculture (Hons.)

BPB-1110 **Basic Punjabi**

Time: 3 Hours **Max. Marks: 50**

Theory: 37

Internal Assessment 13

Periods per Week 4+0

1. **ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਤੇ ਗੁਰਮੁਖੀ ਲਿਪੀ**
   ੳ) ਨਾਮਕਰਣ ਤੇ ਸੰਖੇਪ ਜਾਣ ਪਛਾਣ : ਗੁਰਮੁਖੀ ਵਰਣਮਾਲਾ, ਅੱਖਰ ਕ੍ਰਮ, ਸਵਰ ਵਾਹਕ (ੳ ਅ ੲ), ਲਗਾਂ ਮਾਤਰਾਂ, ਪੈਰ ਵਿਚ ਬਿੰਦੀ ਵਾਲੇ ਵਰਣ, ਪੈਰ ਵਿਚ ਪੈਣ ਵਾਲੇ ਵਰਣ, ਬਿੰਦੀ, ਟਿੱਪੀ, ਅੱਧਕ।
   ਅ) ਸਿਖਲਾਈ ਤੇ ਅਭਿਆਸ 12 **ਅੰਕ**

2. **ਗੁਰਮੁਖੀ, ਆਰਥੋਗ੍ਰਾਫੀ ਅਤੇ ਉਚਾਰਨ** : ਸਵਰ, ਵਿਅੰਜਨ : ਮੁੱਢਲੀ ਜਾਣ-ਪਛਾਣ ਅਤੇ ਉਚਾਰਣ, ਮੁਹਾਰਨੀ, ਲਗਾਂ ਮਾਤਰਾਂ ਦੀ ਪਛਾਣ । 10 **ਅੰਕ**

3. **ਪੰਜਾਬੀ ਸ਼ਬਦ ਜੋੜ** : ਮੁਕਤਾ (ਦੋ ਅੱਖਰਾਂ ਵਾਲੇ ਸ਼ਬਦ, ਤਿੰਨ ਅੱਖਰਾਂ ਵਾਲੇ ਸ਼ਬਦ), ਸਿਹਾਰੀ ਵਾਲੇ ਸ਼ਬਦ, ਬਿਹਾਰੀ ਵਾਲੇ ਸ਼ਬਦ, ਔਂਕੜ ਵਾਲੇ ਸ਼ਬਦ, ਦੁਲੈਂਕੜ ਵਾਲੇ ਸ਼ਬਦ, ਲਾਂ ਵਾਲੇ ਸ਼ਬਦ, ਦੁਲਾਵਾਂ ਵਾਲੇ ਸ਼ਬਦ, ਹੋੜੇ ਵਾਲੇ ਸ਼ਬਦ, ਕਨੌੜੇ ਵਾਲੇ ਸ਼ਬਦ, ਲਗਾਂਖਰ (ਟਿੱਪੀ, ਬਿੰਦੀ, ਅੱਧਕ) ਵਾਲੇ ਸ਼ਬਦ, ਸ਼ੁੱਧ-ਅਸ਼ੁੱਧ।
   15 **ਅੰਕ**

ਅੰਕ ਵੰਡ ਅਤੇ ਪਰੀਖਿਅਕ ਲਈ ਹਦਾਇਤਾਂ

1. ਪਹਿਲੇ ਭਾਗ ਵਿਚੋਂ ਵਰਣਨਾਤਮਕ ਪ੍ਰਸ਼ਨ ਪੁੱਛੇ ਜਾਣਗੇ। ਜਿਨ੍ਹਾਂ ਵਿਚੋਂ ਤਿੰਨ ਪ੍ਰਸ਼ਨਾਂ ਦਾ ਉੱਤਰ ਦੇਣਾ ਲਾਜ਼ਮੀ ਹੈ। ਹਰ ਪ੍ਰਸ਼ਨ ਦੇ ਚਾਰ-ਚਾਰ ਅੰਕ ਹਨ। (4+4+4) 12 **ਅੰਕ**
2. ਭਾਗ ਦੂਸਰਾ ਵਿਚੋਂ ਦੋ-ਦੋ ਨੰਬਰ ਦੇ ਪੰਜ ਪ੍ਰਸ਼ਨ ਪੁੱਛੇ ਜਾਣਗੇ। ਸਾਰੇ ਪ੍ਰਸ਼ਨ ਲਾਜ਼ਮੀ ਹਨ। 10 **ਅੰਕ**
3. ਭਾਗ ਤੀਸਰਾ ਵਿਚੋਂ ਤਿੰਨ ਪ੍ਰਸ਼ਨ ਪੁੱਛੇ ਜਾਣਗੇ। ਜਿਨ੍ਹਾਂ ਦੇ ਪੰਜ-ਪੰਜ ਅੰਕ ਹਨ। 15 **ਅੰਕ**

B.Sc. Agriculture (Hons.)

SOA-101* **Drug Abuse: Problem, Management and Prevention**

Time: 3 Hours **Max. Marks: 50 (NC)**

Theory: 37

Internal Assessment=13

Periods per week 2+0

Instructions for the Paper Setters:

1. Question paper should be set strictly according to the syllabus.
2. The language of questions should be straight & simple.
3. There will be total of nine questions, out of which first question (Comprising of 9 short answer type questions) covering the whole syllabus will be compulsory.
4. Of remaining eight questions, two questions should be asked from each section, out of which the candidates are required to attempt one question from each section. All questions will carry equal marks (7).

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B.Sc. AGRICULTURE (HONS.)

SEMESTER - II

BCT-121: Fundamentals of Plant Biochemistry and Biotechnology

Time: 3 Hours **Max. Marks: 75**

Theory: 37

Practical: 19

Internal Assessment 19

Periods per week 4+3

Instructions for the Paper Setters:

5. Question paper should be set strictly according to the syllabus.
6. The language of questions should be straight & simple.
7. There will be total of nine questions, out of which first question (comprising of 9 short answer type questions) covering the whole syllabus will be compulsory.
8. Of the remaining 8 questions, two questions will be asked from each section (A,B,C,D) and the candidate will attempt 4 questions (one from each section). All questions will carry equal marks (7).

Theory

Section-A: Importance of Biochemistry. Properties of Water, pH and Buffer. Carbohydrate: Importance and classification. Structures of Monosaccharides, Structure of Disaccharides and Polysaccharides. Lipid: Importance and classification. Proteins: Importance of proteins and classification; Structures, zwitterions, nature of amino acids; Structural organization of proteins. Enzymes: General properties; Classification; Mechanism of action.

Section-B: Nucleic acids: Importance and classification; Structure of Nucleotides, A, B & Z DNA; RNA: Types and Secondary & Tertiary structure. Metabolism of carbohydrates: Glycolysis, TCA cycle, Electron transport chain. Metabolism of lipids: Beta oxidation, Biosynthesis of fatty acids.

Section-C: Concepts and applications of plant biotechnology: embryo culture, another culture, pollen culture and ovule culture and their applications; Micro-propagation methods; organogenesis and embryogenesis, Synthetic seeds and their significance; somatic hybridization and cybrids;;

Section-D: Introduction to recombinant DNA methods: physical (Gene gun method), chemical (PEG mediated) and *Agrobacterium* mediated gene transfer methods; PCR techniques and its applications;

Practical

Preparation of solution, pH & buffers, Qualitative tests of carbohydrates, amino acids and proteins. Paper chromatography, Sterilization techniques. Composition of various tissue culture media and preparation of stock solutions for MS nutrient medium. Callus induction from various explants, micropropagation.

FSC-122: Fundamentals of Horticulture

Time: 3 Hours **Max. Marks: 50**

Theory: 25

Practical: 12

Internal Assessment 13

Periods per week 3+3

Instructions for the Paper Setters:

5. Question paper should be set strictly according to the syllabus.
6. The language of questions should be straight & simple.
7. There will be total of nine questions, out of which first question (comprising of 5 short answer type questions of 1 mark each) covering the whole syllabus will be compulsory.
8. Of the remaining 8 questions, two questions will be asked from each section (A,B,C,D) and the candidate will attempt 4 questions (one from each section). All questions will carry equal marks (5).

Theory

Section-A: Horticulture - Its definition and branches, importance and scope; horticultural and botanical classification; principles of orchard establishment; climate and soil for horticultural crops;

Section-B: Plant propagation-methods and propagating structures; Seed dormancy, Seed germination,

Section-C: Principles and methods of training and pruning, juvenility and flower bud differentiation; unfruitfulness; pollination, pollinizers and pollinators; fertilization and parthenocarpy; medicinal and aromatic plants;

Section-D: Importance of plant bio-regulators in horticulture. Irrigation – methods, Fertilizer application in horticultural crops.

Practical

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

SWE-123 Soil and Water Conservation Engineering

Time: 3 Hours **Max. Marks: 50**
Theory: 25
Practical: 12
Internal Assessment 13
Periods per week 3+3

Instructions for the Paper Setters:

1. Question paper should be set strictly according to the syllabus.
2. The language of questions should be straight & simple.
3. There will be total of nine questions, out of which first question (comprising of 5 short answer type questions of 1 mark each) covering the whole syllabus will be compulsory.
4. Of the remaining 8 questions, two questions will be asked from each section (A,B,C,D) and the candidate will attempt 4 questions (one from each section). All questions will carry equal marks (5).

Theory:

Section-A:

1) Soil Erosion Principles.
2) Erosivity and Erodibility
3) Factors affecting water erosion
4) Types of water erosion (Raindrop, sheet, rill and gully erosion)

Section-B:

5) Gully classification
6) Gully control measures

Section-C:

7) Factors affecting wind erosion
8) Wind erosion control measures (wind breaks and shelter belts)

Section-D:

9) Universal Soil loss Equation for water erosion
10) Conservation measure for hill slopes
11) Conservation measures for agricultural lands

Practical:

1) General Status of Soil Conservation in India
2) Calculation of erosion index
3) Estimation of soil loss
4) Design of contour bunds
5) Design of graded bunds
6) Design of bench terracing system
7) Problems on wind erosion

BOT-124 **Fundamentals of Crop Physiology**

Time: 3 Hours **Max. Marks: 50**
Theory: 25
Practical: 12
Internal Assessment 13
Periods per week 3+3

Instructions for the Paper Setters:

1. Question paper should be set strictly according to the syllabus.
2. The language of questions should be straight & simple.
3. There will be total of nine questions, out of which first question (comprising of 5 short answer type questions of 1 mark each) covering the whole syllabus will be compulsory.
4. Of the remaining 8 questions, two questions will be asked from each section (A,B,C,D) and the candidate will attempt 4 questions (one from each section). All questions will carry equal marks (5).

Theory

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

Section-B: Mineral nutrition of Plants: Functions and deficiency symptoms of nutrients, nutrient uptake mechanisms;

Section-A: Photosynthesis: Light and Dark reactions, C3, C4 and CAM plants; Respiration: Glycolysis, TCA cycle and electron transport chain;

Section-D: Plant growth regulators: Physiological roles and agricultural uses, Physiological aspects of growth and development of major crops: Growth analysis, Role of Physiological growth parameters in crop productivity.

Practical

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

B.Sc. AGRICULTURE (HONS.)

AGE-125: Fundamentals of Agricultural Economics

Time: 3 Hours **Max. Marks: 50**

Theory: 37

Internal Assessment 13

Periods per week 4+0

Instructions for the Paper Setters:

1. Question paper should be set strictly according to the syllabus.
2. The language of questions should be straight & simple.
3. There will be total of nine questions, out of which first question (comprising of 9 short answer type questions) covering the whole syllabus will be compulsory.
4. Of the remaining 8 questions, two questions will be asked from each section (A,B,C,D) and the candidate will attempt 4 questions (one from each section). All questions will carry equal marks (7).

Theory:

Section-A: Basic concepts: Goods and services, desire, want, demand, utility, cost and price, wealth, capital, income and welfare. Agricultural economics: meaning, importance role of Agriculture in economic development. Agricultural planning and development in the country. Population: Malthusian theory, Elements of economic planning.

Section-B: *Demand:* meaning, law of demand, schedule and demand curve,determinants, utility theory; law of diminishing marginal utility, equi-marginal utility principle. Consumer's equilibrium and derivation of demand curve, concept of consumer surplus. Elasticityof demand: concept and measurement of price elasticity, income elasticity and cross elasticity.

Section-C: Production: input output relationship. *Laws of returns*: Law of variable proportions and law of returns to scale. *Cost:* concepts, short run andlong run cost curves. Supply: Stock v/s supply, law of 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. Price determination under perfect competition;short run and long run equilibrium of firm and industry,

Section-D: *National income:* Meaning concepts of national income approaches to measurement, difficulties in measurement. Money: Barter system of exchange and its problems, meaning and functions of money, classification of money, Agricultural and public finance: micro v/s macro finance, need for agricultural finance, public revenue and public expenditure. *Tax:* meaning, direct and indirect taxes, agricultural taxation, socialistic and mixed economies,

PPL-126: Fundamentals of Plant Pathology

Time: 3 Hours **Max. Marks: 100**
Theory: 50
Practical: 25
Internal Assessment: 25
Periods per week 6+3

Instructions for the Paper Setters:

5. Question paper should be set strictly according to the syllabus.
6. The language of questions should be straight & simple.
7. There will be total of nine questions, out of which first question (comprising of 10 short answer type questions of 1 mark each) covering the whole syllabus will be compulsory.
8. Of the remaining 8 questions, two questions will be asked from each section (A,B,C,D) and the candidate will attempt 4 questions (one from each section). All questions will carry equal marks (10).

Theory

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

Section-B: Fungi: general characters, definition of fungus, somatic structures, types of fungal thalli, fungal tissues, modifications of thallus, reproduction (asexual and sexual). Nomenclature, Binomial system of nomenclature, rules of nomenclature, classification of fungi. Key to divisions, sub-divisions, orders and classes. Bacteria and mollicutes: general morphological characters. Basic methods of classification and reproduction. Viruses: nature, structure, replication and transmission. Study of phanerogamic plant parasites.

Section-C: Growth and reproduction of plant pathogens. Liberation/dispersal and survival of plant pathogens. Types of parasitism and variability in plant pathogens. Pathogenesis. Role of enzymes, toxins and growth regulators in disease development. Defense mechanism in plants.

Section-D: Epidemiology: Factors affecting disease development. Principles and methods of plant disease management. Nature, chemical combination, classification, mode of action and formulations of fungicides and antibiotics.

Practical:

Acquaintance with various laboratory equipments and microscopy. Collection and preservation of disease specimen. Preparation of media, isolation and Koch's postulates. General study of different structures of fungi. Study of symptoms of various plant diseases. Study of representative fungal genera. Transmission of plant viruses. Study of phanerogamic plant parasites.

Study of fungicides and their formulations. Methods of pesticide application and their safe use. Calculation of fungicide sprays concentrations.

B.Sc. AGRICULTURE (HONS.)

ENT-127 **Fundamentals of Entomology**

Time: 3 Hours **Max. Marks: 100**

Theory: 50

Practical: 25

Internal Assessment: 25

Periods per week: 6+3

Instructions for the Paper Setters:

1. Question paper should be set strictly according to the syllabus.
2. The language of questions should be straight & simple.
3. There will be total of nine questions, out of which first question (comprising of 10 short answer type questions of 1 mark each) covering the whole syllabus will be compulsory.
4. Of the remaining 8 questions, two questions will be asked from each section (A,B,C,D) and the candidate will attempt 4 questions (one from each section). All questions will carry equal marks (10).

Theory

Section-A: History of Entomology in India. Classification of phylum Arthropoda upto classes. Systematics: Taxonomy –importance, history and development and binomial nomenclature. Definitions of Biotype, Sub-species, Species, Genus, Family and Order. Classification of class Insecta upto Orders, Special emphasis to orders and families of Agricultural importance like **Orthoptera**: Acrididae, Tettigonidae, Gryllidae; **Dictyoptera**: Mantidae, Blattidae; **Odonata**; **Isoptera**: Termitidae; **Thysanoptera**: Thripidae; **Hemiptera**: Pentatomidae, Pyrrhocoridae, Lygaeidae, Cicadellidae, Delphacidae, Aphididae, Coccidae; **Neuroptera**: Chrysopidae; **Lepidoptera**: Pieridae, Noctuidae, Pyralidae, Gelechiidae, Arctiidae, Bombycidae; **Coleoptera**: Coccinellidae, Chrysomelidae, Curculionidae, Bruchidae; **Hymenoptera**: Tenthridinidae, Apidae. Trichogrammatidae, lchneumonidae, Braconidae; **Diptera**: Cecidomyiidae, Culicidae,Muscidae, Tephritidae.

Section-B: Morphology: Structure and functions of insect cuticle and molting. Body segmentation. Structure and modifications of insect antennae, mouth parts, legs, Wing modifications and wing coupling apparatus. Structure of male and female genital organ. Metamorphosis and diapause in insects. Types of larvae and pupae. Structure and functions of digestive, circulatory, excretory, respiratory, nervous and reproductive system in insects. Types of reproduction in insects. Major sensory organs like simple and compound eyes, chemoreceptor.

Section-C: Insect Ecology: Introduction, Environment and its components. Effect of abiotic factors– temperature, moisture, humidity, rainfall, light. Effect of biotic factors – food competition, natural and environmental resistance. Major points related to dominance of class Insecta in Animal kingdom. Various categories of pests.

Section-D: Concept of IPM, Practices, scope and limitations of IPM. Classification of insecticides, toxicity of insecticides and formulations of insecticides. Chemical control- importance, hazards and limitations. Recent methods of pest control, repellents, antifeedants, hormones, attractants, gamma radiation. Insecticides Act 1968- Important provisions. Symptoms of poisoning, first aid and antidotes.

Practical:

Methods of collection and preservation of insects including immature stages;

External features of Grasshopper

Types of insect antennae, mouthparts and legs; Wing venation, types of wings and wing coupling apparatus. Types of insect larvae and pupae;

Dissection of digestive system in insects (Grasshopper); Dissection of male and female reproductive systems in insects (Grasshopper);

Study of characters of orders Orthoptera, Dictyoptera, Odonata, Isoptera,Thysanoptera, Hemiptera, Lepidoptera, Neuroptera, Coleoptera, Hymenoptera, Diptera and their families of agricultural importance.

Insecticides and their formulations. Pesticide appliances and their maintenance.

Sampling techniques for estimation of insect population and damage

EXT-128 Fundamentals of Agricultural Extension Education

Time: 3 Hours **Max. Marks: 75**

Theory: 37

Practical: 19

Internal Assessment 19

Periods per week 4+3

Instructions for the Paper Setters:

1. Question paper should be set strictly according to the syllabus.
2. The language of questions should be straight & simple.
3. There will be total of nine questions, out of which first question (comprising of 9 short answer type questions) covering the whole syllabus will be compulsory. This will comprise of 9 marks.
4. Of the remaining 8 questions, two questions will be asked from each section (A,B,C,D) and the candidate will attempt 4 questions (one from each section). All questions will carry equal marks (7).

Theory:

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

Section-B: Extension efforts in pre-independence era (Sriniketan, Marthandam, Firka Development Scheme, Gurgaon Experiment, etc.) and post-independence era (Etawah Pilot Project, Nilokheri Experiment, etc.); various extension/ agriculture development programmes launched by ICAR/Govt. of India (IADP, IAAP, HYVP, KVK, IVLP, ORP, ND, NATP, NAIP etc.), New trends in agriculture extension, cyber extension/e-extension, expert system etc. Rural Development: concept, meaning, definition; Community Dev.-meaning, definition, concept & principles.

Section-C: Philosophy of C.D. Rural Leadership: concept and definition, types of leaders in rural context; extension administration: meaning and concept, principles and functions. Monitoring and evaluation: concept and definition, monitoring and evaluation of extension programmes; transfer of technology: extension teaching methods: meaning, classification, individual, group and mass contact methods.

Section-D: Principles and Functions of Communication, models and barriers to communication. Agriculture journalism; diffusion and adoption of innovation: concept and meaning, process and stages of adoption, adopter categories.

Practical:

To get acquainted with university extension system. Group discussion- exercise; handling and use of audio visual equipments and digital camera and LCD projector; preparation and use of AV aids, preparation of extension literature – leaflet, booklet, folder, pamphlet news stories and success stories; Presentation skills exercise; micro teaching exercise; Role of community radio and television studio for understanding the process of programme production; script writing, writing for print and electronic media, developing script for radio and television.

ENG-129 Communication Skills in English

Time: 3 Hours **Max. Marks: 50**
Theory: 37
Internal Assessment:13
Periods per week :4+0

1. Listening Skills: Barriers to listening; effective listening skills; feedback skills. Attending telephone calls; note taking.

Activities:

a) Listening exercises – Listening to conversation, speech/lecture and taking notes.

2. Speaking and Conversational Skills: Components of a meaningful and easy conversation; understanding the cue and making appropriate responses; forms of polite speech; asking and providing information on general topics. Situation based Conversation in English. Essentials of Spoken English.

Activities:

a) Conversation; dialogue and speech.
b) Oral description or explanation of a common object, situation or concept.
c) Interviews and group discussion.

Suggested Pattern of Question Paper:

The question paper will consist of Seven skill-oriented questions from Listening and Speaking Skills. The first 6 questions carry 5 marks each. The 7th question carries 7 marks. The questions shall be phrased in a manner that students know clearly what is expected of them. There will be internal choice wherever possible.

viii. Making summary/precise or paraphrasing of an idea of a given passage.
ix. Writing a paragraph of expository or argumentative nature of a given topic.
x. Interpretation of a given data, charts, diagrams etc and making a brief report.
xi. Transcoding (given dialogue to a prose or given prose to dialogue)
xii. Draft and Advertisement for a given Product.
xiii. Do as directed change of voice units 42-46 (6x5=30 Marks)
xiv. Retranslation from Vernacular (Punjabi/Hindi) to English (Isolated Sentences) (1x7=7 Marks)

Recommended Books:

4. Oxford Guide to Effective Writing and Speaking by John Seely.
5. The Written Word by Vandana R Singh, Oxford University Press.
Murphy's English Grammer (by Raymond Murphy) CUP.

B.Sc. AGRICULTURE (HONS.)

GPB-1210 **Punjabi (Compulsory)**

Time: 3 Hours **Max. Marks: 50**
Theory: 37
Internal Assessment:13
Periods per Week 4+0

ਪਾਠ-ਕ੍ਰਮ ਅਤੇ ਪਾਠ-ਪੁਸਤਕਾਂ

1. **ਸਾਹਿਤ ਦੇ ਰੰਗ** (ਸੰਪਾ. ਡਾ. ਮਹਿਲ ਸਿੰਘ), ਭਾਗ ਦੂਜਾ (ਵਾਰਤਕ ਅਤੇ ਰੇਖਾ-ਚਿੱਤਰ), ਰਵੀ ਸਾਹਿਤ ਪ੍ਰਕਾਸ਼ਨ, ਅੰਮ੍ਰਿਤਸਰ।
2. **ਸ਼ਬਦ-ਬਣਤਰ ਅਤੇ ਸ਼ਬਦ ਰਚਨਾ** : ਪਰਿਭਾਸ਼ਾ, ਮੁਢਲੇ ਸੰਕਲਪ।
3. **ਸ਼ਬਦ ਸ਼੍ਰੇਣੀਆਂ**
4. **ਪੈਰ੍ਹਾ ਰਚਨਾ**
5. **ਪੈਰ੍ਹਾ ਪੜ੍ਹ ਕੇ ਪ੍ਰਸ਼ਨਾਂ ਦੇ ਉੱਤਰ**
6. **ਮੁਹਾਵਰੇ ਅਤੇ ਅਖਾਣ**

ਅੰਕ-ਵੰਡ ਅਤੇ ਪਰੀਖਿਅਕ ਲਈ ਹਦਾਇਤਾਂ

1. ਕਿਸੇ ਲੇਖ/ਨਿਬੰਧ ਦਾ ਸਾਰ ਜਾਂ ਉਸਦਾ ਵਿਸ਼ਾ ਵਸਤੂ (ਦੋ ਵਿਚੋਂ ਇਕ) **(7 ਅੰਕ)**
2. ਰੇਖਾ ਚਿਤਰ : ਸਾਰ, ਵਿਸ਼ਾ-ਵਸਤੂ, ਸ਼ਖ਼ਸੀਅਤ ਦੇ ਗੁਣ **(7 ਅੰਕ)**
3. ਯੂਨਿਟ 3-4 ਨੰਬਰ ਉੱਤੇ ਦਿੱਤੀ ਵਿਆਕਰਣ ਦੇ ਆਧਾਰ ਤੇ ਵਰਣਨਾਤਮਕ ਪ੍ਰਸ਼ਨ **(7 ਅੰਕ)**
5. ਪੈਰ੍ਹਾ ਰਚਨਾ : ਤਿੰਨ ਵਿਸ਼ਿਆਂ ਵਿਚੋਂ ਕਿਸੇ ਇਕ ਉਤੇ ਪੈਰ੍ਹਾ ਲਿਖਣ ਲਈ ਕਿਹਾ ਜਾਵੇ । **(4 ਅੰਕ)**
6. ਪੈਰ੍ਹਾ ਦੇ ਕੇ ਉਸ ਬਾਰੇ ਚਾਰ ਪ੍ਰਸ਼ਨਾਂ ਦੇ ਉੱਤਰ **(4 ਅੰਕ)**
7. ਨੰਬਰ 7 ਵਿਚ ਅੱਠ ਅਖਾਣ ਅਤੇ ਅੱਠ ਮੁਹਾਵਰੇ ਪੁੱਛੇ ਜਾਣਗੇ, ਜਿਨ੍ਹਾਂ ਵਿਚੋਂ ਵਿਦਿਆਰਥੀ ਨੇ ਚਾਰ-ਚਾਰ ਨੂੰ ਵਾਕਾਂ ਵਿਚ ਵਰਤ ਕੇ ਅਰਥ ਸਪੱਸ਼ਟ ਕਰਨੇ ਹੋਣਗੇ। **(4+4 = 8 ਅੰਕ)**

ਨੋਟ: ਇੰਟਰਨਲ ਅਸੈੱਸਮੈਂਟ 13 ਅੰਕਾਂ ਦੀ ਹੈ, ਜੋ ਕਾਲਜ ਵਲੋਂ ਨਿਰਧਾਰਿਤ ਦਿਸ਼ਾ ਨਿਰਦੇਸ਼ਾ ਅਨੁਸਾਰ ਇਨ੍ਹਾਂ ਅੰਕਾਂ ਤੋਂ ਵੱਖਰੀ ਹੋਵੇਗੀ। ਇਸ ਪੇਪਰ ਦੇ ਕੁਲ ਅੰਕ 37+13=50 ਹਨ।

B.Sc. AGRICULTURE (HONS.)

BPB-1210 **Basic Punjabi**

Time: 3 Hours **Max. Marks: 50**
Theory: 37
Internal Assessment:13
Periods per Week 4+0

ਪਾਠ-ਕ੍ਰਮ ਅਤੇ ਪਾਠ-ਪੁਸਤਕਾਂ

1. **ਪੰਜਾਬੀ ਸ਼ਬਦ ਬਣਤਰ** : ਧਾਤੂ, ਵਧੇਤਰ (ਅਗੇਤਰ, ਮਧੇਤਰ, ਪਿਛੇਤਰ), ਪੰਜਾਬੀ ਕੋਸ਼ਗਤ ਸ਼ਬਦ ਅਤੇ ਵਿਆਕਰਣਿਕ ਸ਼ਬਦ 12 **ਅੰਕ**

2. **ਪੰਜਾਬੀ ਸ਼ਬਦ ਪ੍ਰਕਾਰ** :
   ੳ) ਸੰਯੁਕਤ ਸ਼ਬਦ, ਸਮਾਸੀ ਸ਼ਬਦ, ਦੋਜਾਤੀ ਸ਼ਬਦ, ਦੋਹਰੇ/ਦੁਹਰੁਕਤੀ ਸ਼ਬਦ ਅਤੇ ਮਿਸ਼ਰਤ ਸ਼ਬਦ
   ਅ) ਸਿਖਲਾਈ ਤੇ ਅਭਿਆਸ 10 **ਅੰਕ**

3. **ਪੰਜਾਬੀ ਸ਼ਬਦ ਰਚਨਾ** :

ੳ) ਇਕ-ਵਚਨ ਬਹੁ-ਵਚਨ, ਲਿੰਗ-ਪੁਲਿੰਗ, ਬਹੁਆਰਥਕ ਸ਼ਬਦ, ਸਮਾਨਅਰਥਕ ਸ਼ਬਦ, ਬਹੁਤੇ ਸ਼ਬਦਾਂ ਲਈ ਇਕ ਸ਼ਬਦ, ਸ਼ਬਦ ਜੁੱਟ, ਵਿਰੋਧਆਰਥਕ ਸ਼ਬਦ, ਸਮਨਾਮੀ ਸ਼ਬਦ

ਅ) ਨਿੱਤ ਵਰਤੋਂ ਦੀ ਪੰਜਾਬੀ ਸ਼ਬਦਾਵਲੀ : ਖਾਣ-ਪੀਣ, ਸਾਕਾਦਾਰੀ, ਰੁੱਤਾਂ, ਮਹੀਨਿਆਂ, ਗਿਣਤੀ, ਮੌਸਮ, ਮਾਰਕੀਟ/ਬਾਜ਼ਾਰ, ਵਪਾਰ, ਧੰਦਿਆਂ ਨਾਲ ਸੰਬੰਧਿਤ। 10+5=15 **ਅੰਕ**

ਅੰਕ ਵੰਡ ਅਤੇ ਪਰੀਖਿਅਕ ਲਈ ਹਦਾਇਤਾਂ

1. ਭਾਗ ਪਹਿਲਾਂ ਵਿਚੋਂ ਚਾਰ ਪ੍ਰਸ਼ਨ ਪੁਛੇ ਜਾਣਗੇ ਜਿਨ੍ਹਾਂ ਵਿਚੋਂ ਤਿੰਨ ਪ੍ਰਸ਼ਨਾਂ ਦਾ ਉੱਤਰ ਦੇਣਾ ਲਾਜ਼ਮੀ ਹਨ। ਹਰ ਪ੍ਰਸ਼ਨ ਦੇ ਪੰਜ-ਪੰਜ ਨੰਬਰ ਹਨ । 12 ਅੰਕ

2. ਭਾਗ ਦੂਸਰਾ ਵਿਚੋਂ ਦੋ-ਦੋ ਨੰਬਰ ਦੇ ਪੰਜ ਪ੍ਰਸ਼ਨ ਪੁੱਛੇ ਜਾਣਗੇ। ਸਾਰੇ ਪ੍ਰਸ਼ਨ ਲਾਜ਼ਮੀ ਹਨ। 10 ਅੰਕ

3. ਭਾਗ ਤੀਸਰਾ ਦੇ (ੳ) ਭਾਗ ਵਿਚੋਂ ਦੋ ਸਵਾਲ ਅਤੇ (ਅ) ਭਾਗ ਵਿਚੋਂ ਇਕ ਸਵਾਲ ਪੁਛਿਆ ਜਾਵੇਗਾ। ਹਰ ਪ੍ਰਸ਼ਨ ਦੇ ਪੰਜ-ਪੰਜ ਅੰਕ ਹਨ। 10+5=15 ਅੰਕ

ਨੋਟ: ਇੰਟਰਨਲ ਅਸੈੱਸਮੈਂਟ 13 ਅੰਕਾਂ ਦੀ ਹੈ, ਜੋ ਕਾਲਜ ਵਲੋਂ ਨਿਰਧਾਰਿਤ ਦਿਸ਼ਾ ਨਿਰਦੇਸ਼ਾਂ ਅਨੁਸਾਰ ਇਨ੍ਹਾਂ ਅੰਕਾਂ ਤੋਂ ਵੱਖਰੀ ਹੋਵੇਗੀ। ਇਸ ਪੇਪਰ ਦੇ ਕੁਲ ਅੰਕ 37+13 = 50 ਹਨ।

SOA-101* **Drug Abuse: Problem, Management and Prevention**

Time: 3 Hours **Max. Marks: 50**
Theory: 37
Internal Assessment:13
Periods per week 2+0

Instructions for the Paper Setters:

1. Question paper should be set strictly according to the syllabus.
2. The language of questions should be straight & simple.
3. There will be total of nine questions, out of which first question (comprising of 9 short answer type questions) covering the whole syllabus will be compulsory.
4. Of the remaining 8 questions, two questions will be asked from each section (A,B,C,D) and the candidate will attempt 4 questions (one from each section). All questions will carry equal marks (7).

B.Sc. AGRICULTURE (HONS.)

SEMESTER-III

AGR-211: Crop Production Technology-I (Kharif Crops)

Time: 3 Hours **Max. Marks: 50**
Theory: 25
Practical: 12
Internal assessment 13
Periods per week 3+3

Instructions for the Paper Setters:

1. Question paper should be set strictly according to the syllabus.
2. The language of questions should be straight & simple.
3. There will be total of nine questions, out of which first question (comprising of 5 short answer type questions of 1 mark each) covering the whole syllabus will be compulsory.
4. Of the remaining 8 questions, two questions will be asked from each section (A,B,C,D) and the candidate will attempt 4 questions (one from each section). All questions will carry equal marks (5).

Theory:

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

Section-A: Cereals – rice, maize, sorghum, pearl millet and finger millet,

Section-B: Pulses-pigeonpea, mungbean and urdbean;

Section-C: Oilseeds- groundnut, and soybean; fibre crops- cotton & Jute;

Section-D: Forage crops-sorghum, cowpea, cluster bean and napier.

Practical:

Rice nursery preparation, transplanting of rice, sowing of soybean, pigeonpea and mungbean. maize, groundnut and cotton, effect of seed size on germination and seedling vigour of kharif season crops, effect of sowing depth on germination of kharif crops, identification of weeds in kharif season crops, top dressing and foliar feeding of nutrients, study of yield contributing characters and yield calculation of kharif season crops, study of crop varieties and important agronomic experiments at experimental farm. study of forage experiments, morphological description of kharif season crops, visit to research centres of related crops.

B.Sc. AGRICULTURE (HONS.)

AGE-212 Agricultural Marketing, Trade and Prices

Time: 3 Hours **Max. Marks: 75**
Theory= 37
Practical=19
Internal Assessment :19
Periods per week 4+3

Instructions for the Paper Setters:

1. Question paper should be set strictly according to the syllabus.
2. The language of questions should be straight & simple.
3. There will be total of nine questions, out of which first question (comprising of 9 short answer type questions) covering the whole syllabus will be compulsory. This will comprise of 9 marks.
4. Of the remaining 8 questions, two questions will be asked from each section (A,B,C,D) and the candidate will attempt 4 questions (one from each section). All questions will carry equal marks (7).

Theory:

Section-A: Agricultural Marketing: Concepts and definitions of market, marketing, agricultural marketing, market structure, 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, marketable and marketed surplus, factors affecting marketable surplus of agri-commodities

Section-B: Marketing process-concentration, dispersion and equalization; exchange functions – buying and selling; physical functions – storage, transport and processing; facilitating functions – packaging, branding, grading, quality control and labeling (Agmark); Market functionaries and marketing channels:

Section-C: 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: 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;

Section-D: Role of Govt. in agricultural marketing: Public sector institutions- CWC, SWC, FCI, CACP & DMI – their objectives and functions 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. GATT and WTO; Agreement on Agriculture (AoA) and its implications on Indian agriculture; IPR.

Practical:

Study of relationship between market arrivals and prices of some selected commodities; Computation of marketable and marketed surplus of important commodities; Study of price behaviour over time for some selected commodities; To study various marketing functions performed by different agencies, identification of marketing channels for selected commodity, collection of data regarding marketing costs, margins and price spread and presentation of report in the class.

B.Sc. AGRICULTURE (HONS.)

AGE-213: Agricultural Finance and Co-Operation

Time: 3 Hours **Max. Marks: 75**

Theory: 37
Practical: 19
Internal assessment 19
Periods per week 4+3

Instructions for the Paper Setters:

1. Question paper should be set strictly according to the syllabus.
2. The language of questions should be straight & simple.
3. There will be total of nine questions, out of which first question (comprising of 9 short answer type questions) covering the whole syllabus will be compulsory. This will comprise of 9 marks.
4. Of the remaining 8 questions, two questions will be asked from each section (A,B,C,D) and the candidate will attempt 4 questions (one from each section). All questions will carry equal marks (7).

Theory

Section-A: 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.

Section-B: 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.

Section-C: An introduction to higher financing institutions – RBI, NABARD, ADB, IMF, world bank. Preparation and analysis of financial statements – Balance Sheet and Income Statement.Basic guidelines for preparation of project reports.

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

Practical

Analysis of progress and performance of cooperatives using published data. Analysis of progress and performance of commercial banks and RRBs using published data. Estimation of credit requirement of farm business – A case study.Preparation and analysis of balance sheet – A case study.Preparation and analysis of income statement – A case study.Appraisal of a loan proposal – A case study.

B.Sc. AGRICULTURE (HONS.)

AGI-214 **Agricultural Informatics**

Time: 3 Hours **Max. Marks: 50**

Theory= 25

Practical = 12

Internal Assessment 13

Periods per week 3+3

Instructions for the Paper Setters:

1. Question paper should be set strictly according to the syllabus.
2. The language of questions should be straight & simple.
3. There will be total of nine questions, out of which first question (comprising of 5 short answer type questions of 1 mark each) covering the whole syllabus will be compulsory.
4. Of the remaining 8 questions, two questions will be asked from each section (A,B,C,D) and the candidate will attempt 4 questions (one from each section). All questions will carry equal marks (5).

Theory:

Section-A: 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,

Section-B: Database, concepts and types, uses of DBMS in Agriculture, World Wide Web (WWW): Concepts and components. Introduction to computer programming languages, concepts and standard input/output operations.

Section-C: e-Agriculture, concepts and applications, Use of ICT in Agriculture. Computer Models for understanding plant processes..

Section-D: Decision support systems, concepts, components and applications in Agriculture, Agriculture Expert System, Soil Information Systems etc for supporting Farm decisions. Preparation of contingent crop-planning using IT tools.

Practical

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

B.Sc. AGRICULTURE (HONS.)

AEN-215 **Farm Machinery and Power**

Time: 3 Hours **Max. Marks: 50**

Theory: 25

Practical: 12

Internal assessment 13

Periods per week 3+3

1. Question paper should be set strictly according to the syllabus.
2. The language of questions should be straight & simple.
3. There will be total of nine questions, out of which first question (comprising of 5 short answer type questions of 1 mark each) covering the whole syllabus will be compulsory.
4. Of the remaining 8 questions, two questions will be asked from each section (A,B,C,D) and the candidate will attempt 4 questions (one from each section). All questions will carry equal marks (5).

Theory:-

Section-A: Farm power in India & Sources. IC engine & terminology, Working Principle of 2-stroke & 4-Stroke engine & numerical problem.

Section-B: Different system of tractor, Primary & Secondary implements, Implementation for intercultural operations, Mulcher

Section-C: Familiarization with sowing & planting equipments, Happy Seeder, Seed Drill, Calibration of Seed drill, & paddy transplanter, its mechanism, Direct seedling Rice(DSR) & some numerical problems.

Section-D: Plant protection equipment, Familiarization with Harvesting &Threshing equipment, Cost of operation of tractor & Machinery.

Practical:-

1. Study of different Components of IC engine.
2. Various systems of Tractor:-

- ❖ Clutch
- ❖ Transmission
- ❖ Differential
- ❖ Brake
- ❖ Steering

3. Study of Mould Board plough, different parts, measurement, Plough size, and Horizontal &Vertical Suction.
4. Study of Reversible Mould Board Plough, disc plough & disc harrow.
5. Familiarization with seed cum fertilizer drill, Furrow openers, Seed metering mechanism & calibration.
6. Familiarization with different types of sprayers & dusters.
7. Familiarization with Harvesting and Threshing machinery.
8. Familiarization with planter, transplanter.
9. Familiarization with different Intercultural equipment.

VSC-216: Production Technology for Vegetable and Spices

Time: 3 Hours **Max. Marks: 50**

Theory: 25

Practical: 12

Internal assessment 13

Periods per week 3+3

Instructions for the Paper Setters:

1. Question paper should be set strictly according to the syllabus.
2. The language of questions should be straight & simple.
3. There will be total of nine questions, out of which first question (comprising of 5 short answer type questions of 1 mark each) covering the whole syllabus will be compulsory.
4. Of the remaining 8 questions, two questions will be asked from each section (A,B,C,D) and the candidate will attempt 4 questions (one from each section). All questions will carry equal marks (5).

Theory:

Importance of vegetables & spices in human nutrition and national economy, brief about origin, area, production, improved varieties and cultivation practices such as time of sowing, sowing, transplanting techniques, planting distance, fertilizer requirements, irrigation, weed management, harvesting, storage, physiological disorders, disease and pest control and seed production of important vegetable groups:

Section-A: Solanaceous, Cucurbitaceaeous,

Section-B: Cole, Root crops,

Section-C: Bulb,Tuber,

Section-D: Leafy and salad crops) and Spices.

Practical:

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

B.Sc. AGRICULTURE (HONS.)

LPM-217 Livestock and Poultry Management

Time: 3 Hours **Max. Marks: 100**
Theory: 50
Practical: 25
Internal assessment 25
Periods per week 6+3

Instructions for the Paper Setters:

1. Question paper should be set strictly according to the syllabus.
2. The language of questions should be straight & simple.
3. There will be total of nine questions, out of which first question (comprising of 10 short answer type questions of 1 mark each) covering the whole syllabus will be compulsory.
4. Of the remaining 8 questions, two questions will be asked from each section (A,B,C,D) and the candidate will attempt 4 questions (one from each section). All questions will carry equal marks (10).

Theory:

Section-A: Role of livestock in the national economy. Important Indian and exotic breeds of cattle, buffalo, sheep, goat, swine and poultry. Improvement of farm animals and poultry. Housing principles, space requirements for different species of livestock and poultry.

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

Section C: 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.

Section D: Reproduction in farm animals and poultry. Introduction of livestock and poultry diseases. Prevention (including vaccination schedule) and control of important diseases of livestock and poultry.

Practical's

1. External body parts of cattle, buffalo, sheep, goat, swine and poultry.
2. Handling and restraining of livestock.
3. Identification methods of farm animals and poultry.
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. Formulation of concentrate mixtures.
8. Hatchery operations, incubation and hatching equipments.
9. Management of chicks, growers and layers.
10. Debeaking, dusting and vaccination.
11. Economics of cattle, buffalo, sheep, goat, swine and poultry production.

STA-218: Statistical Methods

Time: 3 Hours **Max. Marks: 50**

Theory:25

Practical: 12

Internal assessment 13

Periods per week 3+3

Instructions for the Paper Setters:

1. Question paper should be set strictly according to the syllabus.
2. The language of questions should be straight & simple.
3. There will be total of nine questions, out of which first question (comprising of 5 short answer type questions of 1 mark each) covering the whole syllabus will be compulsory.
4. Of the remaining 8 questions, two questions will be asked from each section (A,B,C,D) and the candidate will attempt 4 questions (one from each section). All questions will carry equal marks (5).

Theory:

Section-A: Introduction to Statistics and its Applications in Agriculture, Graphical Representation of Data, Measures of Central Tendency

Section-B: Dispersion, Definition of Correlation, Scatter Diagram. Karl Pearson's Coefficient of Correlation. Linear Regression Equations.

Section-C: Introduction to Test of Significance, One sample & two sample test t for Means, Chi-Square Test of Independence of Attributes in 2 ×2 Contingency Table.

Section-D: Introduction to Analysis of Variance, Analysis of One Way Classification. Introduction to Sampling Methods, Sampling versus Complete Enumeration, Simple Random Sampling with and without replacement,

Practical

Graphical Representation of Data. Measures of Central Tendency (Ungrouped data) with Calculation of Quartiles, Deciles & Percentiles. Measures of Central Tendency (Grouped data) with Calculation of Quartiles, Deciles & Percentiles. Measures of Dispersion (Ungrouped Data). Measures of Dispersion (Grouped Data). Moments, Correlation & Regression Analysis. Application of One Sample t-test. Application of Two Sample Fisher's t-test. Chi-Square test of Goodness of Fit. Chi-Square test of Independence of Attributes for 2 ×2 contingency table. Analysis of Variance One Way Classification. Analysis of one way.

B.Sc. AGRICULTURE (HONS.)

DMT-219 **Disaster Management**

Time: 3 Hours **Max. Marks: 50**

Theory: 37

Internal Assessment 13

Periods per week 3+0

Instructions for the Paper Setters:

1. Question paper should be set strictly according to the syllabus.
2. The language of questions should be straight & simple.
3. There will be total of nine questions, out of which first question (comprising of 9 short answer type questions) covering the whole syllabus will be compulsory. This will comprise of 9 marks.
4. Of the remaining 8 questions, two questions will be asked from each section (A,B,C,D) and the candidate will attempt 4 questions (one from each section). All questions will carry equal marks (7).

Theory:

Section-A: Natural Disasters- Meaning and nature of natural disasters, their types and effects. cyclone, avalanches, volcanic eruptions, Heat and cold waves, Man Made Disasters, chemical disasters, biological disasters, building fire, coal fire, forest fire, oil fire

Section-B: Disaster Management- Effect to mitigate natural disaster at national and global levels. International strategy for disaster reduction.

Section-C: Concept of disaster management, national disaster management framework; financial arrangements; role of NGOs, community –based organizations and media.

Section-D: Central, state, district and local administration; Armed forces in disaster response; Disaster response; Police and other organizations.

ESL-222* **ENVIRONMENTAL STUDIES**

Time: 3 Hours **Max. Marks: 100**

Theory: 50
Practical: 25
Internal assessment 25
Periods per week 6+3

Instructions for the Paper Setters:

1. Question paper should be set strictly according to the syllabus.
2. The language of questions should be straight & simple.
3. There will be total of nine questions, out of which first question (comprising of 10 short answer type questions of 1 mark each) covering the whole syllabus will be compulsory.
4. Of the remaining 8 questions, two questions will be asked from each section (A,B,C,D) and the candidate will attempt 4 questions (one from each section). All questions will carry equal marks (10)

Section-A

The multidisciplinary nature of environmental studies:
Definition, scope and its importance
Need for public awareness.

Natural resources:
Natural resources and associated problems:

(a) Forest resources:
Use ofover exploitation, deforestation, case studies, Timber extraction, mining, dams and their effects on forests and tribal people.

(b) Water resources:
Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.

(c) Mineral resources:
Use and exploitation, environmental effects of extracting and using mineral resources, case studies.

(d) Food Resources:
World food problems, change caused by agriculture and overgrazing, effects on modern agriculture, fertilizer-pesticide problem, salinity, case studies.

(e) Energy Resources:
Growing of energy needs, renewable and non-renewable energy resources, use of alternate energy sources, case studies.

(f) Land Resources:
Land as a resource, land degradation, soil erosion and desertification.

- Role of an individual in conservation of natural resources.
- Equitable use of resources for sustainable lifestyles.

Section-B

Ecosystem:

- Concept of an ecosystem.
- Structure and function of an ecosystem.
- Producers, consumers and decomposers.
- Energy flow in the ecosystem.
- Ecological succession.

- Food chains, food webs and ecological pyramids.
- Introduction, types, characteristic features, structure and function of following ecosystem:

a) Forest ecosystem
b) Grassland ecosystem
c) Desert ecosystem
d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Social issues and Environment:

- From unsustainable to sustainable development.
- Urban problems related to energy.
- Water conservation, rain water harvesting, watershed management.
- Resettlement and rehabilitation of people; its problems and concerns. Case studies. Environmental ethics: Issues and possible solutions.
- Climate change, global warning, acid rain, ozone layer depletion, nuclear accidents and holocause. Case studies.
- Wasteland reclamation.
- Consumerism and waste products.
- Environmental Protection Acts:
    - Air (Prevention and control of pollution) Act.
    - Water (Prevention and control of pollution) Act.
    - Wildlife Protection Act
    - Forest conservation Act.
- Issues involved in enforcement of environmental legislation.
- Public awareness.

Section-C

Biodiversity and its Conservation:

- Definition: Genetic, species and ecosystem diversity.
- Biogeographical classification of India.
- Value of Biodiversity: Consumptive use; productive use, social, ethical, aesthetic and option values.
- Biodiversity of global, National and local levels.
- India as mega-diversity nation.
- Hot-spots of biodiversity.
- Threats to Biodiversity: Habitat loss, poaching of wild life, man wildlife conflicts.
- Endangered and endemic species of India.
- Conservation of Biodiversity: In situ and Ex-situ conservation of biodiversity.

6. Environmental Pollution:

Definition, causes, effects and control measures of:

a) Air Pollution
b) Water Pollution
c) Soil Pollution
d) Marine Pollution
e) Noise Pollution
f) Thermal Pollution
g) Nuclear Hazards,
h) Electronic Waste
    - Solid waste management: Causes, effects and control measures of urban and industrial wastes

- Role of an individual in prevention of pollution
- Pollution case studies
- Disaster Management: Floods, Earthquake, Cyclone and Landslides.

Section-D

Human Population and Environment:
Population growth, variation among nations.
Population explosion-Family welfare programme.
Environment and human health.
Human rights.

Value Education:

- HIV/AIDS.
- Women and child welfare.
- Role of information technology in environment and human health. Case studies.
- Road Safety Rules & Regulations.
- Accident & First Aid:
- First Aid to Road Accident Victims, Calling Patrolling Police & Ambulance.
- Visit to a local area to document environmental assets–river/forest/grassland/hill/ mountain. Visit to a local polluted site–Urban/Rural/Industrial/Agricultural.
- Study of common plants, insects, birds. Study of simple ecosystems–pond, river, hill slopes etc.

Practical:

1. Pollution case studies.
2. Case studies- field work: Visit to a local area to document environmental assets river/forest/grasslands/hill/mountain,
3. Visit to a local polluted site- Urban/Rural/Industrial/Agricultural,
4. Study of common plants, insects, birds
5. Study of simple ecosystems-ponds, river, hill slopes, etc.

B.Sc. AGRICULTURE (HONS.)

SEMESTER-IV

AGR-221 Crop Production Technology-II (Rabi crops)

Time: 3 Hours **Max. Marks: 50**

Theory: 25

Practical: 12

Internal assessment =13

Periods per week 3+3

Instructions for the Paper Setters:

1. Question paper should be set strictly according to the syllabus.
2. The language of questions should be straight & simple.
3. There will be total of nine questions, out of which first question (comprising of 5 short answer type questions of 1 mark each) covering the whole syllabus will be compulsory.
4. Of the remaining 8 questions, two questions will be asked from each section (A,B,C,D) and the candidate will attempt 4 questions (one from each section). All questions will carry equal marks (5).

Theory

Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of rabi crops as per section:

Section-A: Cereals –wheat and barley, pulses-chickpea, lentil, peas,

Section-B: Oilseeds-rapeseed, mustard and sunflower;

Section-C: Sugar crops-sugarcane; medicinal and aromatic crops-mentha, lemon grass and citronella,

Section-D: Forage crops-berseem, lucerne and oat.

Practical

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

FSC-222 Production Technology for Ornamental Crops, MAPs and Landscaping

Time: 3 Hours **Max. Marks: 50**
Theory: 25
Practical: 12
Internal assessment 13
Periods per week 3+3

1. Question paper should be set strictly according to the syllabus.
2. The language of questions should be straight & simple.
3. There will be total of nine questions, out of which first question (comprising of 5 short answer type questions of 1 mark each) covering the whole syllabus will be compulsory.
4. Of the remaining 8 questions, two questions will be asked from each section (A,B,C,D) and the candidate will attempt 4 questions (one from each section). All questions will carry equal marks (5).

Theory

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

Section-B: Production technology of important cut flowers like rose, gerbera, carnation, lilium and orchids under protected conditions and gladiolus, tuberose, chrysanthemum under open conditions.

Section-C: Package of practices for loose flowers like marigold and jasmine under open conditions. Production technology of important medicinal plants like ashwagandha, asparagus, aloe, costus, Cinnamomum, periwinkle, isabgol

Section-D: Aromatic plants like mint, lemongrass, citronella, palmarosa, ocimum, rosegeranium, vetiver. Processing and value addition in ornamental crops and MAPs produce.

Practical

Identification of Ornamental plants. Identification of Medicinal and Aromatic Plants. Nursery bed preparation and seed sowing. Training and pruning of Ornamental plants. Planning and 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.

B.Sc. AGRICULTURE (HONS.)

AEN-223 Renewable Energy & Green Technology

Time: 3 Hours **Max. Marks: 50**

Theory: 25

Practical: 12

Internal assessment =13

Periods per week 3+3

1. Question paper should be set strictly according to the syllabus.
2. The language of questions should be straight & simple.
3. There will be total of nine questions, out of which first question (comprising of 5 short answer type questions of 1mark each) covering the whole syllabus will be compulsory.
4. Of the remaining 8 questions, two questions will be asked from each section (A,B,C,D) and the candidate will attempt 4 questions (one from each section). All questions will carry equal marks (5).

Theory:

Section-A: Classification of energy sources and their contribution in Agricultural sector. Briquetts and uses of briquettes.

Section-B: Biomass utilization for bio-fuel production and their application , Biogas, Bio-alcohol, Biodiesel and bio-oil production and their utilization as bio-energy resources,

Section-C: Introduction to solar energy, Collection and their applications, Solar energy Gadgets, Solar cooker, solar water heater,

Section-D: Application of Solar Energy; Solar drying , Solar pond, Solar pump, Solar distillation, Solar photovoltaic system and their application. Introduction to wind energy, types and their application.

Practical:

1. To study biogas plants.
2. To study Gasifiers.
3. To study the production process of bio diesel.
4. To study briquetting machine.
5. To study the production process of bio-fuels.
6. To study soar cooker.
7. To study solar drying system.
8. To study solar distillation.
9. To study the performance of wind mill.

SSC-224 **Problematic Soils and their Management**

Time: 3 Hours **Max. Marks: 50**

Theory: 37

Internal assessment =13

Periods per week 4+0

1. Question paper should be set strictly according to the syllabus.
2. The language of questions should be straight & simple.
3. There will be total of nine questions, out of which first question (comprising of 9 short answer type questions of 1 mark each) covering the whole syllabus will be compulsory.
4. Of the remaining 8 questions, two questions will be asked from each section (A,B,C,D) and the candidate will attempt 4 questions (one from each section). All questions will carry equal marks (7).

Theory:

Section-A: Soil quality and health, Distribution of Waste land and problem soils in India, their Categorization based on properties. Problematic soils under different Agro-ecosystems.

Section-B: Reclamation and management of Saline and sodic soils, Acid soils, Acid Sulphate soils, Eroded and Compacted soils, Flooded soils, Polluted soils. Multipurpose tree species, bio remediation through MPTs of soils.

Section-C: Remote sensing and GIS in diagnosis and management of problem soils. land capability and classification, land suitability classification.

Section-D: Irrigation water – quality and standards, utilization of saline water in agriculture.

FSC-225: Production Technology for Fruit and Plantation Crops

Time: 3 Hours **Max. Marks: 50**

Theory: 25

Practical: 12

Internal assessment =13

Periods per week 3+3

1. Question paper should be set strictly according to the syllabus.
2. The language of questions should be straight & simple.
3. There will be total of nine questions, out of which first question (comprising of 5 short answer type questions of 1 mark each) covering the whole syllabus will be compulsory.
4. Of the remaining 8 questions, two questions will be asked from each section (A,B,C,D) and the candidate will attempt 4 questions (one from each section). All questions will carry equal marks (5).

Theory:

Section-A: Importance and scope of fruit and plantation crop industry in India; High density planting; Use of rootstocks;

Section-B: Production technologies for the cultivation of major fruits-mango, citrus, grape, plum, almond, guava, litchi, papaya, pear, peach

Section-C: Minor fruits- pineapple, pomegranate, jackfruit, strawberry,

Section-D: Cashew, tea, coffee.

Practical:

Seed propagation. Scarification and stratification of seeds. Propagation methods for fruit and plantation crops including Micro-propagation. Description and identification of fruit. Preparation of plant bio regulators and their uses, Identification of Pests, diseases and physiological disorders of above fruit and plantation crops, Visit to commercial orchard.

B.Sc. AGRICULTURE (HONS.)

PBG-226 **Principles of Seed Technology**

Time: 3 Hours **Max. Marks: 50**

Theory: 25

Practical: 12

Internal assessment :13

Periods per week 3+3

1. Question paper should be set strictly according to the syllabus.
2. The language of questions should be straight & simple.
3. There will be total of nine questions, out of which first question (comprising of 5 short answer type questions of 1 mark each) covering the whole syllabus will be compulsory.
4. Of the remaining 8 questions, two questions will be asked from each section (A,B,C,D) and the candidate will attempt 4 questions (one from each section). All questions will carry equal marks (5).

Theory:

Section-A: Seed and seed technology: introduction, definition and importance. Deterioration causes of crop varieties and their control; Maintenance of genetic purity during seed production. Seed quality-Definition, Characters of good quality seed, different classes of seed. Foundation and certified seed production of important cereals, pulses, oilseeds, fodder and vegetables.

Section-B: Seed certification, phases of certification, procedure for seed certification, field inspection. Seed Act and Seed Act enforcement. 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.

Section-C: 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. Measures for pest and disease control during storage.

Section-D: Seed marketing: structure and organization, sales, generation activities, promotional media. Factors affecting seed marketing, Role of WTO and OECD in seed marketing. Private and public sectors and their production and marketing strategies.

Practical:

- Seed production in major cereals: Wheat, Rice, Maize, Sorghum, Bajra and Ragi.
- Seed production in major pulses: Urd, Mung, Pigeonpea, Lentil, Gram, Field bean, pea.
- Seed production in major oilseeds: Soybean, Sunflower, Rapeseed, Groundnut and Mustard.
- Seed production in important vegetable crops: Solanaceous, Cruciferous, Malvaceous, Amaryllidaceous and Cucurbitaceous
- Seed sampling and testing: Physical purity, germination, viability, etc. Seed and seedling vigour test.
- Genetic purity test: Grow out test.
- Seed certification: Procedure, Field inspection and preparation of field inspection report.

AGR- 227 **Farming System and Sustainable Agriculture**

Time: 3 Hours **Max. Marks: 25**

Theory: 18

Internal assessment =07

Periods per week 3+0

1. Question paper should be set strictly according to the syllabus.
2. The language of questions should be straight & simple.
3. There will be total of nine questions, out of which first question (comprising of 4 short answer type questions of 1 mark each) covering the whole syllabus will be compulsory. This will comprise of 4 marks.
4. Of the remaining 8 questions, two questions will be asked from each section (A,B,C,D) and the candidate will attempt 4 questions (one from each section). All questions will carry equal marks (3½).

Theory:

Section-A: 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, Efficient cropping system and their evaluation,

Section-B: 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, conservation agriculture strategies in agriculture, HEIA, LEIA and LEISA and its techniques for sustainability,

Section-C: Integrated farming system-historical background, objectives and characteristics, components of IFS and its advantages, Site specific development of IFS model for different agro-climatic zones,

Section-D: Resource use efficiency and optimization techniques, 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.

PBG- 228: Fundamentals of Plant Breeding

Time: 3 Hours **Max. Marks: 75**

Theory: 37
Practical: 19
Internal assessment 19
Periods per week 4+3

Instructions for the Paper Setters:

1. Question paper should be set strictly according to the syllabus.
2. The language of questions should be straight & simple.
3. There will be total of nine questions, out of which first question (comprising of 9 short answer type questions) covering the whole syllabus will be compulsory. This will comprise of 9 marks.
4. Of the remaining 8 questions, two questions will be asked from each section (A,B,C,D) and the candidate will attempt 4 questions (one from each section). All questions will carry equal marks (7).

Theory:

Section-A: Historical development, concept, nature and role of plant breeding, major achievements and future prospects; modes of reproduction and apomixis, self – incompatibility and male sterility- genetic consequences, cultivar options. Domestication, Acclimatization, introduction; Centres of origin/diversity,

Section-B: Genetics in relation to plant breeding, 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. Concepts of population genetics and Hardy-Weinberg Law, Genetic basis and methods of breeding cross pollinated crops, modes of selection;

Section-C: Heterosis and inbreeding depression, development of inbred lines and hybrids, composite and synthetic varieties; Breeding methods in asexually propagated crops, clonal selection and hybridization; Wide hybridization and pre-breeding;

Section-D: Polyploidy in relation to plant breeding, mutation breeding-methods and uses; Biotechnological tools-DNA markers and marker assisted selection. Participatory plant breeding; Intellectual Property Rights, Patenting, Plant Breeders and Farmer's Rights.

Practical

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

AGM-229: Introductory Agro-meteorology & Climate Change

Time: 3 Hours **Max. Marks: 50**

Theory: 25

Practical: 12

Internal Assessment 13

Periods per week 3+3

1. Question paper should be set strictly according to the syllabus.
2. The language of questions should be straight & simple.
3. There will be total of nine questions, out of which first question (comprising of 5 short answer type questions of 1 mark each) covering the whole syllabus will be compulsory.
4. Of the remaining 8 questions, two questions will be asked from each section (A,B,C,D) and the candidate will attempt 4 questions (one from each section). All questions will carry equal marks (5).

Theory: Meaning and scope of agricultural meteorology.

Section-A: 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; Nature and properties of solar radiation, solar constant, depletion of solar radiation, short wave, longwave and thermal radiation, net radiation, albedo;

Section-B: Atmospheric temperature, temperature inversion, lapse rate, daily and seasonal variations of temperature, vertical profile of temperature, Energy balance of earth; Atmospheric humidity, concept of saturation, vapor pressure, process of condensation, formation of dew, fog, mist, frost, cloud; Precipitation, process of precipitation, types of precipitation such as rain, snow, sleet, and hail,

Section-C: Cloud formation and classification; 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.

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

Practical:

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

B.Sc. AGRICULTURE (HONS.)

ACH-2210 **Agrochemicals**

Time: 3 Hours **Max. Marks: 75**

Theory: 37

Practical: 19

Internal assessment 19

Periods per week 4+3

Instructions for the paper setters:

1. Question paper should be set strictly according to the syllabus.
2. The language of questions should be straight & simple.
3. There will be total of nine questions, out of which first question (comprising of 9 short answer type questions) covering the whole syllabus will be compulsory.
4. Of the remaining 8 questions, two questions will be asked from each section (A,B,C,D) and the candidate will attempt 4 questions (one from each section). All questions will carry equal marks (7).

Theory:

Section – A An introduction to agrochemicals, their type and role in agriculture, effect on environment, soil, human and animal health, merits and demerits of their uses in agriculture, management of agrochemicals for sustainable agriculture. Herbicides-Major classes, properties and important herbicides. Fate of herbicides. Fungicides - Classification – Inorganic fungicides - characteristics, preparation and use of sulfur and copper, Mode of action-Bordeaux mixture and copper oxychloride. Organic fungicides-Mode of action- Dithiocarbamates-characteristics, preparation and use of Zineb and maneb. Systemic fungicides- Benomyl, carboxin, oxycarboxin, Metalaxyl, Carbendazim, characteristics and use.

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

Section – C Fertilizers and their importance. Nitrogenous fertilizers: Feed stocks 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.

Section – D Mixed and complex fertilizers: Sources and compatibility–preparation of major, secondary and micronutrient mixtures. Complex fertilizers: Manufacturing of ammonium phosphates, nitrophosphates and NPK complexes. Fertilizer control order. Fertilizer logistics and marketing. Plant bio-pesticides for ecological agriculture, Bio-insect repellent.

Practical:

Sampling of fertilizers and pesticides. Pesticides application technology to study about various pesticides appliances. Quick tests for identification of common fertilizers. Identification of anion and cation in fertilizer. Calculation of doses of insecticides to be used. To study and identify various formulations of insecticide available kin market. Estimation of nitrogen in Urea. Estimation of water soluble P2O5 and citrate soluble P2O5 in single super phosphate. Estimation of potassium in Muraite of Potash/ Sulphate of Potash by flame photometer. Determination of copper content in copper oxychloride. Determination of sulphur content in sulphur fungicide. Determination of thiram. Determination of ziram content.

B.Sc. AGRICULTURE (HONS.)

WMG-2210 Weed Management

Time: 3 Hours **Max. Marks: 75**

Theory: 37

Practical: 19

Internal assessment 19

Periods per week 4+3

Instructions for the paper setters:

1. Question paper should be set strictly according to the syllabus.
2. The language of questions should be straight & simple.
3. There will be total of nine questions, out of which first question (comprising of 9 short answer type questions) covering the whole syllabus will be compulsory.
4. Of the remaining 8 questions, two questions will be asked from each section (A,B,C,D) and the candidate will attempt 4 questions (one from each section). All questions will carry equal marks (7).

Theory:

Section-A Introduction to weeds, characteristics of weeds their harmful and beneficial effects on ecosystem. Classification, reproduction and dissemination of weeds.

Section-B Herbicide classification, concept of adjuvant, surfactant, herbicide formulation and their use. Introduction to mode of action of herbicides and selectivity.

Section-C Allelopathy and its application for weed management. Bio-herbicides and their application in agriculture. Concept of herbicide mixture and utility in agriculture. Herbicide compatibility with agro-chemicals and their application.

Section-D Integration of herbicides with non chemical methods of weed management. Herbicide Resistance and its management.

Practical:

Techniques of weed preservation. Weed identification and their losses study. Biology of important weeds. Study of herbicide formulations and mixture of herbicide. Herbicide and agrochemicals study. Shift of weed flora study in long term experiments. Study of methods of herbicide application, spraying equipments. Calculations of herbicide doses and weed control efficiency and weed index.

BPF-2210 Biopesticides & Biofertilizers

Time: 3 Hours **Max. Marks: 75**

Theory: 37

Practical: 19

Internal assessment 19

Periods per week 4+3

1. Question paper should be set strictly according to the syllabus.
2. The language of questions should be straight & simple.
3. There will be total of nine questions, out of which first question (comprising of 9 short answer type questions) covering the whole syllabus will be compulsory.
4. Of the remaining 8 questions, two questions will be asked from each section (A,B,C,D) and the candidate will attempt 4 questions (one from each section). All questions will carry equal marks (7).

Theory:

Section- A History and concept of biopesticides. Importance, scope and potential of biopesticide. Definitions, concepts and classification of biopesticides viz. pathogen, botanical pesticides, and biorationales. Botanicals and their uses.

Section - B 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.

Section – C Biofertilizers – Introduction, status and scope. Structure and characteristic features of bacterial biofertilizers- *Azospirillum, Azotobacter, Bacillus, Pseudomonas, Rhizobium* and *Frankia*; Cynobacterial biofertilizers- *Anabaena*, *Nostoc*, Hapalosiphon and fungal biofertilizers- VAM mycorrhiza and ectomycorrhiza. Nitrogen fixation –Free living and symbiotic nitrogen fixation. Mechanism of phosphate solubilization and phosphate mobilization, K solubilization.

Section- D Production technology: Strain selection, sterilization, growth and fermentation, mass production of carrier based and liquid biofertiizers. 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.

Practical:

Isolation and purification of important biopesticides: *Trichoderma Pseudomonas, Bacillus, Metarhyzium* etc. and its production. Identification of important botanicals. Visit to biopesticide laboratory in nearby area. Field visit to explore naturally infected cadavers. Identification of entomopathogenic entities in field condition. Quality control of biopesticides. Isolation and purification of *Azospirillum , Azotobacter, Rhizobium*, P-solubilizers and cyanobacteria. Mass multiplication and inoculums production of biofertilizers. Isolation of VAM fungi –Wet sieving method and sucrose gradient method. Mass production of VAM inoculants.

SSA-2210 System Simulation and Agroadvisory

Time: 3 Hours **Max. Marks: 75**
Theory: 37
Practical: 19
Internal assessment 19
Periods per week 4+3

1. Question paper should be set strictly according to the syllabus.
2. The language of questions should be straight & simple.
3. There will be total of nine questions, out of which first question (comprising of 9 short answer type questions) covering the whole syllabus will be compulsory.
4. Of the remaining 8 questions, two questions will be asked from each section (A,B,C,D) and the candidate will attempt 4 questions (one from each section). All questions will carry equal marks (7).

Theory:

Section-A System Approach for representing soil-plant-atmospheric continuum, system boundaries, Crop models, concepts & techniques, types of crop models, data requirements, relational diagrams.

Section-B 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.

Section-C Crop production in moisture and nutrients limited conditions; components of soil water and nutrients balance. Weather forecasting, types, methods, tools & techniques, forecast verification; Value added weather forecast, ITK for weather forecast and its validity.

Section-D Crop-Weather Calendars; Preparation of agro-advisory bulletin based on weather forecast. Use of crop simulation model for preparation of Agro-advisory and its effective dissemination.

Practical:

Preparation of crop weather calendars. Preparation of agro-advisories based on weather forecast using various approaches and synoptic charts. Working with statistical and simulation models for crop growth. Potential & achievable production; yield forecasting, insect & disease forecasting models. Simulation with limitations of water and nutrient management options. Sensitivity analysis of varying weather and crop management practices. Use of statistical approaches in data analysis and preparation of historical, past and present meteorological data for medium range weather forecast. Feedback from farmers about the agroadvisory.

SEMESTER - V

AGR-311 Practical Crop Production-I *(Kharif Crops)*

Time: 3 Hours **Max. Marks: 50**
Practical: 40
Internal assessment 10
Periods per week 0+4

Instructions for the paper setters:

1. Question paper should be set strictly according to the syllabus.
2. The language of questions should be straight & simple.
3. Not more than one question should be based on one topic.
4. The question paper should cover the whole syllabus and questions should be evenly distributed.
5. At least eight questions should be set, out of which the candidates should be required to attempt any five.

Practical

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

PPL-312 Principles of Integrated Pest and Disease Management

Time: 3 Hours **Max. Marks: 75**

Theory: 40

Practical: 20

Internal assessment 15

Periods per week 4+3

Instructions for the paper setters:

1. Question paper should be set strictly according to the syllabus.
2. The language of questions should be straight & simple.
3. Not more than one question should be based on one topic.
4. The question paper should cover the whole syllabus and questions should be evenly distributed.
5. At least eight questions should be set, out of which the candidates should be required to attempt any five.

Theory

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. 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. 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. Development and validation of IPM module. Implementation and impact of IPM (IPM module for Insect pest and disease. Safety issues in pesticide uses. Political, social and legal implication of IPM.

Practical

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

SSC-313 Manures, Fertilizers and Soil Fertility Management

Time: 3 Hours **Max. Marks: 75**

Theory: 40

Practical: 20

Internal assessment 15

Periods per week 4+3

Instructions for the paper setters:

1. Question paper should be set strictly according to the syllabus.
2. The language of questions should be straight & simple.
3. Not more than one question should be based on one topic.
4. The question paper should cover the whole syllabus and questions should be evenly distributed.
5. At least eight questions should be set, out of which the candidates should be required to attempt any five.

Theory

Introduction and importance of organic manures, properties and methods of preparation of bulky and concentrated manures. Green/leaf manuring. Fertilizer recommendation approaches. Integrated nutrient management. Chemical fertilizers: classification, composition and properties of major nitrogenous, phosphatic, potassic fertilizers, secondary & micronutrient fertilizers, Complex fertilizers, nano fertilizers Soil amendments, Fertilizer Storage, Fertilizer Control Order. History of soil fertility and plant nutrition. criteria of essentiality. Role, deficiency and toxicity symptoms of essential plant nutrients, Mechanisms of nutrient transport to plants, factors affecting nutrient availability to plants. Chemistry of soil nitrogen, phosphorus, potassium, calcium, magnesium, sulphur and micronutrients. Soil fertility evaluation, Soil testing. Critical levels of different nutrients in soil. Forms of nutrients in soil, plant analysis, rapid plant tissue tests. Indicator plants. Methods of fertilizer recommendations to crops. Factor influencing nutrient use efficiency (NUE), methods of application under rainfed and irrigated conditions.

Practical

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

ENT-314 Pests of Crops and Stored Grains and their Management

Time: 3 Hours **Max. Marks: 75**

Theory: 40

Practical: 20

Internal assessment 15

Periods per week 4+3

Instructions for the paper setters:

1. Question paper should be set strictly according to the syllabus.
2. The language of questions should be straight & simple.
3. Not more than one question should be based on one topic.
4. The question paper should cover the whole syllabus and questions should be evenly distributed.
5. At least eight questions should be set, out of which the candidates should be required to attempt any five.

Theory

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 crop, fruit crop, plantation crops, ornamental crops, spices and condiments. 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. Storage structure and methods of grain storage and fundamental principles of grain store management.

Practical

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

PPL-315 Diseases of Field & Horticultural Crops & their Management-I

Time: 3 Hours **Max. Marks: 75**
Theory: 40
Practical: 20
Internal assessment 15
Periods per week 4+3

Instructions for the paper setters:

1. Question paper should be set strictly according to the syllabus.
2. The language of questions should be straight & simple.
3. Not more than one question should be based on one topic.
4. The question paper should cover the whole syllabus and questions should be evenly distributed.
5. At least eight questions should be set, out of which the candidates should be required to attempt any five.

Theory

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

Field Crops: Rice: blast, brown spot, bacterial blight, sheath blight, false smut, khaira 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 **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; **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; **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; **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

Practical

Identification and histopathological studies of selected diseases of field and horticultural crops covered in theory. Collection and preservation of plant diseased specimens for Herbarium;

Note: Students should submit 50 pressed and well-mounted specimens/ photographs giving systematic position and brief description of symptoms.

B.Sc. AGRICULTURE (HONS.)

PBG-316 Crop Improvement – I (*Kharif*)

Time: 3 Hours **Max. Marks: 75**
Theory: 40
Practical: 20
Internal assessment 15
Periods per week 3+3

Instructions for the paper setters:

1. Question paper should be set strictly according to the syllabus.
2. The language of questions should be straight & simple.
3. Not more than one question should be based on one topic.
4. The question paper should cover the whole syllabus and questions should be evenly distributed.
5. At least eight questions should be set, out of which the candidates should be required to attempt any five.

Theory

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

Practical

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

AGE-317 Entrepreneurship Development and Business Communication

Time: 3 Hours **Max. Marks: 75**

Theory: 40

Practical: 20

Internal assessment 15

Periods per week 3+3

Instructions for the paper setters:

1. Question paper should be set strictly according to the syllabus.
2. The language of questions should be straight & simple.
3. Not more than one question should be based on one topic.
4. The question paper should cover the whole syllabus and questions should be evenly distributed.
5. At least eight questions should be set, out of which the candidates should be required to attempt any five.

Theory

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

Practical

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

AGR-318 Geoinformatics, Nano-technology and Precision Farming

Time: 3 Hours **Max. Marks: 75**
Theory: 40
Practical: 20
Internal assessment 15
Periods per week 3+3

Instructions for the paper setters:

1. Question paper should be set strictly according to the syllabus.
2. The language of questions should be straight & simple.
3. Not more than one question should be based on one topic.
4. The question paper should cover the whole syllabus and questions should be evenly distributed.
5. At least eight questions should be set, out of which the candidates should be required to attempt any five.

Theory

Precision agriculture: concepts and techniques; their issues and concerns for Indian agriculture; Geo-informatics- definition, concepts, tool and techniques; their use in Precision Agriculture. Crop discrimination and Yield monitoring, soil mapping; fertilizer recommendation using geospatial technologies; Spatial data and their management in GIS; Remote sensing concepts and application in agriculture; Image processing and interpretation; Global positioning system (GPS), components and its functions; Introduction to crop Simulation Models and their uses for optimization of Agricultural Inputs; STCR approach for precision agriculture; Nanotechnology, definition, concepts and techniques, brief introduction about nanoscale effects, nano-particles, nano-pesticides, nano-fertilizers, nano-sensors, Use of nanotechnology in seed, water, fertilizer, plant protection for scaling-up farm productivity.

Practical

Introduction to GIS software, spatial data creation and editing. Introduction to image processing software. Visual and digital interpretation of remote sensing images. Generation of spectral profiles of different objects. Supervised and unsupervised classification and acreage estimation. Multispectral remote sensing for soil mapping. Creation of thematic layers of soil fertility based on GIS. Creation of productivity and management zones. Fertilizers recommendations based of VRT and STCR techniques. Crop stress (biotic/abiotic) monitoring using geospatial technology. Use of GPS for agricultural survey. Formulation, characterization and applications of nanoparticles in agriculture. Projects formulation and execution related to precision farming.

IPR-319 **Intellectual Property Rights**

Time: 3 Hours **Max. Marks: 50**

Theory: 40

Internal assessment 10

Periods per week 3+0

Instructions for the paper setters:

1. Question paper should be set strictly according to the syllabus.
2. The language of questions should be straight & simple.
3. Not more than one question should be based on one topic.
4. The question paper should cover the whole syllabus and questions should be evenly distributed.
5. At least eight questions should be set, out of which the candidates should be required to attempt any five.

Theory

Introduction and meaning of intellectual property, brief introduction to GATT, WTO, TRIPs and WIPO, Treaties for IPR protection: Madrid protocol, Berne Convention, Budapest treaty, etc. Types of Intellectual Property and legislations covering IPR in India:-Patents, Copyrights, Trademark, Industrial design, Geographical indications, Integrated circuits, Trade secrets Patents Act 1970 and Patent system in India, patentability, process and product patent, filing of patent, patent specification, patent claims, Patent opposition and revocation, infringement, Compulsory licensing, Patent Cooperation Treaty, Patent search and patent database. Origin and history including a brief introduction to UPOV for protection of plant varieties, Protection of plant varieties under UPOV and PPV&FR Act of India, Plant breeders rights, Registration of plant varieties under PPV&FR Act 2001, breeders, researcher and farmers rights. Traditional knowledge-meaning and rights of TK holders. Convention on Biological Diversity, International treaty on plant genetic resources for food and agriculture (ITPGRFA). Indian Biological Diversity Act, 2002 and its salient features, access and benefit sharing.

B.Sc. AGRICULTURE (HONS.)

PCV-3110 **Protected Cultivation**

Time: 3 Hours **Max. Marks: 75**

Theory: 40

Practical: 20

Internal assessment 15

Periods per week 4+3

Instructions for the paper setters:

1. Question paper should be set strictly according to the syllabus.
2. The language of questions should be straight & simple.
3. Not more than one question should be based on one topic.
4. The question paper should cover the whole syllabus and questions should be evenly distributed.
5. At least eight questions should be set, out of which the candidates should be required to attempt any five.

Theory:

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. Greenhouse design, environment control, artificial lights, Automation. Soil preparation and management, Substrate management. Types of benches and containers. Irrigation and fertigation management. Propagation and production of quality planting material of horticultural crops. Greenhouse cultivation of important horticultural crops – rose, carnation, chrysanthemum, gerbera, orchid, anthurium, lilium, tulip, tomato, bell pepper, cucumber, strawberry, pot plants, etc. Cultivation of economically important medicinal and aromatic plants. Off-season production of flowers and vegetables. Insect pest and disease management.

Practical:

Raising of seedlings and saplings under protected conditions, use of portrays in quality planting material production, Bed preparation and planting of crop for production, Inter cultural operations, Soil EC and pH measurement, Regulation of irrigation and fertilizers through drip, fogging ad misting.

MPT-3110 Micro Propagation Technique

Time: 3 Hours **Max. Marks: 75**

Theory: 40
Practical: 20
Internal assessment 15
Periods per week 4+3

5. Question paper should be set strictly according to the syllabus.
6. The language of questions should be straight & simple.
7. There will be total of nine questions, out of which first question (comprising of 5 short answer type questions) covering the whole syllabus will be compulsory.
8. Of the remaining 8 questions, two questions will be asked from each section (A,B,C,D) and the candidate will attempt 4 questions (one from each section). All questions will carry equal marks (5).

Theory:

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

Practical:

Identification and use of equipments in tissue culture Laboratory, Nutrition media composition, sterilization techniques for media, containers and small instruments, sterilization techniques for explants, Preparation of stocks and working solution, Preparation of working medium, Culturingof explants: Seeds, shoot tip and single node, Callus induction, Induction of somatic embryos regeneration of whole plants from different explants, Hardening procedures.

B.Sc. AGRICULTURE (HONS.)

LSP-3110 **Landscaping**

Time: 3 Hours **Max. Marks: 75**

Theory: 40

Practical: 20

Internal assessment 15

Periods per week 4+3

Instructions for the paper setters:

1. Question paper should be set strictly according to the syllabus.
2. The language of questions should be straight & simple.
3. Not more than one question should be based on one topic.
4. The question paper should cover the whole syllabus and questions should be evenly distributed.
5. At least eight questions should be set, out of which the candidates should be required to attempt any five.

Theory:

Importance and scope of landscaping. Principles of landscaping, garden styles and types, terrace gardening, vertical gardening, garden components, adornments, lawn making, rockery, water garden, walk-paths, bridges, other constructed features etc. gardens for special purposes. Trees: selection, propagation, planting schemes, canopy management, shrubs and herbaceous perennials: selection, propagation, planting schemes, architecture. Climber and creepers: importance, selection, propagation, planting, Annuals: selection, propagation, planting scheme, Other garden plants: palms, ferns, grasses and cacti succulents. Pot plants: selection, arrangement, management. Bio-aesthetic planning: definition, need, planning; landscaping of urban and rural areas, Peri-urban landscaping, Landscaping of schools, public places like bus station, railway station, townships, river banks, hospitals, play grounds, airports, industries, institutions. Bonsai: principles and management, lawn: establishment and maintenance. CAD application.

Practical:

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

HTH-3110 **Hi-tech. Horticulture**

Time: 3 Hours **Max. Marks: 75**

Theory: 40
Practical: 20
Internal assessment 15
Periods per week 4+3

1. Question paper should be set strictly according to the syllabus.
2. The language of questions should be straight & simple.
3. There will be total of nine questions, out of which first question (comprising of 5 short answer type questions) covering the whole syllabus will be compulsory.
4. Of the remaining 8 questions, two questions will be asked from each section (A,B,C,D) and the candidate will attempt 4 questions (one from each section). All questions will carry equal marks (5).

Theory

Introduction & importance; Nursery management and mechanization; micro propagation of horticultural crops; Modern field preparation and planting methods, Protected cultivation: advantages, controlled conditions, method and techniques, Micro irrigation systems and its components; EC, pH based fertilizer scheduling, canopy management, high density orcharding, Components of precision farming: Remote sensing, Geographical Information System (GIS), Differential Geo positioning System (DGPS), Variable Rate applicator (VRA), application of precision farming in horticultural crops (fruits, vegetables and ornamental crops); mechanized

harvesting of produce.

Practical

Types of polyhouses and shade net houses, Intercultural operations, tools and equipments identification and application, Micro propagation, Nursery-protrays, micro-irrigation, EC, pH based fertilizer scheduling, canopy management, visit to hi-tech orchard/nursery.

SEMESTER – VI

AGR-321 Practical Crop Production-II *(Rabi Crops)*

Time: 3 Hours **Max. Marks: 50**
Practical: 40
Internal assessment 10
Periods per week 0+4

Instructions for the paper setters:

1. Question paper should be set strictly according to the syllabus.
2. The language of questions should be straight & simple.
3. Not more than one question should be based on one topic.
4. The question paper should cover the whole syllabus and questions should be evenly distributed.
5. At least eight questions should be set, out of which the candidates should be required to attempt any five.

Practical

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

AGR-322 Rainfed Agriculture and Watershed Management

Time: 3 Hours **Max. Marks: 75**
Theory: 40
Practical: 20
Internal assessment 15
Periods per week 3+3

Instructions for the paper setters:

1. Question paper should be set strictly according to the syllabus.
2. The language of questions should be straight & simple.
3. Not more than one question should be based on one topic.
4. The question paper should cover the whole syllabus and questions should be evenly distributed.
5. At least eight questions should be set, out of which the candidates should be required to attempt any five.

Theory

Rainfed agriculture: Introduction, types, History of rainfed agriculture and watershed in India; Problems and prospects of rainfed agriculture in India ; 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; Water harvesting: importance, its techniques, Efficient utilization of water through soil and crop management practices,Management of crops in rainfed areas, Contingent crop planning for aberrant weather conditions, Concept, objective, principles and components of watershed management, factors affecting watershed management.

Practical

Studies on climate classification, studies on rainfall pattern in rainfed areas of the country and pattern of onset and withdrawal of monsoons. Studies on cropping pattern of different rainfed areas in the country and demarcation of rainfed area on map of India. Interpretation of meteorological data and scheduling of supplemental irrigation on the basis of evapo-transpiration demand of crops. Critical analysis of rainfall and possible drought period in the country, effective rainfall and its calculation. Studies on cultural practices for mitigating moisture stress. Characterization and delineation of model watershed. Field demonstration on soil & moisture conservation measures. Field demonstration on construction of water harvesting structures. Visit to rainfed research station/watershed

AEN-323 Protected Cultivation and Secondary Agriculture

Time: 3 Hours **Max. Marks: 75**

Theory: 40

Practical: 20

Internal assessment 15

Periods per week 3+3

Instructions for the paper setters:

1. Question paper should be set strictly according to the syllabus.
2. The language of questions should be straight & simple.
3. Not more than one question should be based on one topic.
4. The question paper should cover the whole syllabus and questions should be evenly distributed.
5. At least eight questions should be set, out of which the candidates should be required to attempt any five.

Theory

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

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

Practical

Study of different type of green houses based on shape. Determine the rate of air exchange in an active summer winter cooling system. Determination of drying rate of agricultural products inside green house. Study of green house equipments. Determination of Moisture content of various grains by oven drying & infrared moisture methods. Determination of engineering properties (shape and size, bulk density and porosity of biomaterials). Determination of Moisture content of various grains by moisture meter. Field visit to seed processing plant.

PPL-324 Diseases of Field & Horticultural Crops & their Management-II

Time: 3 Hours **Max. Marks: 75**

Theory: 40

Practical: 20

Internal assessment 15

Periods per week 4+3

Instructions for the paper setters:

1. Question paper should be set strictly according to the syllabus.
2. The language of questions should be straight & simple.
3. Not more than one question should be based on one topic.
4. The question paper should cover the whole syllabus and questions should be evenly distributed.
5. At least eight questions should be set, out of which the candidates should be required to attempt any five.

Theory

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

Field Crops: **Wheat:** rusts, loose smut, karnal bunt, powdery mildew, alternaria blight, and ear cockle; **Sugarcane:** red rot, smut, wilt, grassy shoot, ratoon stunting and Pokkah Boeng; **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.

Horticultural Crops: 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; **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.

Practical

Identification and histopathological studies of selected diseases of field and horticultural crops covered in theory. Field visit for the diagnosis of field problems.

Note: Collection and preservation of plant diseased specimens for herbarium/photographs with systematic position and brief description of symptoms.

FSC-325 Post-harvest Management and Value Addition of Fruits and Vegetables

Time: 3 Hours **Max. Marks: 75**
Theory: 40
Practical: 20
Internal assessment 15
Periods per week 3+3

Instructions for the paper setters:

1. Question paper should be set strictly according to the syllabus.
2. The language of questions should be straight & simple.
3. Not more than one question should be based on one topic.
4. The question paper should cover the whole syllabus and questions should be evenly distributed.
5. At least eight questions should be set, out of which the candidates should be required to attempt any five.

Theory

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

Practical

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

ENT-326 **Management of Beneficial Insects**

Time: 3 Hours **Max. Marks: 75**

Theory: 40

Practical: 20

Internal assessment 15

Periods per week 3+3

Instructions for the paper setters:

1. Question paper should be set strictly according to the syllabus.
2. The language of questions should be straight & simple.
3. Not more than one question should be based on one topic.
4. The question paper should cover the whole syllabus and questions should be evenly distributed.
5. At least eight questions should be set, out of which the candidates should be required to attempt any five.

Theory

Importance of beneficial Insects, Beekeeping and pollinators, bee biology, commercial methods of rearing, equipment used, seasonal management, bee enemies and disease. Bee pasturage, bee foraging and communication. Insect pests and diseases of honey bee. Role of pollinators in cross pollinated plants. Types of silkworm, voltinism and biology of silkworm. Mulberry cultivation, mulberry varieties and methods of harvesting and preservation of leaves. Rearing, mounting and harvesting of cocoons. Pest and diseases of silkworm, management, rearing appliances of mulberry silkworm and methods of disinfection. 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.
Insect orders bearing predators and parasitoids used in pest control and their mass multiplication techniques. Important species of pollinator, weed killers and scavengers with their importance.

Practical

Honey bee species, castes of bees. Beekeeping appliances and seasonal management, bee enemies and disease. Bee pasturage, bee foraging and communication. Types of silkworm, 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.

PBG-327 **Crop Improvement – II (*Rabi*)**

Time: 3 Hours **Max. Marks: 75**

Theory: 40

Practical: 20

Internal assessment 15

Periods per week 3+3

Instructions for the paper setters:

1. Question paper should be set strictly according to the syllabus.
2. The language of questions should be straight & simple.
3. Not more than one question should be based on one topic.
4. The question paper should cover the whole syllabus and questions should be evenly distributed.
5. At least eight questions should be set, out of which the candidates should be required to attempt any five.

Theory

Centers of origin, distribution of species, wild relatives in different cereals; pulses; oilseeds; fodder crops and cash crops; vegetable and horticultural crops; Plant genetic resources, its utilization and conservation; study of genetics of qualitative and quantitative characters; Major breeding objectives and procedures including conventional and modern innovative approaches for development of hybrids and varieties for yield, adaptability, stability, abiotic and biotic stress tolerance and quality (physical, chemical, nutritional); Hybrid seed production technology of *rabi* crops. Ideotype concept and climate resilient crop varieties for future.

Practical

Floral biology, emasculation and hybridization techniques in different crop species, namely, Wheat, Oat, Barley, Chickpea, Lentil, Field pea, Rajma, Horse gram, Rapeseed Mustard, Sunflower, Safflower, Potato, Berseem. Sugarcane, Tomato, Chilli, Onion; Handling of germplasm and segregating populations by different methods like pedigree, bulk and single seed descent methods; Study of field techniques for seed production and hybrid seeds production in *Rabi* crops; Estimation of heterosis, inbreeding depression and heritability; Layout of field experiments; Study of quality characters, study of donor parents for different characters;

AGR-328 Principles of Organic Farming

Time: 3 Hours **Max. Marks: 75**
Theory: 40
Practical: 20
Internal assessment 15
Periods per week 3+3

Instructions for the paper setters:

1. Question paper should be set strictly according to the syllabus.
2. The language of questions should be straight & simple.
3. Not more than one question should be based on one topic.
4. The question paper should cover the whole syllabus and questions should be evenly distributed.
5. At least eight questions should be set, out of which the candidates should be required to attempt any five.

Theory

Organic farming, principles and its scope in India; Initiatives taken by Government (central/ state), NGOs and other organizations for promotion of organic agriculture; Organic ecosystem and their concepts; Organic nutrient resources and its fortification; 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; Operational structure of NPOP; Certification process and standards of organic farming; Processing, leveling, economic considerations and viability, marketing and export potential of organic products.

Practical

Visit of organic farms to study the various components and their utilization; Preparation of enrich compost, vermicompost, bio-fertilizers/bio-inoculants and their quality analysis; Indigenous technology knowledge (ITK) for nutrient, insect, pest disease and weed management; Cost of organic production system; Post harvest management; Quality aspect, grading, packaging and handling.

AGE-329 Farm Management, Production and Resource Economics

Time: 3 Hours **Max. Marks: 75**

Theory: 40

Practical: 20

Internal assessment 15

Periods per week 3+3

Instructions for the paper setters:

1. Question paper should be set strictly according to the syllabus.
2. The language of questions should be straight & simple.
3. Not more than one question should be based on one topic.
4. The question paper should cover the whole syllabus and questions should be evenly distributed.
5. At least eight questions should be set, out of which the candidates should be required to attempt any five.

Theory

Meaning and concept of farm management, objectives and relationship with other sciences. Meaning and definition of farms, its types and characteristics, factor determining types and size of farms. Principles of farm management: concept of production function and its type, use of production function in decision-making on a farm, factor-product, factor-factor and productproduct relationship, law of equi-marginal/or principles of opportunity cost and law of comparative advantage. 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 labour income and farm business income Importance of farm records and accounts in managing a farm, various types of farm records needed to maintain on farm, farm inventory, balance sheet, profit and loss accounts. Meaning and importance of farm planning and budgeting, partial and complete budgeting, steps in farm planning and budgeting. 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. Important issues in economics and management of common property resources of land, water, pasture and forest resources etc.

Practical

Preparation of farm layout. Determination of cost of fencing of a farm. Computation of depreciation cost of farm assets. Application of equi-marginal returns/opportunity cost principle in allocation of farm resources. Determination of most profitable level of inputs use in a farm production process. Determination of least cost combination of inputs. Selection of most profitable enterprise combination. Application of cost principles including CACP concepts in the estimation of cost of crop and livestock enterprises. Preparation of farm plan and budget, farm records and accounts and profit & loss accounts.

FST-3210 Principles of Food Science and Nutrition

Time: 3 Hours **Max. Marks: 50**
Theory: 40
Internal assessment 10
Periods per week 4+0

Instructions for the paper setters:

1. Question paper should be set strictly according to the syllabus.
2. The language of questions should be straight & simple.
3. Not more than one question should be based on one topic.
4. The question paper should cover the whole syllabus and questions should be evenly distributed.
5. At least eight questions should be set, out of which the candidates should be required to attempt any five.

Theory

Concepts of Food Science (definitions, measurements, density, phase change, pH, osmosis, surface tension, colloidal systems etc.); Food composition and chemistry (water, carbohydrates, proteins, fats, vitamins, minerals, flavours, colours, miscellaneous bioactives, important reactions); Food microbiology (bacteria, yeast, moulds, spoilage of fresh & processed foods, Production of fermented foods); Principles and methods of food processing and preservation (use of heat, low temperature, chemicals, radiation, drying etc.); 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.

ABM-3211 **Agri-business Management**

Time: 3 Hours **Max. Marks: 75**

Theory: 40

Practical: 20

Internal assessment 15

Periods per week 4+3

Instructions for the paper setters:

1. Question paper should be set strictly according to the syllabus.
2. The language of questions should be straight & simple.
3. Not more than one question should be based on one topic.
4. The question paper should cover the whole syllabus and questions should be evenly distributed.
5. At least eight questions should be set, out of which the candidates should be required to attempt any five.

Theory:

Transformation of agriculture into agribusiness, various stakeholders and components of agribusiness systems. Importance of agribusiness in the Indian economy and New Agricultural Policy. Distinctive features of Agribusiness Management: Importance and needs of agro-based industries, Classification of industries and types of agro based industries. Institutional arrangement, procedures to set up agro based industries. Constraints in establishing agro-based industries. Agri-value chain: Understanding primary and support activities and their linkages. Business environment: PEST & SWOT analysis. Management functions: Roles & activities, Organization culture. Planning, meaning, definition, types of plans. Purpose or mission, goals or objectives, Strategies, polices procedures, rules, programs and budget. Components of a business plan, Steps in planning and implementation. Organization staffing, directing and motivation. Ordering, leading, supervision, communications, control. Capital Management and Financial management of Agribusiness. Financial statements and their importance. Marketing Management: Segmentation, targeting & positioning. Marketing mix and marketing strategies. Consumer behaviour analysis, Product Life Cycle (PLC). Sales & Distribution Management. Pricing policy, various pricing methods. Project Management definition, project cycle, identification, formulation, appraisal, implementation, monitoring and evaluation. Project Appraisal and evaluation techniques.

Practical:

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

CPB-3211 Commercial Plant Breeding

Time: 3 Hours **Max. Marks: 75**

Theory: 40

Practical: 20

Internal assessment 15

Periods per week 4+3

Instructions for the paper setters:

1. Question paper should be set strictly according to the syllabus.
2. The language of questions should be straight & simple.
3. Not more than one question should be based on one topic.
4. The question paper should cover the whole syllabus and questions should be evenly distributed.
5. At least eight questions should be set, out of which the candidates should be required to attempt any five.

Theory:

Types of crops and modes of plant reproduction. Line development and maintenance breeding in self and cross pollinated crops (A/B/R and two line system) for development of hybrids and seed production. Genetic purity test of commercial hybrids. Advances in hybrid seed production of maize, rice, sorghum, pearl millet, castor, sunflower, cotton pigeon pea, Brassica etc. Quality seed production of vegetable crops under open and protected environment. Alternative strategies for the development of the line and cultivars: haploid inducer, tissue culture techniques and biotechnological tools. IPR issues in commercial plant breeding: DUS testing and registration of varieties under PPV & FR Act. 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.

Practical:

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

FSS-3211 Food Safety and Standards

Time: 3 Hours **Max. Marks: 75**
Theory: 40
Practical: 20
Internal assessment 15
Periods per week 4+3

Instructions for the paper setters:

1. Question paper should be set strictly according to the syllabus.
2. The language of questions should be straight & simple.
3. Not more than one question should be based on one topic.
4. The question paper should cover the whole syllabus and questions should be evenly distributed.
5. At least eight questions should be set, out of which the candidates should be required to attempt any five.

Theory:

Food Safety – Definition, Importance, Scope and Factors affecting Food Safety. Hazards and Risks, Types of hazards - Biological, Chemical, Physical hazards. Management of hazards - Need. Control of parameters. Temperature control. Food storage. Product design. Hygiene and Sanitation in Food Service Establishments- Introduction. Sources of contamination and their control. Waste Disposal. Pest and Rodent Control. Personnel Hygiene. Food Safety Measures. Food Safety Management Tools- Basic concepts. PRPs, GHPs, GMPs, SSOPs etc. HACCP. ISO series. TQM - concept and need for quality, components of TQM, Kaizen. Risk Analysis. Accreditation and Auditing, Water Analysis, Surface Sanitation and Personal Hygiene. Food laws and Standards- Indian Food Regulatory Regime, FSSA. Global Scenario CAC. Other laws and standards related to food. Recent concerns- New and Emerging Pathogens. Packaging, Product labeling and Nutritional labeling. Genetically modified foods\ transgenics. Organic foods. Newer approaches to food safety. Recent Outbreaks. Indian and International Standards for food products.

Practical:

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

ACJ-3211 Agricultural Journalism

Time: 3 Hours **Max. Marks: 75**
Theory: 40
Practical: 20
Internal assessment 15
Periods per week 4+3

Instructions for the paper setters:

1. Question paper should be set strictly according to the syllabus.
2. The language of questions should be straight & simple.
3. Not more than one question should be based on one topic.
4. The question paper should cover the whole syllabus and questions should be evenly distributed.
5. At least eight questions should be set, out of which the candidates should be required to attempt any five.

Theory

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. 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. The agricultural story: Types of agricultural stories, subject matter of the agricultural story, structure of the agricultural story. Gathering agricultural information: Sources of agricultural information, interviews, coverage of events, abstracting from research and scientific materials, wire services, other agricultural news sources. 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, lay outing.

Practical

Practice in interviewing. Covering agricultural events. Abstracting stories from research and scientific materials and from wire services. Writing different types of agricultural stories. Selecting pictures and artwork for the agricultural story. Practice in editing, copy reading, headline and title writing, proofreading, layouting. Testing copy with a readability formula. Visit to a publishing office.

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SEMESTER VII

Rural Agricultural Work Experience and Agro-Industrial Attachment (RAWE & AIA)

Sr. No.	Course Code	Training Components	Number of weeks	M.Marks
1.	RAWE-411	General Orientation & On campus Training by different faculties	3	75
2.	RAWE-412	Plant Clinic	3	75
3.	RAWE-413	Village Attachment	8	200
4.	AIA-414	Agro-Industrial Attachment-I	3	75
5.	AIA-415	Agro-Industrial Attachment-II	3	75
		Total	**20**	**500**

RAWE-411: General Orientation: The students will attend compulsory GoC (General Orientation Course) to be conducted by various faculties. (Agricultural Economics, Soil Science, Agronomy, Horticuture, Entomology, Plant Pathology and Extension Education)

RAWE-412: Plant clinic (3 weeks) Plant clinic will be established in the farm/department & subject experts will be asked to coordinate the training.

RAWE-413: Village Attachment Training Programmes (8 weeks):

Appropriate number of villages will be selected and group of students will be allotted a village. Approximately 25 students will be allotted one village and two teachers will assist them in the selected village. Students will study the following interventions in the respective villages allotted to them.

1. Orientation & Survey of the village to study the social-economic profile. – 1 week
2. Agronomic intervention - 1 week
3. Plant Protection Intervention - 1 week

4. Soil Improvement - 1 week
5. Fruit & Vegetable Production Intervention - 1 week
6. Food Processing and storage intervention - 1 week
7. Extension & Transfer of Technology - 1 week
8. Annual Production Intervention - 1 week

For each intervention, concerned specialized teacher would be assigned the duty so as to ensure comprehensive study of the area. The students will record their observation based on daily field observation recorded in note books and weekly diaries maintained by them to prepare the final report based on these observations.

The timings of the village attachment will be flexible so as to coincide with the main cropping season.

AIA-414: Agro-Industrial Attachment-I (3 weeks)

AIA-415; Agro-Industrial Attachment-II (3 weeks)

Agro-Industrial Attachment (6 weeks): The students would be attached with two varied Agro-Industries, one at a time for a period of six weeks (3+3) to get an experience of the industrial environment and working.

Students shall be placed in Agro and cottage industries (List attached*)

Activities during agro industrial attachment programmes.

- 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 the 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.

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***A student will opt for any two course codes under Agro-Industrial Attachment (AIA-414 & AIA-415) out of the following:**				
Sr. No.	**Course Title** **AIA**	**Course Code** **AIA**	**No. of weeks**	**Modules**
1.	Agro-industrial Attachment	Agron.	3	(i) Seed Industries (ii) Herbicides Formulators
2.	Agro-industrial Attachment	Entomology	3	(i) Commercial Honey Production, Hive and Apicultural Equipment and Honey Processing Manufacturing Units: Honey Trading, Processing, Packaging, Exporting and Marketing Units.
3.	Agro-industrial Attachment	Ent.Plant. Pathology	3	(i) Pesticide and Biopesticide Industries (ii) Biocontrol Agents Production Units (iii) Plant Quarantine Station (iv) Virus free Potato Tuber Production Units
4.	Agro-industrial Attachment	Ext. Edu	3	(i) NGOs and SHGs in Agriculture (ii) Extension Services of CAO, Deputy Director(Horticulture), Soil Conservation, PAMETI, ATMA, Markfed, DRDA, etc.
5.	Agro-industrial Attachment	Flori	3	(i) Commercial Flower Nurseries (ii) Flower Marketing Firms (iii) Flower Seed Production and Landscaping Units.
6.	Agro-industrial Attachment	Forest	3	(i) Forest Based Industry (ii) High- tech Nursery (Tree Planting Stock Production)
7.	Agro-industrial Attachment	Horticulture	3	(i) Commerial Fruit Nurseries
8.	Agro-industrial Attachment	PBG	3	Commercial Hybrid Seed Production Units
9.	Agro-industrial Attachment	Soil	3	(i) Fertilizer Industries (ii) Vermicompost Units (iii) Biofertilizer Units
10.	Agro-industrial Attachment	Vegetable	3	(i) Commercial Vegetable Nurseries (ii) Farms of Progressive Vegetable Growers
11.	Agro-industrial	Agri. Eco.	3	(i) Agricultural Finance Institutions, Commercial Banks, Cooperative Banks, Cooperative Agricultural Service

	Attachment			Societies (CASS), Market Committees.
12.	Agro-industrial Attachment	ABM	3	(i) Agribusiness Industry in Public/Private Sector for Agribusiness Management Practices/Processes.
13.	Agro-industrial Attachment	Micro	3	Mushroom Production Units
14.	Agro-industrial Attachment	Horti/FT		Post harvest processing and value added units. Sugar units, Milk plants

Evaluation Criterion:

- **RAWE-411: General Orientation:** An objective type/subjective type exam of 75 marks will be conducted at the end of the semester for evaluation of this component.
- **RAWE-412: Plant Clinic (3 weeks)**

Assessment Parameters	Evaluators	Max. Marks (75)
• Discipline (Conduct & Regularity)	Group Incharge	5
• Problem observation, Inference and Prescription Writing	Group Incharge	20
• Sample collection & Preservation •	Group Incharge/Clinic Curator	20
• Report Writing Skill	Departmental Committee	15
• Open Presentation	Departmental Committee /External Examier	15

- **RAWE-413: Village Attachment (8 weeks)**

Assessment Parameters	Evaluators	Max. Marks (200)
Regularity	Group Incharge	20

Discipline/Conduct	Group Incharge	20
Social interaction with farmers	Group Incharge	20
Innovative ideas to disseminative information	Group Incharge	30
Skill in data recording	Departmental Committee	30
Report Writing Skill	Departmental Committee	40
Open Presentation	Departmental Committee /External Examier	40

- **AIA-414: Agro-Industrial Attachment (3 weeks)**
- **AIA-415; Agro-Industrial Attachment (3 weeks)**

Assessment Parameters	**Evaluators**	**Max. Marks (75)**
• Discipline, Regularity	Industry officials	10
• Weekly Assessment	Industry officials	10
• Report Writing Skills	Departmental committee	30
• Final Presentation/Viva Voce	Departmental committee and External Evaluator	25

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SEMESTER VIII

Experiential Learning Programmes

Modules for skill development and entrepreneurship. A student has to register for two modules from the following package of modules: (Any two).

Sr. No.	Course Code	Experiential Learning Modules/	Number of weeks	M.Marks
		Any two of the following options: -		
	ELM-421	Production Technology Bio-agents and Bio-fertilizer	10	250
	ELM-422	Mushroom Cultivation Technology		
	ELM-423	Soil, Plant, Water and Seed Testing		
	ELM-424	Commercial Beekeeping		
	ELM-425	Floriculture and Landscaping	10	250
	ELM-426	Commercial Horticulture		
	ELM-427	Food Processing		
	ELM-428	Organic Production Technology		
		Total		**500**

- **Evaluation criterion to be followed for each training component (ELM-421, ELM-422)**

Parameters	Evaluators	Max. Marks (250)
Discipline, Conduct & Regularity	Course Coordinator/Instructor	30
Monthly Assessment	Course Coordinator/Instructor	50
Business Marketing/ Networking skills	Course Coordinator/Instructor	50
Report Writing Skills	Department Committee	70
Final Presentation	Department Committee	50

Attendance during trainings:

The minimum attendance required for all trainings will be 80 percent (as per the college minimum requirement). The attendance of students will be maintained by respective training and course coordinators for Sem-VII (RAWE-411, RAWE-412, RAWE-413, AIA-414, AIA-415) and Sem-VIII (ELG-421 & ELG-422) communicated to the office for final evaluation. The students will be eligible for final evaluation only when the attendance requirements are met with. Any student falling short of attendance has to registerr again with the concerned establishment/ course coordinator.

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TRAINING SCHEME

SEMESTER VII

Sr. No.	Course Code	Training Components	Credit hours/weeks	Max. Marks
1.	TR-411	General Orientation	3 weeks	75
2.	TR-412	Agro-Industrial Attachment (3+3)	6 weeks	150
3.	TR-413	Village Attachment	8 weeks	200
4.	TR-404	Plant Clinic	3 weeks	75
		Total		**500**

Evaluation criterion to be followed for each training component (TR-412, TR-413, TR-414) :

Parameters	Max. Marks (As percent of total allotted marks for each component)
• Project Planning and Writing	10%
• Presentation	10%
• Regularity	10%
• Monthly Assessment	10%
• Output delivery	10%
• Technical Skill Development	10%
• Entrepreneurship Skills	10%
• Business networking skills	10%
• Report Writing Skills	10%
• Final Presentation	10%

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SEMESTER VIII

Sr. No.	Course Code	Training Components	Credit hours/weeks	M.Marks
1.	TR-421	(Any two) • Production Technology Bio-agents and Bio-fertilizer • Seed Production and Technology • Mushroom Cultivation Technology • Soil, Plant, Water and Seed Testing • Poultry Production Technology • Hybrid Seed Production Technologies • Floriculture and Landscaping • Food Procession • Commercial Horticulture • Agriculture Waste Management • Organic Production Technology • Commercial Sericulture	10 weeks	250
2.	TR-422		10 weeks	250
		Total		**500**