# FACULTY OF AGRICULTURE

## SYLLABUS

**For**

## B.Sc. AGRICULTURE (Hons.)

**(Semester: I–VIII)**

**Session: 2016-17**

## KHALSA COLLEGE AMRITSAR-143001

# B.Sc. Agriculture (Hons.)

## SEMESTER-I

| Sr. No. | Course Code | Subject | Periods per Week | | Marks | | Int. Assessment | | Total Marks | | Grand Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Th. | Prac. | Th. | Prac | Th | Prac | Th. | Prac | |
| 1. | AGR-111 | Elementary Agronomy | 4 | 3 | 40 | 20 | 10 | 05 | 50 | 25 | **75** |
| 2. | AGM-112 | Introductory Agrometeorology | 4 | 3 | 40 | 20 | 10 | 05 | 50 | 25 | **75** |
| 3. | MBL- 113 | Elementary Microbiology | 4 | 3 | 40 | 20 | 10 | 05 | 50 | 25 | **75** |
| 4. | SSC-114 | Introduction to Soil Science | 4 | 3 | 40 | 20 | 10 | 05 | 50 | 25 | **75** |
| 5. | AGE-115 | Principles of Agricultural Economics | 4 | 0 | 40 | | 10 | | 50 | -- | **50** |
| 6. | BOT-116<br>MAT-116 | Basic Botany/<br>Basic Maths–I | 2<br>4 | 3<br>0 | 20<br>40 | 20<br>- | 05<br>10 | 05<br>- | 25<br>50 | 25<br>-- | **50**<br>**50** |
| 7. | ENG-117 | Communication Skill in English | 6 | 0 | 40 | 0 | 10 | 0 | 50 | 0 | **50** |
| 8. | GPB-118/<br>BPB-118 | Punjabi (Compulsory) /<br>Basic Punjabi (Mudhli Punjabi) | 6 | 0 | 40 | - | 10 | - | 50 | -- | **50** |
| | | **Total** | **38** | **15** | **300** | **100** | **75** | **25** | **375** | **125** | **500** |

**Note:**

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

# B.Sc. Agriculture (Hons.)

## SEMESTER-II

| Sr. No | Course Code | Subject | Periods per Week | | Marks | | Int. Assessment | | Total Marks | | Grand Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Th. | Pract. | Th. | Prac. | Th. | Prac. | Th. | Pract. | |
| 1. | FSC-121 | Fundamentals of Horticulture | 4 | 3 | 40 | 20 | 10 | 5 | 50 | 25 | **75** |
| 2. | BCH-122 | Fundamentals of Plant Biochemistry | 4 | 3 | 40 | 20 | 10 | 5 | 50 | 25 | **75** |
| 3. | FOR-123 | Introduction to Forestry | 4 | 3 | 40 | 20 | 10 | 5 | 50 | 25 | **75** |
| 4. | BOT-124 | Fundamentals of Crop Physiology | 4 | 3 | 40 | 20 | 10 | 5 | 50 | 25 | **75** |
| 5. | PBG-125 | Fundamentals of Genetics | 4 | 3 | 40 | 20 | 10 | 5 | 50 | 25 | **75** |
| 6. | EXT-126 | Fundamentals of Agricultural Extension Education | 4 | 3 | 40 | 20 | 10 | 5 | 50 | 25 | **75** |
| 7. | ENT-127 | Fundamentals of Entomology | 4 | 3 | 20 | 20 | 5 | 5 | 25 | 25 | **50** |
| 8. | ENG-128 | Communication Skill in English | 6 | 0 | 40 | 0 | 10 | 0 | 50 | 0 | **50** |
| 9. | GPB-129 /BPB-129 | Punjabi (Compulsory) / Basic Punjabi (Mudhli Punjabi) | 6 | | 40 | | 10 | | 50 | -- | **50** |
| 10. | AGH-130 | Agriculture Heritage | 2 | | 20 | | 5 | | 25 | | **25** |
| | | **TOTAL** | **40** | **24** | **360** | **140** | **90** | **35** | **450** | **175** | **650** |

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

# B.Sc. Agriculture (Hons.)

## SEMESTER-III

| Sr. No. | Course Code | Subject | Periods per Week | | Marks | | Int. Assessment | | Total Marks | | Grand Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Th. | Prac. | Th. | Prac. | Th. | Prac. | Th. | Prac. | |
| 1. | AGR-211 | Principles of Agronomy- I ( Kharif Crops) | 4 | 3 | 40 | 20 | 10 | 05 | 50 | 25 | 75 |
| 2. | BOT-212 | Crop Physiology | 4 | 3 | 40 | 20 | 10 | 05 | 50 | 25 | 75 |
| 3. | ENT-213 | Insect Morphology and Systematics | 4 | 3 | 40 | 20 | 10 | 05 | 50 | 25 | 75 |
| 4. | EXT-214 | Dimension of Agriculture Extension | 4 | 3 | 40 | 20 | 10 | 05 | 50 | 25 | 75 |
| 5. | FPM-215 | Farm Power and Machinery | 4 | 3 | 40 | 20 | 10 | 05 | 50 | 25 | 75 |
| 6. | SSC-216 | Manures and Fertilizers | 4 | | 40 | 00 | 10 | 00 | 50 | 00 | 50 |
| 7. | FSC-217 | Production Technology of Fruit Crops | 4 | 3 | 40 | 20 | 10 | 05 | 50 | 25 | 75 |
| 8. | SSC-218 | Soil Physics and Erosion Management | 4 | 3 | 40 | 20 | 10 | 05 | 50 | 25 | 75 |
| 9 | FST-219 | Introduction to Food Science and Post Harvest Value Addition | 4 | 3 | 40 | 20 | 10 | 05 | 50 | 25 | 75 |
| 10. | ESL-221* | Environmental Studies–I | 2 | | 40 | | 10 | | | | 50 |
| | **Total** | | **38** | **24** | **360** | **160** | **90** | **40** | **450** | **200** | **650** |

***Note: The marks of ESL-221 & ESL-222 (Environmental Studies) will not be added in the total marks.**

# B.Sc. Agriculture (Hons.)

## SEMESTER-IV

| Sr. No | Course Code | Subject | Periods per Week | | Marks | | Int. Assessment | | Total Marks | | Grand Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Th | Prac | Th. | Prac | Th | Prac | Th. | Prac | |
| 1. | AGR-221 | Principles of Agronomy-II (Rabi Crops) | 4 | 3 | 40 | 20 | 10 | 05 | 50 | 25 | 75 |
| 2. | PBG-222 | Principles of Seed Technology | 4 | 3 | 40 | 20 | 10 | 05 | 50 | 25 | 75 |
| 3. | ENT-223 | Insect Ecology and Integrated Pest Management | 4 | 3 | 40 | 20 | 10 | 05 | 50 | 25 | 75 |
| 4. | EXT-224 | Extension Methodologies and Communication Skills for Transfer of Technology | 4 | 3 | 40 | 20 | 10 | 05 | 50 | 25 | 75 |
| 5. | LPM-225 | Livestock Production and Management | 4 | 3 | 40 | 20 | 10 | 05 | 50 | 25 | 75 |
| 6. | AGR-226 | Organic Farming | 4 | 3 | 40 | 20 | 10 | 05 | 50 | 25 | 75 |
| 7. | FCL-227 | Flower Cultivation and Landscape Gardening | 4 | 3 | 40 | 20 | 10 | 05 | 50 | 25 | 75 |
| 8. | SWE 228 | Fundamentals of Soil and Water Conservation Engineering | 4 | 3 | 40 | 20 | 10 | 05 | 50 | 25 | 75 |
| 9. | MGT-229 | Fundamentals of Agri-business Management and Entrepreneurship Development | 4 | 0 | 40 | 00 | 10 | 00 | 50 | 00 | 50 |
| 10. | ESL-222* | Environmental Studies–II | 2 | | 40 | - | 10 | - | 50 | - | 50 |
| | **Total** | | **38** | **24** | **360** | **160** | **90** | **40** | **400** | **200** | **650** |

***Note: The marks of ESL-221 & ESL-222 (Environmental Studies) will not be added in the total marks.**

# B.Sc. Agriculture (Hons.)

**Scheme of Studies & Examination Semester-V**

| Sr. No. | Course | Subject | Period Per week | | Marks | | Internal Assessment | | Total Marks | | Grand Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Th. | Prt. | Th. | Prt. | Th. | Prt. | Th. | Prt. | |
| 1. | AGR-311 | Practical Crop Production-I *(Kharif Crops)* | 0 | 3 | 0 | 20 | 0 | 05 | 0 | 25 | 25 |
| 2. | AGR-312 | Water Management and Micro Irrigation | 4 | 3 | 40 | 20 | 10 | 05 | 50 | 25 | 75 |
| 3. | CHE-313 | Chemistry of Agrochemicals, Plant Products and Growth Regulators | 2 | 3 | 20 | 20 | 05 | 05 | 25 | 25 | 50 |
| 4. | AGE-314 | Agricultural Marketing, Trade and Prices | 4 | 3 | 40 | 20 | 10 | 05 | 50 | 25 | 75 |
| 5. | PPL-315 | Plant Pathogens and Principles of Plant Pathology | 4 | 3 | 40 | 20 | 10 | 05 | 50 | 25 | 75 |
| 6. | ENT-316 | Insect Pests of Crops and stored Grain | 4 | 3 | 40 | 20 | 10 | 05 | 50 | 25 | 75 |
| 7. | PBG-317 | Principles of Plant Breeding | 4 | 3 | 40 | 20 | 10 | 05 | 50 | 25 | 75 |
| 8. | BIT-318 | Principles of Plant Biotechnology | 4 | 3 | 40 | 20 | 10 | 05 | 50 | 25 | 75 |
| 9. | DAI-319 | Dairy Technology | 4 | 3 | 40 | 20 | 10 | 05 | 50 | 25 | 75 |
| | **Total** | | **30** | **27** | **300** | **180** | **75** | **45** | **375** | **225** | **600** |

# B.Sc. Agriculture (Hons.)

**Scheme of Studies & Examination Semester- VI**

| Sr. No. | Course | Subject | Period Per week | | Marks | | Internal Assessment | | Total Marks | | Grand Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Th. | Prt. | Th. | Prt. | Th. | Prt. | Th. | Prt. | |
| 1. | AGR-321 | Practical Crop Production-II *(Rabi Crops)* | 0 | 3 | 0 | 20 | 0 | 05 | 0 | 25 | 25 |
| 2. | EST-322 | Renewable Energy | 4 | 3 | 40 | 20 | 10 | 05 | 50 | 25 | 75 |
| 3. | STA-323 | Basic Statistics | 4 | 3 | 40 | 20 | 10 | 05 | 50 | 25 | 75 |
| 4. | AGE-324 | Production Economics, Farm Management and Agricultural Finance | 4 | 3 | 40 | 20 | 10 | 05 | 50 | 25 | 75 |
| 5. | PPL-325 | Diseases of Field Crops and their Management | 4 | 3 | 40 | 20 | 10 | 05 | 50 | 25 | 75 |
| 6. | PPL-326 | Diseases of Horticultural Crops and Their Management | 4 | 3 | 40 | 20 | 10 | 05 | 50 | 25 | 75 |
| 7. | PBG-327 | Breading of Field and Horticulture Crops | 4 | 3 | 40 | 20 | 10 | 05 | 50 | 25 | 75 |
| 8. | PFE-328 | Protected Cultivation and Post Harvest Technology | 4 | 3 | 40 | 20 | 10 | 05 | 50 | 25 | 75 |
| | **Total** | | **28** | **24** | **280** | **160** | **70** | **40** | **350** | **200** | **550** |

# B.Sc. Agriculture (Hons.)

## SEMESTER VII

### ELECTIVE HORTICULTURE
### (Fruit Science, Vegetable Science & Floriculture)

| Sr. No. | Course Code | Subject | Periods per Week | | Marks | | Grand Total |
|---|---|---|---|---|---|---|---|
| | | | Th. | Pract | Th. | Pract | |
| 1. | FSC-411 | Nursery Management of Horticultural Crops | 4 | 3 | 100 | 50 | 150 |
| 2. | FSC-412 | Fundamentals of Fruit Production | 4 | 3 | 75 | 25 | 100 |
| 3. | VSC-413 | Commercial Vegetable Production | 4 | 6 | 100 | 50 | 150 |
| 4. | VSC-414 | Vegetable Breeding and Seed Production | 4 | 6 | 100 | 50 | 150 |
| 5. | | Training Project Report (TPR) | | | | | 150 |
| | | **Total** | **16** | **18** | **375** | **175** | **700** |

# B.Sc. Agriculture (Hons.)

## SEMESTER VII

### ELECTIVE CROP SCIENCE
### (Agronomy, Soil Science & Agroforestry)

| Sr. No. | Course Code | Subject | Periods per Week | | Marks | | Grand Total |
|---|---|---|---|---|---|---|---|
| | | | Th. | Pract | Th. | Pract. | |
| 1. | AGR 411 | Weed Management | 4 | 6 | 100 | 50 | 150 |
| 2. | AGR-412 | Crop Production under Special Situations | 4 | - | 100 | | 100 |
| 3. | SSC-413 | Analytical Techniques in Soils, Plants, Fertilizers and Water | 4 | 6 | 100 | 50 | 150 |
| 4. | FOR-414 | Production Technology of Economic Forest Trees | 4 | 6 | 100 | 50 | 150 |
| 5. | | Training Project Report (TPR) | | | | | 150 |
| | | **Total** | **16** | **18** | **400** | **150** | **700** |

# B.Sc. Agriculture (Hons.)

## SEMESTER-VII

### ELECTIVE -- AGRICULTURAL ECONOMICS
### (Agril. Economics, Extension Education & Agri- Business Management)

| Sr. No. | Course Code | Subject | Periods per Week | | Marks | | Grand Total |
|---|---|---|---|---|---|---|---|
| | | | Th | Pract | Th | Pract | |
| 1. | EXT-411 | Communication and Information Technology | 4 | 6 | 100 | 50 | 150 |
| 2. | MGT-412 | Financial and Project Management | 4 | 6 | 100 | 50 | 150 |
| 3 | EXT-413 | Behavioral Skills for Human Resource Development | 4 | 0 | 100 | | 100 |
| 4. | AGE-414 | Micro Economic Analysis | 4 | 6 | 100 | 50 | 150 |
| 5. | | Training Project Report (TPR) | | | | | 150 |
| | | **Total** | **16** | **18** | **400** | **150** | **700** |

# B.Sc. Agriculture (Hons.)

## SEMESTER VII

### ELECTIVE -CROP PROTECTION
### (Entomology, Plant Pathology & Nematology)

| Sr. No. | Course Code | Subject | Periods per Week | | Marks | | Grand Total |
|---|---|---|---|---|---|---|---|
| | | | Th. | Pract | Th. | Pract | |
| 1. | ENT-411 | Apiculture | 4 | 6 | 100 | 50 | 150 |
| 2. | PPL-412 | Post Harvest Diseases and their Management | 4 | 6 | 100 | 50 | 150 |
| 3. | ENT-413 | Quarantine in Plant Protection | 4 | | 100 | | 100 |
| 4. | NEM-414 | Plant Nematology | 4 | 6 | 100 | 50 | 150 |
| 5. | | Training Project Report (TPR) | | | | | 150 |
| | | **Total** | **16** | **18** | **400** | **150** | **700** |

# B.Sc. Agriculture (Hons.)

## SEMESTER VIII

### ELECTIVE HORTICULTURE
### (Fruit Science, Vegetable Science & Floriculture)

| Sr. No. | Course Code | Subject | Periods per Week | | Marks | | Grand Total |
|---|---|---|---|---|---|---|---|
| | | | Th. | Pract | Th | Pract | |
| 1. | FSC-421 | Commercial Fruit Production | 4 | 6 | 100 | 50 | 150 |
| 2. | FSC-422 | Processing and Value Addition of Horticultural Crops | 4 | 6 | 75 | 25 | 100 |
| 3. | VSC-423 | Forcing Techniques in Vegetable Production | 4 | 6 | 75 | 25 | 100 |
| 4. | FCL-424 | Commercial Floriculture and Landscaping | 4 | 6 | 100 | 50 | 150 |
| 5. | | Training Project Report (TPR) | | | | | 150 |
| | | **Total** | **16** | **24** | **350** | **150** | **650** |

# B.Sc. Agriculture (Hons.)

## SEMESTER VIII

### ELECTIVE CROP SCIENCE
### (Agronomy, Soil Science & Agroforestry)

| Sr. No. | Course Code | Subject | Periods per Week | | Marks | | Grand Total |
|---|---|---|---|---|---|---|---|
| | | | Th. | Pract | Th | Pract | |
| 1. | AGR-421 | Farming Systems and Sustainable Agriculture | 4 | 6 | 100 | 50 | 150 |
| 2. | SSC-422 | Soil Physical and Biological Environment | 4 | 6 | 100 | 50 | 150 |
| 3. | SSC-423 | Soil Survey, Classification and Mapping | 0 | 6 | | 50 | 50 |
| 4 | AGR-424 | Production Technology of Spices, Aromatic, Medicinal and Plantation Crops | 4 | 6 | 100 | 50 | 150 |
| 5. | | Training Project Report (TPR) | | | | | 150 |
| | | **Total** | **12** | **24** | **300** | **200** | **650** |

# B.Sc. Agriculture (Hons.)

## SEMESTER VIII

### ELECTIVE -- AGRICULTURAL ECONOMICS
### (Agril. Economics, Extension Education & Agri- Business Management)

| Sr. No. | Course Code | Subject | Periods per Week | | Marks | | Grand Total |
|---|---|---|---|---|---|---|---|
| | | | Th. | Pract | Th. | Pract | |
| 1. | MGT-421 | Retailing and Supply Chain Management | 4 | 0 | 100 | | 100 |
| 2. | AGE-422 | Macro Economic Analysis | 4 | 0 | 100 | | 100 |
| 3. | AGE-423 | Economic problems of Agriculture in India | 4 | 6 | 100 | 50 | 150 |
| 4. | EXT-424 | Visual and Graphic Communication | 4 | 6 | 100 | 50 | 150 |
| 5. | | Training Project Report (TPR) | | | | | 150 |
| | | **Total** | **16** | **12** | **400** | **100** | **650** |

# B.Sc. Agriculture (Hons.)

## SEMESTER -VIII

### ELECTIVE -CROP PROTECTION
### (Entomology, Plant Pathology & Nematology)

| Sr. No. | Course Code | Subject | Periods per Week | | Marks | | Grand Total |
|---|---|---|---|---|---|---|---|
| | | | Th. | Pract | Th | Pract | |
| 1. | PPL-421 | Biocontrol and Integrated Disease Management | 4 | 6 | 100 | 50 | 150 |
| 2. | ENT-422 | Biocontrol and Integrated Pest management | 4 | 6 | 100 | 50 | 150 |
| 3. | ENT-423 | Pesticides and Plant Protection Equipment | 4 | 6 | 100 | 50 | 150 |
| 4 | PPL-424 | Plant Disease Diagnosis | 0 | 6 | - | 50 | 50 |
| 5. | | Training Project Report (TPR) | | | | | 150 |
| | | **Total** | **12** | **24** | **300** | **200** | **650** |

## B.Sc. Agriculture (Hons.) Semester-I

**AGR-111: Elementary Agronomy**

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

**Theory: 40**

**Practical: 20**

**Internal Assessment 10+5=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:**

Agriculture, its importance and branches; climate, soil and water in relation to crop production; farm tools and implements; crop seasons; seed structure and germination; phases of plant growth and factors affecting it; mode of propagation; classification and relative status of important crops in the state; importance of water to plants; agronomic practices, seed bed preparation, sowing, fertilizer application; weed control, harvesting, thrashing and marketing of important field crops.

**Practical:**

Land measurements; seed bed preparation; interculture techniques; identification of field crops, their seeds and important weeds; germination of different crop seeds in lab. and field; depth of seed placement in relation to seed size; methods of irrigation; familiarization of agricultural hand tools and implements; maintenance and keeping farm records

## B.Sc. Agriculture (Hons.) Semester-I

**AGM-112: Introductory Agrometeorology**

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

**Theory: 40**

**Practical: 20**

**Internal Assessment 10+5=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:**

Definition, practical utility and scope. General climatology. Structure and composition of earth's atmosphere. Elements and factors of weather and climate - temperature, pressure, wind, solar radiation and moisture. Impact of climate on crops and livestock distribution and production. Agro climatic indices – definitions and applications in agriculture. Effect of environmental factors on crop growth. Weather hazards in agriculture. Climatic classifications. Agro climatic regions of Punjab and India. Basics of field microclimate modification. Introduction to monsoons. Elementary aspects of weather forecasting. Effects of climate change on agriculture.

**Practical:**

Site selection for Agro-meteorological Observatory. Project on setting up, recording and maintenance of instruments in a meteorological observatory. Measurement of temperature, rainfall, evaporation, atmospheric pressure, sunshine duration, solar radiation, wind direction, wind speed and relative humidity. Study of weather forecasting and synoptic charts. Processing, presentation and interpretation of climatic data in relation to crops.

## B.Sc. Agriculture (Hons.) Semester-I

**MBL-113: Elementary Microbiology**

**Time: 3 Hours** **Max. Marks: 75**
**Theory: 40**
**Practical: 20**
**Internal Assessment 10+5=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:**

Its applied areas. Discovery of microorganisms and their role in fermentation. Germ theory of disease and protection. Structure of eukaryotic and prokaryotic cell. Major groups of eukaryotes – fungi, algae and protozoa. Major groups of prokaryotes – actinomycetes, cyan bacteria, arhaebacteria, rickettsias and Chlamydia. Bacterial growth. Metabolism in bacteria – ATP generation. chemoautotrophy, photoautotrophy, respiration, fermentation. Bacteriophages – structure and properties, lytic and lysogenic cycles, viriods, prions. Genetic recombinations. Microbial groups in soil. Microbial transformation of carbon, nitrogen, phosphorus and sulphur. Biological nitrogen fixation. Microbes in composting. Microbiology of water and food. Beneficial microorganisms in agriculture – biofertilizers, microbial pesticides. Biodegradation. Biogas production. Plant–microbe interactions. Introduction to mushrooms and mushroom growing. Edible and poisonous mushrooms. Cultivation technology of mushrooms.

**Practical:**

Familiarization with instruments and other materials in a Microbiology laboratory. Practice of aseptic methods on nutrient broth, slants and agar plate. Methods of sterilization and preparation of media and glassware. Sterilization of nutrient broth by filtration. Plating methods for isolation and purification of bacteria. Identification of bacteria by staining methods. Enumeration of bacteria by staining, pour plate and spread plate methods. Cultivation technology of mushrooms. Tissue culture preparation and maintenance of edible fungi. Spawn production.

**B.Sc. Agriculture (Hons.) Semester-I**

**SSC-114: Introduction to Soil Science**

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

**Theory: 40**

**Practical: 20**

**Internal Assessment 10+5=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:**

Concept of land, soil and soil science. Composition of earth crust and its relationship with soils. Rocks and minerals. Weathering. Soil forming factors and processes. Soil profile. Soil colour. Elementary knowledge of taxonomic classification of soils. Soils of Punjab and India. Soil physical properties. Soil texture- textural classes. Soil structure- classification, soil aggregation and significance, soil consistency, soil crusting, bulk density and particle density of soils and porosity, their significance and manipulation. Soil colloids- properties, nature, types and significance. Sources of charges in clay minerals. Ion exchange, CEC, AEC – factors affecting and adsorption of ions. Soil organic matter- decomposition, mineralization, humus. Carbon cycle, C: N ratio. Soil organisms and their beneficial and harmful roles.

**Practical:**

Determination of bulk density and particle density. Aggregate size analysis. Soil mechanical analysis. Analytical chemistry- basic concepts, techniques and calculations, collection and processing of soil samples for analysis of organic carbon, pH, EC, available N, P, K and S. Study of a soil profile. Identification of rocks and minerals.

## B.Sc. Agriculture (Hons.) Semester-I

**AGE-115: Principles of Agricultural Economics**

**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:**

Agricultural Economics-Meaning, definition, subject matter, basic economic concepts. Wants-Meaning and characteristics. Theory of consumption- marginal utility analysis. Demand-Meaning, definition, kinds of demand, law of demand, change in demand. Elasticity of demand-various types, degrees, methods of measurement, importance and factors influencing elasticity of demand. Consumer's surplus– mWelfare Economics – meaning, Pareto's optimality. National Income- concepts, measurement. meaning, definition, importance. Perfect and Imperfect competition- definition, types and characteristics.

National income- Concepts, Measurement. Inflation – Meaning, definition, kinds of inflation.

## B.Sc. Agriculture (Hons.) Semester-I

**BOT-116:** **Basic Botany**

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

**Theory: 20**

**Practical: 20**

**Internal Assessment 5+5=10**

**Periods per week 2+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:**

Plant kingdom- features of each group (Thallophyta or algae, bryophyta, pteridophyta and spermatophyta).

Morphology of root, stem, leaf, flower and inflorescence- Characteristics, types, various modifications and functions.

Pollination and fertilization.

Fruit and seed- Basic structure and different types.

Plant Cell structure. Tissue types.

Anatomy- Internal structure of root, stem and leaf.

Plant taxonomy and systems of classification.

Characteristic features and economic importance of Cruciferae, Malvaceae, Leguminosae, Cucurbitaceae, Solanaceae and Gramineae.

**Practical:**

Salient features of each group of plant kingdom, morphology and modification of root, stem and leaf, flower and types of inflorescence, structure of various types of seeds and fruits, cell structure and tissue types, structure of monocot and dicot root, stem and leaf, permanent slides, characteristic features of economically important families.

## B.Sc. Agriculture (Hons.) Semester-I

**MAT-116** **Basic Mathematics-I**

**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:**

1. **Complex numbers:** Basic concepts, addition, subtracrion, multiplication, division, equality, conjugate, modulus of complex numbers. Reduction to standard form a+ib only applications (excluding polar form).
2. **Arithmetic Progression:** Definition, $n^{th}$ term, sum of n terms (with proof) and applications.
3. **Geometric Progression:** Definition, $n^{th}$ term, sum of n terms (with proof) and applications. Sum of infinite G.P.
4. **Logarithms:** Definition, Laws of logarithm (with Proof) and applications of logarithm.
5. **Binomial theorem:** Binomial Theorem for positive integral index only (without proof). Applications of binomial theorem. General term, middle term(s).
6. **Trigonometry:** Trigonometric identities and allied angles (only applications).
7. **Graphs of basic T-ratios:** sin theta, cos theta, tan theta, sec theta, cosec theta, cot theta. Addition and subtraction formulae (only applications): sin(A+B), cos(A+B), tan(A+B), sin(A-B), cos(A-B), tan(A-B)
8. **Sum and product formulae (only applications):** sinC+sinD, sinC-SinD, cosC+cosD, cosC-cosD, 2sinCcosD, 2cosCcosD, 2sinCsinD, Formulae for sin2 theta, cos2 theta, tan2 theta, sin3 theta (only proofs without applications)

**B.Sc. Agriculture (Hons.) Semester-I**

**ENG-117 Communication Skill in English**

**Time: 3 Hours**

**Max. Marks: 50**
**Theory: 30**
**Presentation: 10**
**Internal Assessment:10**
**Periods per week: 6**

**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, Editorial 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 eight skill-oriented questions from Reading and Writing Skills. Each question will carry 5 marks. The question 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. Writing technical report
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 (5x1=5marks) (articles, tenses, pronouns, prepositions, conjunctions, forms of verbs) (6x5=30)

**Presentation:-**

**1.** 10 Marks for presentation.
**2.** Topic for presentation will be based on the skills mentioned in syllabus.
**3.** The Examiner is to be appointed by HOD.

**B.Sc. Agriculture (Hons.) Semester-I**

**GPB-118** **Punjabi (Compulsory)**

**Time: 3 Hours** **Max. Marks: 50**
**Theory: 40**
**Internal Assessment 10**
**Periods per Week 6+0**

## ਪਾਠ-ਕ੍ਰਮ ਅਤੇ ਪਾਠ-ਪੁਸਤਕਾਂ

1. **ਦੋ ਰੰਗ** (ਕਵਿਤਾ ਭਾਗ) (ਸੰਪਾ. ਹਰਜਿੰਦਰ ਸਿੰਘ ਢਿੱਲੋ ਅਤੇ ਪ੍ਰੀਤਮ ਸਿੰਘ ਸਰਗੋਧੀਆ), ਗੁਰੂ ਨਾਨਕ ਦੇਵ ਯੂਨੀਵਰਸਿਟੀ, 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) **8 ਅੰਕ**
2. ਰੇਖਾ ਚਿਤਰ : ਸਾਰ, ਵਿਸ਼ਾ-ਵਸਤੂ, ਸ਼ਖ਼ਸੀਅਤ ਦੇ ਗੁਣ **8 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 **8 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**

## B.Sc. Agriculture (Hons.) Semester-I

**BPB-118** **Basic Punjabi**

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

**Theory: 40**

**Internal Assessment 10**

**Periods per Week 6+0**

1. **ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਤੇ ਗੁਰਮੁਖੀ ਲਿਪੀ**
   ੳ) ਨਾਮਕਰਣ ਤੇ ਸੰਖੇਪ ਜਾਣ ਪਛਾਣ : ਗੁਰਮੁਖੀ ਵਰਣਮਾਲਾ, ਅੱਖਰ ਕ੍ਰਮ, ਸਵਰ ਵਾਹਕ (ਓ ਅ ਏ), ਲਗਾਂ ਮਾਤਰਾਂ, ਪੈਰ ਵਿਚ ਬਿੰਦੀ ਵਾਲੇ ਵਰਣ, ਪੈਰ ਵਿਚ ਪੈਣ ਵਾਲੇ ਵਰਣ, ਬਿੰਦੀ, ਟਿੱਪੀ, ਅੱਧਕ।
   ਅ) ਸਿਖਲਾਈ ਤੇ ਅਭਿਆਸ **15 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 ਪੰਜ-ਪੰਜ ਅੰਕ ਹਨ। **(5+5+5) 15 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.) Semester-II

**FSC-121: Fundamentals of Horticulture**

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

**Theory: 40**

**Practical: 20**

**Internal Assessment 10+5=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:**

Horticulture-Its definition and branches, importance and scope; Horticultural Classification; climate and soil for horticultural crops; Plant propagation-methods and propagating structures; principles of orchard establishment; Principles and methods of training and pruning, juvenility and flower bud differentiation; unfruitfulness; pollination, pollinizers and pollinators; fertilization and parthenocarpy; kitchen gardening; garden types and parts; lawn making; medicinal and aromatic plants; species and condiments; Irrigation & fertilizers application-method and quantity.

**Practical:**

Identification of garden tools. Identification of horticultural crops. Preparation of seed bed/nursery bed. Practice of sexual and asexual methods of propagation. Layout and planting of orchard plants. Training and pruning of fruit trees. Transplanting and care of vegetable seedlings. Making of herbaceous and shrubbery borders. Preparation of potting mixture, potting and repotting. Fertilizer application in different crops. Visits to commercial nurseries/orchard.

**B.Sc. Agriculture (Hons.) Semester-II**

**BCH-122 Fundamentals of Plant Biochemistry**

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

**Theory: 40**

**Practical: 20**

**Internal Assessment 10+5=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 of Biochemistry. Properties of Water, pH and Buffer. Carbohydrate: Importance and classification. Structures of Monosaccharides, Structure of Disaccharides and Polysaccharides. Lipid: Importance and classification; Structures and properties of fatty acids; storage lipids and membrane lipids. Proteins: Importance of proteins and classification; Structures, zwitterion nature of amino acids; Structural organization of proteins. Enzymes: General properties; Classification; Mechanism of action; Introduction to allosteric enzymes. Nucleic acids: Importance and classification; Structure of Nucleotides, A, B & Z DNA; RNA: Types and Secondary & Tertiary structure. Metabolism of carbohydrates: Glycolysis, TCA cycle, Glyoxylate cycle, Electron transport chain. Metabolism of lipids: Beta oxidation, Biosynthesis of fatty acids.

**Practical:**.

Preparation of solution, pH & buffers, Qualitative tests of carbohydrates and amino acids. Quantitative estimation of glucose/ proteins. Titration methods for estimation of amino acids/lipids, Effect of pH, temperature and substrate concentration on enzyme action, Paper chromatography/ TLC demonstration for separation of amino acids/ Monosaccharides.

**B.Sc. Agriculture (Hons.) Semester-II**

**FOR-123: Introduction to Forestry**

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

**Theory: 40**

**Practical: 20**

**Internal Assessment 10+5=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 – definitions of basic terms related to forestry, objectives of silviculture, forest classification, salient features of Indian Forest Policies. Forest regeneration, Natural regeneration - natural regeneration from seed and vegetative parts, coppicing, pollarding, root suckers; Artificial regeneration – objectives, choice between natural and artificial regeneration, essential 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; 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. Agroforestry – definitions, importance, criteria of selection of trees in agroforestry, different agroforestry systems prevalent in the country, shifting cultivation, taungya, alley cropping, wind breaks and shelter belts, home gardens. Cultivation practices of two important fast growing tree species of the region.

**Practical:**

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

**B.Sc. Agriculture (Hons.) Semester-II**

**BOT-124 Fundamentals of Crop Physiology**

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

**Theory: 40**

**Practical: 20**

**Internal Assessment 10+5=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 to crop physiology and its importance in Agriculture; Plant cell: an Overview; Diffusion and osmosis; Absorption of water, transpiration and Stomatal Physiology; Mineral nutrition of Plants: Functions and deficiency symptoms of nutrients, nutrient uptake mechanisms; Photosynthesis: Light and Dark reactions, Photorespiration, C3, C4 and CAM plants; Respiration: Glycolysis, TCA cycle and electron transport chain; 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. Photoperiodism and vernalisation, translocation of assimilates. Senecense and Abscission, fruit ripening and its hormonal regulation.

**Practical:**

Study of plant cells, structure and distribution of stomata, imbibitions, osmosis, plasmolysis, measurement of root pressure, rate of transpiration, Separation of photosynthetic pigments through paper chromatography, Rate of transpiration, photosynthesis, respiration, tissue test for mineral nutrients, estimation of relative water content, Measurement of photosynthetic $CO_2$ assimilation by Infra Red Gas Analyser (IRGA).

**B.Sc. Agriculture (Hons.) Semester-II**

**PBG-125 Fundamentals of Genetics**

**Time: 3 Hours** **Max. Marks: 75**
**Theory: 40**
**Practical: 20**
**Internal Assessment10+5=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:**

Pre and Post Mendelian concepts of heredity, Mendelian principles of heredity, Cell division – mitosis, meiosis, Probability and Chi-square. Dominance relationships, gene interaction.

Multiple alleles, pleiotropism and pseudoalleles, Sex determination and sex linkage, sex limited and sex influenced traits, Blood group genetics, Linkage and Numerical and its estimation, crossing over mechanisms, chromosome mapping. Structural and numerical changes in chromosome, Mutation, classification, Methods of inducing mutation & CIB technique, mutagenic agents and induction of mutation. Qualitative & Quantitative traits, Polygenes and continuous variations, multiple factor hypothesis, Epistatic interactions with examples. Cytoplasmic inheritance. Genetic disorders,. Nature, structure & replication of genetic material. Protein synthesis, Transcription and translational mechanism of genetic material, Gene concept: Gene structure, function and regulation, Lac and Trp operons.

**Practical**

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

**B.Sc. Agriculture (Hons.) Semester-II**

**EXT-126 Fundamentals of Agricultural Extension Education**

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

**Theory: 40**

**Practical: 20**

**Internal Assessment10+5=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:**

Meaning, definition & Types; Extension Education- meaning, definition, scope and process; objectives and principles of Extension Education; Extension Programme planning- Meaning, Process, Principles and Steps in Programme Development. Extension systems in India: extension efforts in pre-independence era (Sriniketan, Marthandam, Firka Development Scheme, Gurgaon Experiment, etc.) and post-independence era (Etawah Pilot Project, Nilokheri Experiment, etc.); various extension/ agriculture development programmes launched by ICAR/ Govt. of India (IADP, IAAP, HYVP, KVK, IVLP, ORP, ND,NATP, NAIP, etc.). New trends in agriculture extension: privatization extension, cyber extension/ e-extension, market-led extension, farmer-led extension, expert systems, etc.

Rural Development: concept, meaning, definition; various rural development programmes launched by Govt. of India. Community Dev.-meaning, definition, concept & principles, Physiology of C.D. Rural Leadership: concept and definition, types of leaders in rural context; extension administration: meaning and concept, principles and functions. Monitoring and evaluation: concept and definition, monitoring and evaluation of extension programmes; transfer of technology: concept and models, capacity building of extension personnel; extension teaching methods: meaning, classification, individual, group and mass contact methods, media mix strategies; communication: meaning and definition; models and barriers to communication. Agriculture journalism; diffusion and adoption of innovation: concept and meaning, process and stages of adoption, adopter categories.

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

## B.Sc. Agriculture (Hons.) Semester-II

**ENT-127** **Fundamentals of Entomology**

**Time: 3 Hours** **Max. Marks: 50**
**Theory: 20**
**Practical: 20**
**Internal Assessment 5+5=10**
**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:**

History of Entomology in India. Factors for insect's abundance. Major points related to dominance of Insecta in Animal kingdom. Classification of phylum Arthropoda upto classes. Relationship of class Insecta with other classes of Arthropoda. Morphology: Structure and functions of insect cuticle and molting. Body segmentation. Structure of Head, thorax and abdomen. Structure and modifications of insect antennae, mouth parts, legs, Wing venation, modifications and wing coupling apparatus. Structure of male and female genital organ. Metamorphosis and diapause in insects. Types of larvae and pupae. Structure and functions of digestive, circulatory, excretory, respiratory, nervous, secretary (Endocrine) and reproductive system, in insects. Types of reproduction in insects. Major sensory organs like simple and compound eyes, chemoreceptor.

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, basic groups of present day insects with special emphasis to orders and families of Agricultural importance like **Orthoptera**: Acrididae, Tettigonidae, Gryllidae, Gryllotalpidae; **Dictyoptera**: Mantidae, Blattidae; **Odonata**; **Isoptera**: Termitidae; **Thysanoptera**: Thripidae; **Hemiptera**: Pentatomidae, Coreidae, Cimicidae, Pyrrhocoridae, Lygaeidae, Cicadellidae, Delphacidae, Aphididae, Coccidae, Lophophidae, Aleurodidae, Pseudococcidae; **Neuroptera**: Chrysopidae; **Lepidoptera**: Pieridae, Papiloinidae, Noctuidae, Sphingidae, Pyralidae, Gelechiidae, Arctiidae, Saturnidae, Bombycidae; **Coleoptera**: Coccinellidae, Chrysomelidae, Cerambycidae, Curculionidae, Bruchidae, Scarabaeidae; **Hymenoptera**: Tenthridinidae, Apidae. Trichogrammatidae, lchneumonidae, Braconidae, Chalcididae; **Diptera**: Cecidomyiidae, Tachinidae, Agromyziidae, Culicidae, Muscidae, Tephritidae.

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

**B.Sc. Agriculture (Hons.) Semester-II**

**ENG-128 Communication Skill in English**

**Time: 3 Hours** **Max. Marks: 50**
**Theory: 40**
**Internal Assessment:10**
**Periods per week :6+0**

**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.

**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 eight skill-oriented questions from Listening and Speaking Skills. Each question will carry 5 marks. The question shall be phrased in a manner that students know clearly what is expected of them. There will be internal choice wherever possible.

vii. Making summary/precise or paraphrasing of an idea of a given passage.
viii. Writing a paragraph of expository or argumentative nature of a given topic.
ix. Interpretation of a given data, charts, diagrams etc and making a brief report.
x. Transcoding (given dialogue to a prose or given prose to dialogue )
xi. Write a press note on college activities.
xii. Do as directed (5x1=5marks) (change of voice, narration, combination of two simple sentence into one, subject verb agreement, using appropriate tense, forms of verbs)

(6x5=30)

**Presentation:-**

4. 10 Marks for presentation.
5. Topic for presentation will be based on the skills mentioned in syllabus. The Examiner is to be appointed by HOD.

**B.Sc. Agriculture (Hons.) Semester-II**

**GPB-129** **Punjabi (Compulsory)**

**Time: 3 Hours** **Max. Marks: 50**
**Theory: 40**
**Internal Assessment 10**
**Periods per Week 6+0**

## ਪਾਠ-ਕ੍ਰਮ ਅਤੇ ਪਾਠ-ਪੁਸਤਕਾਂ

1. **ਦੋ ਰੰਗ** (ਕਹਾਣੀ ਭਾਗ) (ਸੰਪਾ. ਹਰਜਿੰਦਰ ਸਿੰਘ ਢਿੱਲੋ ਅਤੇ ਪ੍ਰੀਤਮ ਸਿੰਘ ਸਰਗੋਧੀਆ), ਗੁਰੂ ਨਾਨਕ ਦੇਵ ਯੂਨੀਵਰਸਿਟੀ, ਅੰਮ੍ਰਿਤਸਰ।
2. **ਪੰਜਾਬ ਦੇ ਮਹਾਨ ਕਲਾਕਾਰ** (ਬਲਵੰਤ ਗਾਰਗੀ), ਗੁਰੂ ਨਾਨਕ ਦੇਵ ਯੂਨੀਵਰਸਿਟੀ, ਅੰਮ੍ਰਿਤਸਰ।
   ਲੇਖ : ਸਤੀਸ਼ ਗੁਜਰਾਲ, ਗੁਰਚਰਨ ਸਿੰਘ, ਠਾਕੁਰ ਸਿੰਘ, ਬਲਰਾਜ ਸਾਹਨੀ, ਸੁਰਿੰਦਰ ਕੌਰ।
3. **ਸ਼ਬਦ-ਬਣਤਰ ਅਤੇ ਸ਼ਬਦ ਰਚਨਾ** : ਪਰਿਭਾਸ਼ਾ, ਮੁਢਲੇ ਸੰਕਲਪ।
4. **ਸ਼ਬਦ ਸ਼੍ਰੇਣੀਆਂ**
5. **ਪੈਰ੍ਹਾ ਰਚਨਾ**
6. **ਪੈਰ੍ਹਾ ਪੜ੍ਹ ਕੇ ਪ੍ਰਸ਼ਨਾਂ ਦੇ ਉੱਤਰ**
7. **ਮੁਹਾਵਰੇ ਅਤੇ ਅਖਾਣ**

## ਅੰਕ-ਵੰਡ ਅਤੇ ਪਰੀਖਿਅਕ ਲਈ ਹਦਾਇਤਾਂ

1. ਕਿਸੇ ਕਹਾਣੀ ਦਾ ਸਾਰ ਜਾਂ ਉਸਦਾ ਵਿਸ਼ਾ ਵਸਤੂ (ਦੋ ਵਿਚੋਂ ਇਕ) **(8 ਅੰਕ)**
2. ਰੇਖਾ ਚਿਤਰ : ਸਾਰ, ਵਿਸ਼ਾ-ਵਸਤੂ, ਸ਼ਖ਼ਸੀਅਤ ਦੇ ਗੁਣ **(8 ਅੰਕ)**
   3-4. 3-4 ਨੰਬਰ ਉੱਤੇ ਦਿੱਤੀ ਵਿਆਕਰਣ ਦੇ ਆਧਾਰ ਤੇ ਵਰਣਨਾਤਮਕ ਪ੍ਰਸ਼ਨ **(8 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)**

**B.Sc. Agriculture (Hons.) Semester-II**

**BPB-129** **Basic Punjabi**

**Time: 3 Hours** **Max. Marks: 50**
**Theory: 40**
**Internal Assessment 10**
**Periods per Week 6+0**

## ਪਾਠ-ਕ੍ਰਮ ਅਤੇ ਪਾਠ-ਪੁਸਤਕਾਂ

1. **ਪੰਜਾਬੀ ਸ਼ਬਦ ਬਣਤਰ** : ਧਾਤੂ, ਵਧੇਤਰ (ਅਗੇਤਰ, ਮਧੇਤਰ, ਪਿਛੇਤਰ), ਪੰਜਾਬੀ ਕੋਸ਼ਗਤ ਸ਼ਬਦ ਅਤੇ ਵਿਆਕਰਣਿਕ ਸ਼ਬਦ **15 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 । 15 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 10 ਅੰਕਾਂ ਦੀ ਹੈ, ਜੋ ਕਾਲਜ ਵਲੋਂ ਨਿਰਧਾਰਿਤ ਦਿਸ਼ਾ ਨਿਰਦੇਸ਼ਾਂ ਅਨੁਸਾਰ ਇਨ੍ਹਾਂ ਅੰਕਾਂ ਤੋਂ ਵੱਖਰੀ ਹੋਵੇਗੀ। ਇਸ ਪੇਪਰ ਦੇ ਕੁਲ ਅੰਕ 40+10 = 50 ਹਨ।

## B.Sc. Agriculture (Hons.) Semester-II

**AGH-130** **Agriculture Heritage**

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

**Theory: 20**

**Internal Assessment=5**

**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. 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 of Indian agricultural heritage, status of farmers in society; advice by sages to kings on their duties towards farmers, soil management in ancient, medieval & pre-modern India and its relevance in modern day sustainable agriculture, heritage of crop & water management, plant growth and development & plant protection through vrikshayurveda and traditional knowledge. Heritage of medicinal plants and their relevance today, seed health in ancient & medieval history and its relevance to present day agriculture, description of Indian civilization and agriculture by travelers from China, Europe and United States, our journey in agriculture, green revolution and its impact and concerns, vision for the future.

**B.Sc. Agriculture (Hons.) Semester-III**

**AGR-211: Principles of Agronomy–I (Kharif Crops)**

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

**Theory: 40**

**Practical: 20**

**Internal assessment 10+5=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:**

Meaning and scope of Agronomy. Tillage and crops stand establishment. Planting geometry and its effect on growth and yield. Cropping systems. Origin, geographic distribution, economic importance, soil and climatic requirement, varieties, cultural practices and yield of *kharif* crops- rice, maize, sorghum, pearl millet, minor millets, pigeonpea, mungbean, urdbean, groundnut, sesame, soybean, cotton, jute , sunhemp and forage crops -sorghum, maize, cowpea, cluster bean and napier.

**Practical:**

Study of tillage implements. Practice of ploughing and pudding. Seed bed preparation, sowing, fertilizer application, nursery raising and transplanting of *Kharif* crops. Calculations of seed rate. Effect of seed size and sowing depth on germination. Identification of weeds of *Kharif* crops. Fertilizer experiments on rice, maize, sorghum and millets. Study of yield components. Study of crop varieties and important agronomic experiments. Study of forage crops.

**B.Sc. Agriculture (Hons.) Semester-III**

**BOT- 212: Crop Physiology**

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

**Theory: 40**

**Practical: 20**

**Internal assessment 10+5=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 crop physiology in agriculture. Seed structures, morpo-physiological and biochemical changes during seed development. Physiological and harvestable maturity. Seed germination seed dormancy. Growth and development. Crop water relations. Transpiration and its significance in relation to crop productivity. Water use efficiency. Significance of $C_3$ $C_4$ and CAM pathways. Photorespiration. Photosynthesis and crop productivity. Translocation of assimilates. Source and sink concept. Respiration its types and significance. Mineral nutrition, physiology of nutrient uptake, defiency and toxicity symptoms and hydroponics. Photoperiodism and vernalisation. Plant growth regulators-occurrence, biosynthesis, mode of action and commercial applications. Senecence and abscission. Fruit ripening and its hormonal regulation.

**Practical:**

Seed structure, germination and seed dormacy. Growth analysis. Calculation of growth parameters. Methods of measuring water status in roots, stems and leaves. Measurement of water potential. Absorption spectrum of chloroplastic pigments. Transpiration, Photosynthesis and Respiration. Stomatal frequency and Index. Deficiency symptoms of nutrients. Leaf anatomy of $C_3$ and $C_4$ plants.

## B.Sc. Agriculture (Hons.) Semester-III

**ENT-213: Insect Morphology and Systematics**

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

**Theory: 40**

**Practical: 20**

**Internal assessment 10+5=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:**

- Entomology- definition and its history.
- Factors for insect abundance.
- Integument, moulting, body regions and segmentation.
- Morphology and anatomy of an insect (Ak Grasshopper).
- Modification and function of mouth parts, antennae, legs and wings.
- Wing venation and wing coupling apparatus.
- Sense organs.
- Metamorphosis and diapause.
- Types of reproduction.
- Taxonomy- its importance, history, development and binomial nomenclature.
- Definitions of biotype, sub-species, species, genus, family and order.
- Classification of class Insecta upto orders, suborders and important families with special emphasis on distinguishing morphological characters.

**Practical:**

Collection and preservation of insects including immature stages.

- Morphology and anatomy of Grasshopper/Blister beetle.
- Different types of antennae, mouth parts, legs and wings.
- Wing venation and wing coupling apparatus.
- Types of larvae and pupae.
- Study of general characters of following orders and their families of agricultural importance- Odonata, Orthoptera, Dictyoptera, Isoptera, Thysanoptera, Hemiptera, Lepidoptera, Neuroptera, Coleoptera, Hymenoptera, Diptera

## B.Sc. Agriculture (Hons.) Semester-III

**EXT-214: Dimensions of Agricultural Extension**

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

**Theory: 40**

**Practical: 20**

**Internal assessment 10+5=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:**

Education- meaning and types. Extension Education and Agricultural Extension- meaning, objectives, principles and philosophy. Importance and problems of rural development. Agricultural and rural development programmes of pre and post independence era. Powers, functions and organizational set-up of three tier Panchayati Raj System. New trends in extension education and privatization of extension. Women development programmes. Emergence of broad based extension. Introduction and importance of rural sociology in agricultural extension. Indian rural society. Teaching- learning process. Principles of learning and their implications for teaching.

**Practical:**

Visit to Village Farmer's Club, Cooperative Agricultural Service Society, Panchayati Raj Institutions, District Rural Development Agency, Self Help Groups and Voluntary Organization. Identification of the agricultural problems using Participatory Rural Appraisal Techniques.

## B.Sc. Agriculture (Hons.) Semester-III

**FPM- 215: Farm Power and Machinery**

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

**Theory: 40**

**Practical: 20**

**Internal assessment 10+5=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:**

Farm power in India-sources, Internal Combustion (IC) engines and terminology, Working principles of two stroke and four stroke engines, Different systems of tractors, types and selection. Primary and secondary tillage implements. Implements for intercultural operations, seed drills, paddy tranplanters, their calibrations. Plant protection. harvesting and threshing equipment. Cost of operation of tractor and machinery.

**Practical:**

Study of different components of IC engine, working of two stroke and four stroke engines. Various, systems of taractors, Study of Mould Board (MB) plough, measurement, plough size, different parts, horizontal and vertical suction, Disc plough, Seed-cum-fertilizer drills, furrow opener, metering mechanism and calibration. Study of different parts, alignment and operation of mowers. Registration procedures. Study of different inter cultivation equipments, paddy transplanters and threshing systems. Repair adjustment and operation of sprayers and dusters.

## B.Sc. Agriculture (Hons.) Semester-III

**SSC-216: Manures and Fertilizers**

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

**Theory:**

Fertilizers – classification, manufacturing processes and properties of major nitrogenous (ammonium sulphate, urea, calcium ammonium nitrate, ammonium nitrate, ammonium sulphate nitrate), phosphatic (single super phosphate, enriched super phosphate, diammonium phosphate, ammonium poly phosphate), potassic and complex fertilizers, their fate and reactions in the soil. Secondary and micronutrient fertilizers and amendments. Fertilizer Control Order. Fertilizer storage. Biofertilizers and their advantages. Manures - bulky and concentrated, Farm Yard Manure. Composting – different methods, mechanical compost plants, vermicomposting, green manuring, oil cakes. Sewage and sludge – biogas plant slurry, plant and animal refuges.

## B.Sc. Agriculture (Hons.) Semester-III

**FSC-217: Production Technology of Fruit Crops**

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

**Theory: 40**

**Practical: 20**

**Internal assessment 10+5=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:**

Definition, importance and divisions of horticulture. Climatic zones, area and production of different fruit crops. Selection of site, fencing and wind break. Planting systems, high density planting, planning and establishment. Propagation methods and use of rootstocks. Methods of training and pruning. Use of growth regulators in fruit production. Package of practices for the cultivation of – Major fruits –mango, banana, citrus, grapes, guava, sapota, apple, litchi and papaya. Minor fruits – pineapple, annonaceous fruits, pomegranate, ber, fig, loquat, phalsa, jackfruit, pear, plum, peaches, apricot and cherry.

**Practical:**

Horticultural tools and their uses. Containers and potting mixtures. Plant and seed propagation, scarification, and stratification. Layout and planting systems. Methods of pruning and training. Training of ber, grape and pomegranate. Pruning of ber, grape, phalsa, fig, apple, pear, peach. Identification of important species and varieties of fruits. Irrigation methods including drip and micro irrigation. Methods of fertilizer application. Preparation of growth regulators, powder, solution and lanolin paste for propagation. Application of growth regulators for improving fruit set, fruit size, quality, delaying and hastening ripening. Visit to local commercial orchards.

## B.Sc. Agriculture (Hons.) Semester-III

**SSC-218: Soil Physics and Erosion Management**

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

**Theory: 40**

**Practical: 20**

**Internal assessment 10+5=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:**

Soil – a water reservoir, role in water cycle. Computation of depletion and accretion of profile water. Forces of water retention. Soil water potential - components and distribution above and below water table. Soil-plant-atmosphere continuum, Indices of plant water status. Soil moisture characteristics, Evaporation in the presence and absence of water table, Components of water balance and their computation. Soil erosion by water – types, effects, mechanics. Rain erosivity and soil erodibility. Runoff – methods of measurement, factors and management, runoff farming. Soil conservation measures.

**Practical:**

Measurement and analysis of rainfall data. Determination of soil moisture, infiltration and drainage characteristics in the field. In situ determination of soil moisture by neutron probe and tensiometery. Soil moisture characteristics. Advancement of wetting front in homogeneous and layered soil columns. Measurement of soil evaporation under differential surface conditions. Estimation of erosivity and erodibility indices. Measurement and estimation of runoff and soil loss.

## B.Sc. Agriculture (Hons.) Semester-III

**FST-219 Introduction to Food Science and Post-Harvest Value Addition**

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

**Theory= 40**

**Practical = 20**

**Internal Assessment 10+5=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 production and consumption trends in India. Major deficiencies of calories and proteins. Food groups and concept of balanced diet. Causes of food spoilage. Principles of processing and preservation of foods by heat, low temperature, chemicals and fermentation. Preservation through ultraviolet and ionizing radiations. Post harvest handling and technology of fruits, vegetables, cereals, oilseeds, milk, egg, meat and poultry. Food safety, adulteration and food laws. Status of food industry in India.

**Practical:**

Quality assessment of cereals, fruits, vegetables, milk, egg, meat and poultry. Value added products from cereals, fruits, vegetables, milk, egg and meat. Visit to local processing units.

**B.Sc. Agriculture (Hons.) Semester-III**

**ESL-221*** **ENVIRONMENTAL STUDIES-I**

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

**Theory: 40**

**Internal Assessment: 10**

**Periods per week 2+0**

**Section A (12 Marks):** It will consist of five short answer type questions. Candidates will be required to attempt three questions, each question carrying four marks. Answer to any of the question should not exceed two pages.

**Section B (16 Marks)**: It will consist of four essay type questions. Candidates will be required to attempt two questions, each question carrying eight marks. Answer to any of the question should not exceed four pages.

**Section C (12 Marks):** It will consist of two questions. Candidate will be required to attempt one question only. Answer to any of the question should not exceed five pages.

**1. The multidisciplinary nature of environmental studies:**

Definition, scope and its importance

Need for public awareness.

**2. Natural resources**:

Natural resources and associated problems:

**(a) Forest resources** :

Use of over 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 or 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.

**3. 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)

**4. 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.

**B.Sc. Agriculture (Hons.) Semester-IV**

**AGR-221 Principles of Agronomy- II (Rabi Crops)**

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

**Theory: 40**

**Practical: 20**

**Internal assessment 10+5=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:**

Origin, geographic distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of *rabi* crops- wheat, barley, chickpea, lentil, peas, french bean, rapeseed and mustard, sunflower, safflower, linseed, sugarcane, sugarbeet, potato, tobacco and forage crops- berseem, lucerne and oats. National and International Agricultural Research Institutes in India.

**Practical:**

Study of manures, fertilizers and green manure crops. Study of interculture implements. Methods of fertilizer application. Seed bed preparation and sowing of wheat, sugarcane and sunflower. Calculations of seed rate. Identification of weeds in wheat and grain legumes. Morphological characteristics of wheat, sugarcane, chickpea and mustard. Yield components of wheat and sugarcane.

## B.Sc. Agriculture (Hons.) Semester-III

**PBG-222** **Principles of Seed Technology**

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

**Theory: 40**

**Practical: 20**

**Internal assessment 10+5=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 of seed production. Certified, foundation and breeder seed production. Maintenance of genesis purity. Seed quality and classes of seed Maintenance and multiplication of pre-release and newly released varieties of self and cross-pollinated crops. Seed production in maize, bajra and sorghum (varieties, hybrids, synthesis and composites), rice (varieties and hybrids) castor, tomato, brinjal, chillies, bhindi, onion, bottle gourd and ridge gourd. Seed certification. Seed Act and its enforcement. Intellectual Property Rights. Patenting, WTO, Plant Breeders Rights. Principal and methods of seed drying. Seed processing. Planning and layout of seed processing plant. Different upgrading equipments and their use. Seed testing procedures for quality assessment. Seed treatment and its importance. Seed packing and storage. Seed marketing and organizational set up.

**Practical:**

Seed sampling principles and procedures. Determination of physical purity, germination moisture, viability, seed health and seed vigour of field and horticulture crops. Seed dormacy and breaking methods. Grow-out tests and electrophoresis for varietal identification. Visit to seed production plots, testing laboratories, processing plants, grow-out testing farms and hybrid seed production farms.

## B.Sc. Agriculture (Hons.) Semester-IV

**ENT-223 Insect Ecology and Integrated Pest Management**

**Time: 3 Hours** **Max. Marks: 75**
**Theory: 40**
**Practical: 20**
**Internal assessment 10+5=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:**

- Insect Ecology- Introduction, environment and its components,
- Effect of abiotic and biotic factors.
- Biotic potential, environmental resistance and causes for pest outbreaks in agroecosystem.
- Pest surveillance and pest forecasting.
- Categories of pests.
- Host plant resistance, cultural, mechanical, physical, legislative and biological control.
- Chemical control- importance, hazards and limitations.
- IPM its tools and limitations.
- Classification, toxicity and formulations of insecticides.
- Study of important insecticides- botanical, organophosphates, carbamates, synthetic pyrethroids. Novel insecticides, pheromones, nicotinyl, chitin synthesis inhibitors, phenyl pyrazoles, avermectins, macrocyclic lactones, oxadiazines, thiourea derivatives, pyridine azomethines, pyroles, etc.,
- Rodenticides, acaricides and fumigants.
- Recent methods of pest control.
- Insecticides Act 1968.
- Symptoms of poisoning, first aid and antidotes.
- Beneficial insects- Important species of pollinators, weed killers and scavengers, their importance.
- Non insect pests- mites, rodents and birds.

## B.Sc. Agriculture (Hons.) Semester-IV

**ENT-223 Insect Ecology and Integrated Pest Management**

**Practical:**

- Study of terrestrial and pond ecosystems, behaviour, orientation, distribution patterns of insects and sampling techniques for the estimation of insect population and damage.
- Pest surveillance through light and pheromone traps.
- Practicable IPM practices.
- Insecticides and their formulations,
- Calculation of doses of insecticides.
- Compatibility of pesticides.
- Phytotoxicity of insecticides.
- IPM case studies.
- Identification of common phytophagous mites, rodent, bird pests and their damage.
- Other beneficial insects – pollinators, weed killers and scavengers.

## B.Sc. Agriculture (Hons.) Semester-IV

### EXT-224 Extension Methodologies and Communication Skills for Transfer of Technology

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

**Theory: 40**

**Practical: 20**

**Internal assessment 10+5=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:**

Meaning, nature, importance, elements, models and barriers in communication. Extension programme planning. Principles and steps in programme development process. Monitoring and evaluation of extension programmes. Extension teaching methods and factors influencing their selection and use. Combination (Media Mix) of teaching methods. Innovative information sources. Audio – visual aids; selection, preparation, use and evaluation. Meaning, scope and importance of agricultural journalism. Diffusion and adoption of innovations. Models of adoption process. Factors influencing adoption process. Capacity building of extension personnel and farmers. Communication skills for effective transfer of technology. Organizing seminars and conferences.

**Practical:**

Simulated exercises on communication. Developing a project based on identified problems in a selected village. Organization of group discussion and method demonstration. Visit to Krishi Vigyan Kendra. Planning and script writing for radio and television talks. Planning and preparation of visual aids and agricultural information materials. Handling of public address system.

**B.Sc. Agriculture (Hons.) Semester-IV**

**LPM-225 Livestock Production and Management**

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

**Theory: 40**

**Practical: 20**

**Internal assessment 10+5=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:**

Place of livestock in the national economy. Livestock development programmes of Govt. of India and State Govt. Important exotic and Indian breeds of cattle, buffalo, sheep, goat and swine. Measures and factors affecting fertility in livestock. Reproductive behaviour, estrous cycle, detection of estrous, Artificial Insemination (AI), pregnancy and parturition in various livestock species. Care of pregnant animal and new born young one. Physiology of milk secretion and different milking methods. Factors affecting milk yield and composition. Selection procedure and various systems of breeding in livestock. Feeding management of calves, heifers, pregnant and milch animals. Feeding and management of sheep, goat and swine. Housing principles for livestock. Vaccination and prevention of important diseases of livestock and poultry. Important breeds of poultry, egg formation, abnormal eggs and factors affecting egg size. Moulting, incubation, hatching and brooding. Housing, breeding, feeding and management of poultry. Biotechnological interventions in animal production and reproduction.

**Practical:**

Visit to livestock farms and breed identification. Study of external body parts. Handling and restraining of animals. Judging of animals. Milking methods. Feeding and ration formulation. Record keeping. Study of reproductive organs and artificial insemination in cattle and buffaloes. Study of physiological norms. Hatching, housing and management of poultry. Economics of various livestock enterprises.

**B.Sc. Agriculture (Hons.) Semester-IV**

**AGR- 226 Organic Farming**

**Time: 3 Hours** **Max. Marks: 75**
**Theory: 40**
**Practical: 20**
**Internal assessment 10+5=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:**

**(In collaboration with Department of Soil Science, Entomology and Plant Pathology)**

Organic farming- introduction, concept, relevance in the present context. Organic production requirements. Biological intensive nutrient management. Recycling of organic residues. Soil improvement and amendments. Integrated diseases and pest management. Use of biocontrol agents, biopesticides, pheromones, trap crops and bird perches. Weed management. Quality considerations - certification, labeling and accreditation processors, marketing and exports.

**Practical:**

Raising of vegetable crops through organic sources. Diseases and pest management. Vermicomposting. Vegetable and ornamental nursery raising. Macro quality analysis. Grading, packaging and post harvest management.

## B.Sc. Agriculture (Hons.) Semester-IV

**FCL-227 Flower Cultivation and Landscape Gardening**

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

**Theory= 40**

**Practical = 20**

**Internal Assessment 10+5=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 to floriculture and landscaping. Package of practices for rose, jasmine, chrysanthemum, gladiolus, marigold and tuberose. Planning of gardens. Landscape-art principles, Formal and informal gardens. Use of trees, shrubs, climbers, houseplants and seasonal flowers in the gardens. Making and maintenance of lawns.

**Practical:**

Identification of trees, shrubs, climbers, houseplants, seasonal flowers. Layout of lawns and maintenance. Potting, repotting and maintenance of houseplants. Training and pruning of rose. Pinching and disbudding chrysanthemum. Planning of gardens and development of garden features. Post-harvest handling of cut flowers.

## B.Sc. Agriculture (Hons.) Semester-IV

**SWE-228 Fundamentals of Soil and Water Conservation Engineering**

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

**Theory: 40**

**Practical: 20**

**Internal assessment 10+5=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:**

Surveying-survey equipments, chain survey. Plotting procedure. Calculations of area of regular and irregular fields. Levelling-equipment, terminology, methods of calculation, Types of levelling and contouring. Irrigation-classification of projects, flow irrigation and lift irrigation. Water sources. Water lifting devices-pumps. their capacity and power calculations. Irrigation water measurement-weirs, flumes and orifices. Water conveyance systems-open channel and underground pipeline. Sureface, drip and sprinkler irrigation methods. Soil and water conservation, soil erosion, types and control measures.

**Practical:**

Acquaintance with chain survey equipment. Ranging and measurement of offsets. Chain triangulation and plotting. Levelling equipment. Differential levelling. Profile levelling. Contour survey and plotting. Study of centrifugal pumping system and irrigation water measuring devices. Surface irrigation methods. Study of different components of sprinkler and drip irrigation systems. Uniformity of water application in drip and sprinkler systems. Study of soil and water conservation measures.

## B.Sc. Agriculture (Hons.) Semester-IV

**MGT-229 Fundamentals of Agri. Business Management and Entrepreneurship Development**

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

**Theory= 40**

**Internal Assessment =10**

**Periods per week 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.

**Theory:**

Agri-business –meaning, definition, features and structure of agri-business (Input, Farm and processing sectors). Importance of agri-business in the Indian economy. Management-definitions importance and functions, planning-meaning, definition and process. Types of plans and characteristics of a sound plan. Introduction to organizing, staffing, directing and controlling. Introduction to marketing management-components of marketing mix. Project definitions, Project cycle-identification, formulation, appraisal, implementation , monitoring and evaluation . Entrepreneurship development-concept of entrepreneurship, entrepreneurial and managerial characteristics. Overview of Indian social, political and economic systems and their implications for decision making by individual entrepreneurs. Procedure and constraints in setting up agro – based industries.

**B.Sc. Agriculture (Hons.) Semester-IV**

**ESL-222*** **ENVIRONMENTAL STUDIES-II**

**Time: 3 Hours** **Max. Marks: 50**
**Theory: 40**
**Internal Assessment: 10**
**Periods per week 2+0**

**Section A (12 Marks):** It will consist of five short answer type questions. Candidates will be required to attempt three questions, each question carrying four marks. Answer to any of the question should not exceed two pages.
**Section B (16 Marks)**: It will consist of four essay type questions. Candidates will be required to attempt two questions, each question carrying eight marks. Answer to any of the question should not exceed four pages.
**Section C (12 Marks):** It will consist of two questions. Candidate will be required to attempt one question only. Answer to any of the question should not exceed five pages.

**1. 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.

**2. 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.

**3. Human Population and Environment:**

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

**4. 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.

**Note:** In this section the students will be required to visit and write on the environment of an area/ ecosystem/vi1lage industry/disaster/mine/dam/agriculture field/waste management/ hospital etc. with its salient features, limitations, their implications and suggestion for improvement.

**B.Sc. Agriculture (Hons.) Semester-V**

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

**Time: 3 Hours** **Max. Marks: 25**
**Practical = 20**
**Internal Assessment =05**
**Periods per week =0+3**

**Practical:**

Crop planning. Raising field crops in multiple cropping systems using improved agronomic practices. Field preparation, seed treatment, nursery raising, sowing. Management of nutrient, water, weed, insect pests and diseases of crops. Harvesting, threshing, drying, winnowing, storage and marketing of produce. Preparation of balance sheet including cost of cultivation, net returns per student.

## B.Sc. Agriculture (Hons.) Semester-V

**AGR-312** **Water Management and Micro Irrigation**

**Time: 3 Hours**

**Max. Marks: 75**
**Theory: 40**
**Practical: 20**
**Internal assessment 10+5=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:

Definition and objectives. Water resources and irrigation development in India and Punjab. Plant water relationships. Crop water requirement and their determination methods. Effective rainfall, mulching and criteria of scheduling irrigation. Methods of irrigation- surface, sprinkler and drip irrigation. Irrigation efficiency. Conjunctive use of water. Water management in rice, wheat, maize, cotton, groundnut, sugarcane, mango, banana and tomato. Agricultural drainage.

### Practical:

Determination of bulk density and field capacity by field methods. Determination of permanent wilting point. Measurement of irrigation water through flumes and weirs. Calculation of irrigation water requirement. Demonstration of furrow, check basin and basin methods of irrigation. Cost estimation of drip irrigation system. Demonstration of filter cleaning, fertigation, injection and flushing of laterals. Erection and operation of sprinkler irrigation system. Measurement of emitter discharge rate, wetted diameter and calculation of emitter discharge variability. Visit to farmers' field.

## B.Sc. Agriculture (Hons.) Semester-V

### CHE-313 Chemistry of Agrochemicals, Plant Products and Growth Regulators

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

**Theory= 20**

**Practical = 20**

**Internal Assessment 05+05=10**

**Periods per week 2+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:**

**O**rganic chemistry as prelude to agro chemicals. Diverse types of agrochemicals, Botanical insecticides (neem), pyrethrum, synthetic pyrethroids, Synthetic organic insecticides, major classes of important insecticide, their chemistry and uses. Fungicides major- classes chemistry and uses of carbendizim, carboxin, captan, tridemorph and copper oxychloride. Plant growth regulators. Herbicides-major-classes. Chemistry and uses of 2,4D, atrazine , glyphosate, butachlor, benthiocarb.

**Practical:**

Argentometric and iodometric titrations- their use in analysis of important pesticides Compatibility of fertilizers with pesticides.

**B.Sc. Agriculture (Hons.) Semester-V**

**AGE-314 Agricultural Marketing, Trade and Prices**

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

**Theory= 40**

**Practical = 20**

**Internal Assessment 10+5=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 Marketing-concept. Definition, scope, components, classification, market structure, conduct and performance, Market functionaries, Producer's Surplus- meaning types, marketable surplus, marketed surplus, Market integration-meaning definition, types. Marketing efficiency- Meaning, definition, marketing costs, margins and price spreads, Trade-domestic trade, free trade, international trade. World trade Organisation implications of Agreement on agriculture, Market access- domestic support export subsidies, Export-Import polity. Co-operative marketing, State trading, public procurement agencies, Quality control of agricultural products Agricultural marketing polity. Risk in marketing, speculations and hedging, Future trading, Contract farming.

**Practical:**

Identification of Marketing channels, Study of apni mandi, regulated markets, unregulated markets, livestock markets, Price spread analysis, Visit to market institutions. Analysis of information of daily prices, marketed and marketable surplus of different commodities.

## B.Sc. Agriculture (Hons.) Semester-V

**PPL-315 Plant Pathogens and Principles of Plant Pathology**

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

**Theory: 40**

**Practical: 20**

**Internal assessment 10+5=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, importance and general characters of fungi, bacteria, fastidious bacteria, nematodes, phytoplasmas, spiroplasmas, viruses, viroids, algae, protozoa and phanerogamic parasites . Definition, objectives, history, terms and concept of plant pathology. Survival and dispersal of plant pathogens. Phenomenon of infection. Study of genera *Pythium, Phytophthora, Albugo, Sclerospora, Plasmopara, Rhizopus, Oidium, Erysiphe, Puccinia, Hemileia, Ustilago, Agaricus, Pleurotus, Ganoderma, Colletotrichum, Pyricularia, Trichoderma, Fusarium, Alternaria, Cercospora, Sclerotinia, Xanthomonas, Pseudomonas, Meloidogyne and Anguina* . Defence mechanisms in plants. Plant disease epidemiology and forecasting. General principles of plant disease management. Plant quarantine and inspection. Genetic, cultural, biological, physical and chemical methods of plant disease management. Integrated plant disease management .

**Practical:**

Acquaintance to plant pathology laboratory equipments. Preparation of culture media for fungi and bacteria. Isolation techniques and preservation of plant disease samples. Study of important plant pathogenic genera. Demonstration of Koch's postulates. Study of different groups of fungicides and antibiotics. Bio-control of plant pathogens. Visit to remote sensing laboratory and experimental area.

**B.Sc. Agriculture (Hons.) Semester-V**

**ENT-316 Insect Pests of Crops and Stored Grains**

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

**Theory= 40**

**Practical = 20**

**Internal Assessment 10+5=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:**

Distribution, biology, symptoms of damage and management strategies of insect pests of rice, sorghum, maize, cotton, groundnut, sugarcane, ragi (*Eleucine coracana*), wheat, pulses, sunflower, mustard, brinjal, bhindi, tomato, cruciferous and cucurbitaceous vegetables, potato, chillies, mango, citrus, grapevine, banana, pomegranate, guava, ber, apple, turmeric, onion, garlic, ginger, rose & gladiolus Stored grain insect pests-their biology damage and management.

**Practical:**

Identification of insect pests, their damage symptoms and management of rice, sorghum, maize, wheat, sugarcane, cotton, pulses, solanaceous, malvaceous, cruciferous and cucurbitaceous vegetables, chilli, mango, citrus, sapota and stored grains.

**B.Sc. Agriculture (Hons.) Semester-V**

**PBG-317 Principles of Plant Breeding**

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

**Theory= 40**

**Practical = 20**

**Internal Assessment 10+5=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:**

Classification of plants, botanical description, floral biology, emasculation and pollination techniques in cereals, millets, pulses, oilseeds, fibers, plantation crops etc. Aims and objectives of Plant Breeding; Modes of reproduction. Significance in plant breeding; Modes of pollination and their genetic consequences. Methods of breeding – Introduction and Acclimatization; Selection, Johannsen's pure-line theory, genetic basis, pure-line selection; Hybridization, aims and objectives, types of hybridization; Methods of handling segregating generations, pedigree method, bulk method, back cross method; Incompatibility and male sterility and their utilization in crop improvement; Heterosis, inbreeding depression, exploitation of hybrid vigor, development of inbred lines, single-cross and double-cross hybrids; population improvement programmes, recurrent selection, synthetics and composites; Methods of breeding vegetatively propagated crops, clonal selection; Mutation breeding; Ploidy breeding; Wide hybridization and its significance in crop improvement.

**Practical:**

Botanical description and floral biology; Study of megasporogenesis and microsporogenesis. Fertilization and life cycle of an angiospermic plant; Plant Breeder's kit: Hybridization techniques and precautions to be taken; Floral morphology, selfing, emasculation and crossing techniques. Field crops: rice**,** sorghum, maize, wheat, bajra, sugarcane, brassicas, groundnut, sunflower, sesamum, red gram, bengal gram, green gram, soybean, black gram, cotton, chillies, brinjal, tomato, bhindi, onion and bottle gourd. Study of male sterility and incompatibility.

**B.Sc. Agriculture (Hons.) Semester-V**

**BIT-318 Principles of Plant Biotechnology**

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

**Theory= 40**

**Practical = 20**

**Internal Assessment 10+5=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:**

Concepts and history of plant tissue culture and plant genetic engineering. Scope and importance of plant tissue culture in crop improvement. Culture media for in-vitro cultures. Cellular totipotency, Sterilization of glassware, explants and culture media, Role of plant growth regulators in tissue culture, Culture techniques. Micro-propagation and somatic embryogenesis. Meristem culture, embryo culture and anther culture. Virus free plant production, haploid plant production and production of synthetic seed. Hybrid embryo rescue technique. Acclimatization of tissue culture raised plants. Protoplast isolation and culture. Somatic cell hybridization and cybridization. Production of secondary metabolites by plant tissue culture. Production of transgenic plants. Direct and indirect method of gene transfer. Vectors for gene transfer. Ti plasmid, Agrobacterium mediated genetic transformation. Risk associated with production and commercialization of transgenic plants. Applications of plant tissue culture and genetic engineering in agriculture.

**Practical:**

Requirements for Plant Tissue Culture Laboratory. Techniques in Plant Tissue Culture. Media components and preparations. Sterilization techniques and Inoculation of various explants. Aseptic manipulation of various explants. Callus induction and Plant Regeneration. Micro propagation of important crops. Anther, Embryo and Endosperm culture. Hardening / Acclimatization of regenerated plants. Somatic embryogenesis and synthetic seed production. Isolation of protoplast. Demonstration of Culturing of protoplast. Demonstration of isolation of DNA. Demonstration of gene transfer techniques- direct methods. Demonstration of gene transfer techniques- indirect methods. Demonstration of confirmation of genetic transformation. Demonstration of gel-electrophoresis techniques.

**B.Sc. Agriculture (Hons.) Semester-V**

**DAI-319** **Dairy Technology**

**Time: 3 Hours** **Max. Marks: 75**
**Theory=40**
**Practical = 20**
**Internal Assessment 10+5=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:**

Milk: Present status of milk production and availability in India and Abroad, sources of milk, Definition, Composition of milk of various species, important characteristics of major constituents of milk viz. milk fat, milk proteins, lactose and minerals. Minor constituents of milk. Factors affecting the quality and quantity of milk produced by mikh animals. Physical, chemical and Nutritive properties of milk. Market Milk : Brief introduction to Standard milk, Toned milk, Double toned milk, Flavored milk, Vitamin enriched milk, Reconstituted milk and recombined milk. Legal and ISI standards of milk. Adulterations of milk and its detection. Common preservative used in milk and their detection. Clean milk production. Milk Processing : Processes of straining, Filtration and clarification. Standardization : Definition of standardization, purpose and uses of standardization process. Use of Pearson's square method to solve the standardization problems in dairy industry. Homogenization : Definition, Effect of homogenization on milk. Uses of homogenization. Checking the effectiveness of homogenization. Pasteurization : Definition, purposes and objects of pasteurization – LTLT and HTST processes of pasteurization. Cream: Different types of cream, composition, production methods. Butter : Types of butter, composition. Cheese : Classification of cheese. Preparation methods of cheddar cheese.

**Practical**:

BIS and legal standards of milk and milk products, Sampling equipment and sampling of milk. Different types of milk samples. Platform tests ( Acidity, COB, and Alcohol test.) Organoleptic Tests : (Physical examination of milk). Determination of milk fat percentage by Gerber's method. Determination of specific gravity by lactometer. Determination of SNF percentage and TS percentage of milk with lactometer. Reporting on the suitability of milk for heat processing. Reporting on the quality of given sample of milk. Visit to milk processing plants. Preparation of flavored milk.

**B.Sc. Agriculture (Hons.) Semester-VI**

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

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

**Practical = 20**

**Internal Assessment =05**

P**eriods per week =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.

**Practical:**

Crop planning. Raising field crops in multiple cropping systems using improved agronomic practices. Field preparation, seed treatment, nursery raising, sowing, nutrient management, water management, weed management and management of insect pests and diseases of crops. Harvesting, threshing, drying, winnowing, storage and marketing of produce. Preparation of balance sheet including cost of cultivation, net returns per student.

## B.Sc. Agriculture (Hons.) Semester-VI

**EST-322** **Renewable Energy**

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

**Theory= 40**

**Practical = 20**

**Internal Assessment 10+5=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:**

Energy sources- Introduction and classification. Types of Biogas plants and utilization of biogas. Agricultural wastes. Principles of combustion, Pyrolysis and gasification. Types of gasifiers, producer gas and its utilization .Briquettes- briquetting machine, uses of briquittes. Solar energy- solar flat plate and focusing plate collectors. Introduction to solar air heaters, cookers, water heating systems, grain dryers, refrigeration system, ponds, lantern, street lights, fencing and pumping systems. Wind energy-types and application of wind mills. Liquid bio fuels-bio diesel and ethanol from agricultural produce and its uses.

**Practical:**

Constructional details of biogas plant. Constructional details of different types of gasifiers. To study and find the efficiency of solar cooker, dryers, domestic water heater. Performance of wind mills. Field visit to biogas plants and wind mills. Bio-diesel preparation.

## B.Sc. Agriculture (Hons.) Semester-VI

**STA-323** **Basic Statistics**

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

**Theory= 40**

**Practical = 20**

**Internal Assessment 10+5=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:**

Definition of statistics, its use and limitations. Frequency distribution and frequency curves. Measures of central tendency. Measures of dispersion. Probability. Normal distribution and its properties. Introduction to sampling. Tests of significance, SND test for means (single sample and two samples), Student's t-test for single sample, two samples and paired t-test. F-test. Chi-square test in 2x2 contingency table. Yate's correction for continuity. Correlation. Computation of correlation coefficient 'r' and its testing. Liner regression of Y on X and X on Y. Interrelationship between 'r' and the regression coefficients. Layout and analysis of Completely Randomized Design (CRD), Randomized Block Design (RBD) and Latin Square Design (LSD).

**Practical:**

Construction of frequency distribution tables and frequency curves, computation of arithmetic mean, median, mode, standard deviation, variance and coefficient of variation for ungrouped and grouped data, SND test for means, Student's t-test, F-test, Chi-square test. Correlation coefficient 'r' and its testing, Fitting of regression equations. Analysis of CRD, RBD and LSD.

## B.Sc. Agriculture (Hons.) Semester-VI

### AGE-324: Production Economics, Farm Management and Agricultural Finance

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

**Theory: 40**

**Practical: 20**

**Internal assessment 10+5=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 Economics- meaning, definition, nature and scope, Laws of returns, Factor Product Relationship- determination of optimum input and output. farm Management- meaning , definition and importance, Economic Principles applied to the organizations of farm business, types and systems of farming, Farm Planning and Budgeting . Risk and Uncertainty. Agricultural Financial -nature and scope, compounding and discounting. Agricultural credit-meaning,definition , need and classification, Credit appraisal, History of financing agriculture in India. Agricultural Financial Institutions. Assessment of crop losses. Determination of compensation, Crop insurance. Agricultural Cooperation. philosophy and principles. History of Indian co-operative credit structure. Reoganization of cooperative credit structure and single window system.

**Practical:**

Methods of depreciation. Analysis of net-worth statement. Farm inventory Analysis preparation of farm plans and budgets, profit and loss account. Break-even analysis. Economic analysis of different crop and livestock enterprises. Compounding and discounting. Preparation of balance sheet. income statement and cash flow analysis, Estimation of credit needs, Determination of unit cost. Preparation and analysis of loan proposals.

## B.Sc. Agriculture (Hons.) Semester-VI

**PPL-325 Diseases of Field Crops and their Management**

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

**Theory: 40**

**Practical: 20**

**Internal assessment 10+5=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:**

Economic importance, symptoms, causal organism, epidemiology, disease cycle and integrated management of diseases of rice, sorghum, *bajra*, maize, wheat, barley, sugarcane, turmeric, tobacco, groundnut, sesamum, castor, sunflower, rapeseed & mustard, cotton, pulses, mentha and *berseem*.

**Practical:**

Study of symptoms and host-parasite relationships of important diseases of field crops. Field visits at appropriate time during the semester.

## B.Sc. Agriculture (Hons.) Semester-VI

**PPL-326 Diseases of Horticultural Crops and their Management**

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

**Theory= 40**

**Practical = 20**

**Internal Assessment 10+5=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:**

Economic importance, symptoms, causal organism, disease cycle and integrated management of diseases of citrus, mango, banana, grapevine, pomegranate, papaya, guava, sapota, *ber*, apple, pear, peach, plum, chilli, brinjal, okra, potato, crucifers, cucurbits, tomato, pea, beans, onion, garlic, mulberry, tea, rose, chrysanthemum, gladiolus, marigold and jasmine.

**Practical:**

Study of symptoms and host-parasite relationships of important diseases of horticultural crops. Field visits at appropriate time during the semester.

**B.Sc. Agriculture (Hons.) Semester-VI**

**PBG-327 Breeding of Field and Horticultural Crops**

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

**Theory= 40**

**Practical = 20**

**Internal Assessment 10+5=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:**

Breeding objectives and important concepts of breeding self-pollinated, cross-pollinated and vegetatively propagated crops; Study in respect of origin, distribution of species, wild relatives and forms, Cereals, (rice, wheat, maize, millets, sorghum, bajra); Pulses (red gram, green gram, black gram, soybean); Oilseeds (Groundnut, sesame, sunflower, brassicas) etc,Fibres (Cotton) etc, Vegetables (Tomato, bhindi, chilli, cucumbers); Flowers crops (Chrysanthemum, rose, gaillardia and marigold); Fruit crops (amla, guava, mango, banana, papaya); Major breeding procedures for development of hybrids/varieties of various crops; Plant genetic resources, their conservation and utilization in crop improvement; Ideotype concept in crop improvement; Breeding for resistance to biotic and abiotic stresses. Variability in pathogens and pests; Genetic basis of adaptability to unfavourable environments; Definition of biometrics, assessment of variability i.e., additive, dominance and epistasis and their differentiation; genotype x environment interaction and influence on yield/performance. IPR and its related issues.

**Practical:**

Emasculation and Hybridization techniques; Handling of segregating generations- pedigree method, bulk method, back cross methods; Field layout of experiments; Field trials, maintenance of records and registers; Estimation of heterosis and inbreeding depression; Estimation of heritability; General and Specific Combining Ability(GCA and SCA); Estimation of variability parameters; Parentage of released varieties/hybrids; Study of quality characters; Sources of donors for different characters; Visit to seed production and certification plots; Visit to AICRP trials and programmes;

## B.Sc. Agriculture (Hons.) Semester-VI

**PFE-328 Protected Cultivation and Post Harvest Technology**

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

**Theory= 40**

**Practical = 20**

**Internal Assessment 10+5=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, planning, design and application of green houses. Plant response to green house environment. Green house equipment. Material of construction for traditional and low cost green houses. Irrigation systems used in greenhouses. Cost estimation and economic analysis. Crop selection and constraints of greenhouse cultivation. Growing media, drainage, flooding and leaching, soil pasteurization, nutrient film technique (NFT)/ hydroponics.

Winnowing . Groundnut decorticators. Maize and castor shellers. Drying- grain drying, types of drying types of dryers. Evaporators- principle and types. Quality standards.

Importance. Maturity indices, harvesting and post harvest handling of fruits and vegetables. Maturity and ripening process. Chemicals used for delaying and hastening ripening. Methods of storage and low cost storage structures. Methods of packing, packaging materials and transport.

**Practical:**

Study of different types of green houses. Estimation of drying rate of agricultural products. Testing of soil and water suitability and fertigtion requirements for greenhouse. Judging maturity of various fruits and vegetables. Conservation of zero energy cool chambers for on farm storage. Determination of physiological loss in weight, total soluble solids, total sugars, acidity and ascorbic acid content in fruits and vegetables. Effect of ethylene on ripening of fruits. Preservation by drying and dehydration. Visit to local market yards, cold storage units and packing house. Visit to commercial green houses. Growing media-their preparation and pasteurization/sterilization.

## B.Sc. Agriculture (Hons.) Semester-VII

**FSC-411 Nursery Management of Horticultural Crops**

**Time: 3 Hours** **Max. Marks: 150**
**Theory: 100**
**Practical: 50**
**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:**

Principles of plant propagation. Seed dormancy and germination. Selection of rootstock and scion. Stock scion relationship. Factors affecting successful propagation. Physiology of dwarfing rootstock. Different methods of propagation like division, cutting, layering, budding and grafting, and tissue culture. Containers, media and mixtures. Propagation structures. Nursery act, quarantine and certification. Nutrient management and plant protection measures in nursery. Economics of raising fruit plant nursery.

**Practical:** Raising of rootstock. Methods to break seed dormancy. Propagation techniques. Training, lifting and packing of nursery plants. Preparation of media and mixtures, and raising nursery in poly bags. Project formulation and valuation of nursery raising.

**B.Sc. Agriculture (Hons.) Semester-VII**

**FSC-412 Fundamentals of Fruit Production**

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

**Theory: 75**

**Practical: 25**

**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:**

Climatic classification of fruits in Punjab & India. Climate as a limiting factor in Horticulture, Principles of orchard planning, selection of site for establishing an orchard. Winter killing and hardiness. Protection of fruit against adverse climatic conditions. Water requirement of fruit crops and factors influencing it. Critical period of water supply, The response of fruits plants to varying conditions of soil moisture and humidity. Orchard soil management methods. Their relation to moisture conservation and nutrient supply. Soil improvement and maintenance of organic matter in the soil. Detection of nutrient deficiency in the orchards. Method and time of application, Role of different elements in Horticulture.

Problems of pollination and fruit set. Factors associated with fruit setting and development of fruits.(Internal & External factors). Role of growth regulators in fruit set, fruit development and maturity of fruits. Pollen viability and germination; stigma receptivity and pollination studies in fruits.

**Practical:**

Nomenclature and identification of fruit plants, Planning and layout of an orchard, Planting of an orchard, Study of different methods of irrigation of fruit crops, Calculate water requirement of fruit crops, Study of different cultural practices adopted in the orchards, Weeds and their management in fruit crops, Protection of fruit plants against adverse weather conditions, Manuring and fertilization of fruit crops, Identification and management of nutritional deficiencies in fruit crops, Collection of soil and leaf samples for diagnosis of nutritional deficiencies, Study of bearing habits of fruits, Types of inflorescence in fruit crops, Role of growth regulators in fruit plants.

**B.Sc. Agriculture (Hons.) Semester-VII**

**VSC-413 Commercial Vegetable Production**

**Time: 3 Hours** **Max. Marks: 150**
**Theory: 100**
**Practical: 50**
**Periods per Week 4+6**

**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:**

Role of soil, climatic and agronomic factors in vegetable production. Principles of cultivation including direct sowing, nursery management, transplanting, hardening of seedlings and vegetable forcing. Weeds and their control. Rotation and Intercropping in vegetable crops. Export potentiality, postharvest handling, processing, storage and marketing of vegetables.

**Practical:**

Sowing and transplanting of vegetable crops. Effect of soil conditions on seedling emergence and plant growth. Nutrient deficiency symptoms. Common weeds, their identification and control. Project formulation and evaluation for vegetable nursery production and vegetable forcing techniques.

**B.Sc. Agriculture (Hons.) Semester-VII**

**VSC-414 Vegetable Breeding and Seed Production**

**Time: 3 Hours** **Max. Marks: 150**
**Theory: 100**
**Practical: 50**
**Periods per Week 4+6**

**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:**

Scope of vegetable breeding and seed production. Origin, floral biology and breeding systems in vegetable crops. Germplasm resources. Principles and methods of breeding self-pollinated, often cross-pollinated and cross- pollinated vegetable crops. Plant introduction, selection, hybridization, population improvement, mutation and polyploidy. Seed production of conventional varieties. Production of F1 hybrids using male sterility, self-incompatibility, various sex-forms etc. Methods of production of nucleus, breeder, foundation and certified seeds isolation, pollination, seed harvesting, processing and storage. Seed testing and certification. Seed Act. Vegetable seed industry and its problems.

**Practical:**

Study of inflorescence and flower structures. Practice in emasculation and artificial pollination. Inspection and rouging. Testing of seeds for purity and germination. Project formulation and evaluation for seed production of vegetable crops.

## B.Sc. Agriculture (Hons.) Semester-VII

**AGR-411** **Weed Management**

**Time: 3 Hours** **Max. Marks: 150**
**Theory: 100**
**Practical: 50**
**Periods per Week 4+6**

**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:**

Weeds- Introduction, harmful and beneficial effects, characteristics and classification. Weed biology and ecology. Crop weed association, competition and allelopathy. Concepts of weed prevention, control and eradication. Methods of weed control. Physical, cultural, chemical, biological and integrated weed management. Herbicides- classification, formulation, advantages ,disadvantages and methods of application. Introduction to adjuvant and their use in herbicides. Introduction to selectivity of herbicides. Mode of action and fate of herbicides in soil. Compatibility of herbicides with other agrochemicals. Weed management in major field and horticultural crops and in non cropped areas. Shift in weed flora in cropping systems. Classification, useful and harmful aspects and control measures of aquatic weeds. Problematic weeds and their control.

**Practical:**

Identification of weeds and weed seeds. Survey of weeds in crop fields and other habitats. Preparation of weed herbarium. Computation of herbicide doses, weed control efficiency and weed index. Methods of recording weed intensity under different situations. Herbicide label information of commonly available herbicides. Herbicide application equipments and their calibration. Diagnosis of herbicide toxicity symptoms in different crops and weeds. Visits to problem areas.

## B.Sc. Agriculture (Hons.) Semester-VII

**AGR-412 Crop Production under Special Situations**

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

**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:**

Dry Farming: extent, and problems. Distribution of low rainfall areas. Effect of moisture stress on physiological processes. Plant water relationships, special characteristics of plants, seed treatments, water conservation characteristics, fertilizer management, mixed cropping, crop and variety selection, crop sequences, use of mulches and chemicals to save water and crop diversification in dry farming. Contingency crop planning for aberrant weather conditions. Problematic soils, crop management problems of water logged, saline, alkali soils; agronomic practices with special reference to crop rotations, planting techniques, irrigation management, weed control and fertilizer use in problematic soils. Raising fodders- Role of fodder crops and pastures in farm economy, raising of different fodders, fodder quality, fodder preservation and factors affecting quality of preserved fodder, silage and hay making.

Plant nutrients-, functions, deficiency symptoms, content and distribution in soils, nutrient transformations, retention and availability, nutrient interactions. Methods of soil fertility evaluation, fertilizers and their fate in soil, crop response to fertilizers, fertilizer use efficiency, time and mode of fertilizer application. Concept of integrated fertilizer use and water management in soil. Nutrient removal by crops, maintenance of soil fertility. Current fertilizer consumptions, future trends and needs.

## B.Sc. Agriculture (Hons.) Semester-VII

**SSC-413 Analytical Techniques in Soils, Plants, Fertilizers and Water**

**Time: 3 Hours** **Max. Marks: 150**

**Theory: 100**

**Practical: 50**

**Periods per Week 4+6**

**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:**

Colorimetric and flame photometric methods. Atomic absorption spectrophotometery. Cation and anion exchange phenomenon and their importance. Ion adsorption, desorption and fixation in soils. Methods ofsoil fertility evaluation. Fertilizer control order. Acid, saline, sodic, calcareous soils and their amelioration. Planning and formulation of project on establishment of soil water and plant testing laboratory. Practical: Preparation of standard solutions. Collection of soil, water, plant and fertilizer samples. Analysis of soil samples for fertility and quality evaluation for field crops and orchard plantations. Analysis of irrigation water for quality appraisal. Fertilizers analysis for quality control. Soil, water and fertilizer analysis reports for recommendation purposes. Analysis of forms of nitrogen , phosphorous, potassium and sulphur in soils. Determination of DTPA- extractable micronutrients. Plant analysis for total N, P, K andmicro-nutrients. Determination of CEC and AEC of soils. Nutrient adsorption and fixation capacities of soils.

## B.Sc. Agriculture (Hons.) Semester-VII

**FOR-414 Production Technology of Economic Forest Trees**

**Time: 3 Hours** **Max. Marks: 150**
**Theory: 100**
**Practical: 50**
**Periods per Week 4+6**

**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:**

Plantation silviculture: native versus exotics; even-aged versus uneven-aged; monoculture versus mixed culture. Plantation technology and tending operations of economically important tree species. Agro-forestry concept and suitable agro-forestry systems/models for different regions. Economic and ecological aspects of agro forestry systems. Importance of superior phenotypes, their evaluation and use implantations. Climate change and forests. Forest regeneration, productivity and rotation. Desertification and rehabilitation of waste lands. Short rotation intensive management of forest plantations. Trees outside forests, energy/industrial plantation and dendro- remediation. Production and marketing of forestry produce. Forest fire and its management. Wood based industries and importance of non-timber forest produce. Framework for forestry extension: participatory rural appraisal and joint-forest management.

**Practical:**

Nursery management: propagation methods, quality planting stock, preparation of nursery and plantation schedule. Layout and establishment of agro forestry models. Estimation of tree volume and biomass; enumeration and vegetation survey. Methods of vegetation analysis: measurement ofbiomass and productivity. Visit to commercial plantations, wood based industries and forestry institutes.

## B.Sc. Agriculture (Hons.) Semester-VII

**EXT-411 Communication and Information Technology**

**Time: 3 Hours** **Max. Marks: 150**
**Theory: 100**
**Practical: 50**
**Periods per Week 4+6**

**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 to communication. Problems in communication and feedback. Role of information and communication technology in agriculture and rural development. Extension teaching methods and their use. Trends in agriculture information management system. Need and scope of cyber extension. Importance of kiosks, agri- portal, internet café, community and FM radio in villages. Privatization of cyber extension. Public-private partnership. Development of Information Communication Technology (ICT) in changing the agricultural scenario.

**Practical:**

Studying problems faced by farmers at Agri-clinic and analyzing communication problems of extension personnel. Use of different extension teaching methods in field and simulated conditions. Practice in planning and conducting video- conferencing. Visit to information kiosks. Identifying problems in agriculture information management system.

**B.Sc. Agriculture (Hons.) Semester-VII**

**MGT-412 Financial and Project Management**

**Time: 3 Hours** **Max. Marks: 150**
**Theory: 100**
**Practical: 50**
**Periods per Week 4+6**

**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, need, scope and functions of finance. Concept of time value of money. Capital budgeting concept and steps in capital budgeting, appraisal criteria- payback period, average rate of return, net present value, benefit cost ratio and internal rate of return. Working Capital Management- concept, determinants and need for working capital in agribusiness. Introduction, objectives and techniques of inventory management for agribusiness. Introduction to cost of capital and capital structure. Project management- concept, characteristics and types of projects. Project feasibility- market, technical, financial and economic feasibility. Project risk analysis. Estimating financial requirements of projects and sources of finance.

**Practical:**

Case studies related to financial management and project management. Visits to agri-business industrial houses. Numerical problems based on capital budgeting. Preparation of project report for various agri-business ventures.

## B.Sc. Agriculture (Hons.) Semester-VII

**EXT-413 Behavioral Skills for Human Resource Development**

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

**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:**

Concept of human behavior. Taxonomy of behavioral domains. Human needs and their hierarchy. Attitude, its characteristics and measurement. Perception and its principles, selectivity in perception. Motivational skills for attitudinal and perceptional changes. Problem-solving skills. Innovativeness in human behavior, response and resistance to change. Concept of self, Johari's window model. Defense mechanism. Group dynamics. Group behavior and conflict management. Decision-making process. Theories of leadership. Concept of human resource development and human relations. Human interaction, its importance and types. Interpersonal perception and social behavior.

## B.Sc. Agriculture (Hons.) Semester-VII

**AGE-414** **Micro Economic Analysis**

**Time: 3 Hours** **Max. Marks: 150**
**Theory: 100**
**Practical: 50**
**Periods per Week 4+6**

**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:**

Micro Economics: meaning, definition, importance, nature and scope. Theory of consumer behavior: marginal utility analysis and indifference curve analysis. Demand analysis: meaning, definition, derivation of demand curve. Firm and industry: meaning, types, difference between firm and industry, equilibrium conditions, short-run and long-run analysis. Production: meaning, process and factors of production, relationship between production and different factors, production lags. Theory of producer behavior production function, costs, optimization of inputs use and product combinations, maximization of returns, specialization and diversification and supply analysis. Product market: meaning, types, assumptions, conditions of perfect and imperfect markets. Equilibrium of a firm and industry, determination of price and output of commodities under different market situations. Factor pricing: meaning, different theories for determination of rent, wages, interest and profit.

**Practical:**

Practical training to study consumer behavior in relation to demand of various commodities, consumer survey. Economic analysis of a firm and industry. Working knowledge of relationship between production and different factors of production, production costs and optimum input use. Product market survey. Practical training of price determination in different types of markets.

**B.Sc. Agriculture (Hons.) Semester-VII**

**ENT-411** **Apiculture**

**Time: 3 Hours** **Max. Marks: 150**
**Theory: 100**
**Practical: 50**
**Periods per Week 4+6**

**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:**

Indian history of beekeeping. Species and races of honey bees. Morphology and anatomy of honey bee. Colony organization, life cycle and division of labour in Apis mellifera. Seasonal management of honey bee colonies; swarming, drifting and curbing drone population. Management of queenless and laying worker colonies. Colony multiplication. Bee enemies and diseases. Protection from pesticidal hazards. Maximizing honey production. Bee flora. Managed bee pollination of crops. Colony migration. Apicultural diversification. Honey and its quality. Economics of beekeeping.

**Practical**:

Important species of honey bees, castes differentiation and body structure. Handling of colonies. Colony organization and food storage pattern. Langstroth hive, apicultural equipment and machinery. Bee flora. Seasonal management practices. Colony division. Mass queen bee rearing techniques. Queen introduction, clipping and marking. Bee pollination of crops. Management of bacterial, viral and fungal diseases of honey bees. Identification and management of parasitic mites, wax moths, ants, wasps and predatory birds. Honey extraction. Pollen, propolis and bee venom collection. Processing of bees wax. Royal jelly production and collection. Honey processing and packaging. Honey testing. Visit to beekeeping industry (Hive manufacturing, equipment manufacturing, honey processing and exporting commercial units).

## B.Sc. Agriculture (Hons.) Semester-VII

**PPL-412 Post Harvest Diseases and their Management**

**Time: 3 Hours** **Max. Marks: 150**
**Theory: 100**
**Practical: 50**
**Periods per Week 4+6**

**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 diseases. Important post-harvest diseases of fruits and vegetables. Factors affecting ripening of fruits and vegetables. Factors favoring development of post-harvest diseases. Effect of handling and storage practices on the development of post-harvest diseases. Storage methods and conditions. Disease management strategies for post-harvest diseases.

**Practical**:

Important post-harvest diseases of fruits and vegetables like mango, citrus, guava, grapes, pear, cucurbits, chilli, tomato and potato. Study of factors favouring development of post-harvest diseases. Disease development under different storage conditions. Demonstration of various methods of disease management. Visit to a packing house.

**B.Sc. Agriculture (Hons.) Semester-VII**

**ENT-413 Quarantine in Plant Protection**

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

**Periods per Week 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.

**Theory:**

## UNIT I

Definition of pest, pesticides and transgenics as per Govt. notification; relative importance; quarantine – domestic and international. Quarantine restrictions in the movement of agricultural produce, seeds and planting material; case histories of exotic pests/diseases and their status.

## UNIT II

Plant protection organization in India. Acts related to registration of pesticides and transgenics. History of quarantine legislations, PQ Order 2003. Environmental Acts, Industrial registration; APEDA, Import and Export of bio-control agents.

## UNIT III

Identification of pest/disease free areas; contamination of food with toxigens, microorganisms and their elimination; Symptomatic diagnosis and other techniques to detect pest/pathogen infestations; VHT and other safer techniques of disinfestation/salvaging of infected material.

## UNIT IV

WTO regulations; non-tariff barriers; Pest risk analysis, good laboratory practices for pesticide laboratories; pesticide industry; Sanitary and Phytosanitary measures.

**B.Sc. Agriculture (Hons.) Semester-VII**

**NEM-414** **Plant Nematology**

**Time: 3 Hours** **Max. Marks: 150**
**Theory: 100**
**Practical: 50**
**Periods per Week 4+6**

**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:**

- History and economic importance of plant parasitic nematodes.
- General characteristics, identification and their classification.
- Relationship with other organisms **(Biotic associations with fungus, bacteria, Rhizobium, arthropods and vertebrates)**
- Morphology and biology of important genera, namely Meloidogyne, Heterodera, Globodera, Anguina, Rotylenchulus, Ditylenchus, Tylenchulus, Pratylenchus, Radopholus and virus vectors.
- **Influence of microorganisms on plant nematode interactions. (Interaction of plant nematodes with microorganisms)**
- **Types of parasitism; nature of damage and general symptomatology**
- Principles and methods of nematode control.
- **Application of biotechnological approaches in Nematode management.**
- **Integrated nematode management**
- **Beneficial nematodes (In brief)**

**Practical**:

Methods of survey, collection of soil and plant samples. Extraction of nematodes and population estimation. Preparation of temporary and permanent mounts. Study of morphological characteristics and disease symptoms. Application of nematicides.

## B.Sc. Agriculture (Hons.) Semester-VII

**Training components and schedule…..**

Students required to submit a report w.r.t their training duly assigned by their training and teacher incharge

**B.Sc. Agriculture (Hons.) Semester-VIII**

**FSC-421 Commercial Fruit Production**

**Time: 3 Hours** **Max. Marks: 150**
**Theory: 100**
**Practical: 50**
**Periods per Week 4+6**

**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 uses, botany, flowering and fruiting, climate and soil, promising varieties, horti- agri techniques, production, plant protection measures and special problems in fruits such as citrus, mango, guava, apple, pear, peach, plum, ber, litchi, grapes, pomegranate, papaya, pineapple, phalsa, banana and sapota.

**Practical:**

Identification of species and fruit varieties, training and pruning, maturity standards, harvesting, handling, grading and packing of fruits. Project formulation and valuation of orchard management.

## B.Sc. Agriculture (Hons.) Semester-VIII

**FSC-422 Processing and Value Addition of Horticultural Crops**

**Time: 3 Hours** **Max. Marks: 100**
**Theory: 75**
**Practical: 25**
**Periods per Week 4+6**

**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:**

Scope of fruit preservation industry in India, present status, constraints and prospects. Importance, principles and practices of fruit processing. Maturity indices, harvesting, transportation and quality parameters of fruits. Pre and post harvest factors affecting processing quality of fruits. Commercial processing technologies for fruits like mango, citrus, guava, grapes, ber, apple, pear, peach, plum, phalsa, litchi, pomegranate and papaya etc. Packing technology for export and value addition.

**Practical:**

Judging of maturity of different fruits. Methods of preparation of jam, jelly, ready to serve, squash, nectar, canning, chutney, pickle and marmalade etc. Packing technologies. Drying and dehydration of fruits. Visit to local processing unit.

**B.Sc. Agriculture (Hons.) Semester-VIII**

**VSC-423 Forcing Techniques in Vegetable Production**

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

**Theory: 75**

**Practical: 25**

**Periods per Week 4+6**

**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:**

Objectives, importance and scope of protected cultivation. Nursery raising techniques. Environmental factors. Vegetable growing media. Irrigation and fertigation. Sustainable land use systems. Maximizing and use efficiency i-protected structures. Problems of growing vegetables in protected structures,. Soil sterilization techniques. Hydroponics cultivation. . Pest management in green house/glass house. Crops and varieties suitable for protected cultivation. Specific technology for raising tomato, sweet pepper, cucumber and high value crops in off season. Cladding material for protected structures -use of mulches. Seed production of vegetables.

**Practical:** **Time: 3 Hours**

Study of various types of structures. Methods to control temperature, CO2, light. Demonstration for sanitation measures. Hydroponics. Maintenance of parental lines and hybrid seed production in glasshouse. Fertigation and nutrient management. Control of diseases and insect pests in glasshouse. Visit to established greenhouses in the region.

## B.Sc. Agriculture (Hons.) Semester-VIII

**FCL-424 Commercial Floriculture and Landscaping**

**Time: 3 Hours** **Max. Marks: 150**
**Theory: 100**
**Practical: 50**
**Periods per Week 4+6**

**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:**

Scope, importance and export potential of floriculture, environment factors influencing plant growth and flower production in cut flowers. Production technology including varieties, propagation, soil, nutrition, disease and pests of important cut flowers. Post harvest handling, grading and packing cupflowers, pot and bedding plants. Flower seed production. History of gardening, characteristics of Hindu, Mughal, Japanese and English gardens. Principle groups of plants like trees, shrubs, climbers, shade loving plants, ground covers, their analysis and use in landscape composition. Principles of art and landscaping. Preparation of landscape plans for homes, farm complexes, small parks and institutions. Development and maintenance of rock, water and terrace gardens. Bonsai and dish gardens, project formulation and evaluation.

**Practical:**

Preparation of plans and laying out of gardens. Identification of planting material and commercial varieties of flowers. Seed collection, germination tests and storage. Harvesting and handling of cut flowers. Judging of flowers and pot plants. Visit to local nurseries and florist centers.

## B.Sc. Agriculture (Hons.) Semester-VIII

**AGR-421 Farming Systems and Sustainable Agriculture**

**Time: 3 Hours** **Max. Marks: 150**
**Theory: 100**
**Practical: 50**
**Periods per Week 4+6**

**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:**

Farming systems, definition, principles and components. Farming System models for irrigated, dryland situations and modules for marginal, small and large farmers. Farming systems of the world-arable, pastoral, lay farming, shifting cultivation, ranching and agro-forestry systems. Energy and fuel wood plantations. Specialized and diversified farming, family co-operative and collective farming: their occurrence, adaptations and weaknesses. Factors affecting choice of farming systems. Cropping systems, their characteristics and management. Cropping patterns. Agro-ecosystem and agro-ecological zones of India. Efficient food producing systems. Sustainable agriculture- Introduction, definition, goal and current concepts, factors affecting ecological balance and ameliorative measures, land degradation and conservation of natural resources.

**Practical:**

Preparation of cropping scheme and integrated farming system models for irrigated and dry land situations. Preparation of enriched Farm Yard Manure and Vermicompost. Visit to urban waste recycling unit, organic farm and model farmers' field. Preparation of farm lay out plans, different intensity crop rotations and cropping schemes. Estimating crop yields. Energy budgeting in different crops and cropping systems. Working out ecological optimum crop zones. Project making exercises for establishment of crop production farms under different situation.

**B.Sc. Agriculture (Hons.) Semester-VIII**

**SSC-422 Soil Physical and Biological Environment**

**Time: 3 Hours** **Max. Marks: 150**
**Theory: 100**
**Practical: 50**
**Periods per Week 4+6**

**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:**

Soil physical properties in relation to crop production. Soil thermal regime and its management. Soil air-composition, renewal, characterization of soil aeration in relation to plant growth. Movement of water in soil. Infiltration and redistribution of water in soil. Evaporation from soils and its management. Runoff from the agricultural fields and factors affecting. Soil organisms and their distribution, ecology, classification and activities in soil. Microbiological transformations of C, N and S in soils.

**Practical:**

Determination of dry and wet stability of aggregates. Measurement of in situ soil bulk density and filling of soil columns with a particular bulk density. Measurement of soil porosity. Determination of consistency limits of soils. Soil moisture characteristics. Measurement of soil temperature using thermocouples. Determination of infiltration rate under different surface conditions. In situ measurement of soil moisture by neutron probe and Time Domain Reflectrometry. In situ measurement of soil matric potentialusing tensiometers. Enumeration of soil bacteria, fungi and actinomycetes. Isolation of Rhizobiumand Azotobacter and measurement of respiration rate.

**B.Sc. Agriculture (Hons.) Semester-VIII**

**SSC-423 Soil Survey, Classification and Mapping**

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

**Periods per Week: 0+6**

**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:**

Application and use of global positioning system for soil survey. Macro-morphological study of soils. Classification of soils developed on different landforms. Study of base maps-cadastral maps, top sheets, aerial photographs and satellite imageries. Soil survey of project area-preparation of base maps, analysis of soil characteristics, classification of surveyed soils, mapping and report writing. Interpretation of soil survey data for land capability and crop suitability classifications. Use of geographical information system for preparing thematic maps

## B.Sc. Agriculture (Hons.) Semester-VIII

### AGR-424 Production Technology of Spices, Aromatic, Medicinal and Plantation Crops

**Time: 3 Hours** **Max. Marks: 150**

**Theory: 100**

**Practical: 50**

**Periods per Week 4+6**

**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:**

Important Spice crops- Ginger, Turmeric, Dill Seed, Pepper, Cardamom, Coriander, Cumin, Fennel, Celery and Fenugreek. Aromatic crops- Mentha, Lemongrass, Citronella, Palmarosa, Vetiver and Geranium. Medicinal plants- Discordia, Rauvolfia, Opium, Periwinkle, Guggal, Belladonna, Nuxvomica, Solanumnigrum, Senna, Amla, Isabgol, Coleus, Acorus and Pipli (mug); Plantation crops- Coconut, Areca nut, Betel vine, Cashew, Cocoa and Coffee with special reference to their origin and distribution, adaptation, classification, growth and development in relation to environment, climatic requirements, varieties, agronomic practices for sustained production, harvesting, processing marketing and quality aspects and uses.

**Practical:**

Identification of crops based on morphological and seed characteristics. Propagation, seed selection, seed treatment, processing and distillation techniques for different medicinal, aromatic and spice crops.

**B.Sc. Agriculture (Hons.) Semester-VIII**

**MGT-421 Retailing and Supply Chain Management**

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

**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:**

Introduction to retailing- definition, concept and overview. Types of retail institutions related to agri- business. Changing food consumption patterns in India. Store location and site selection. Managing retail operations procurement and inventory management. Promoting store. Introduction to customer relationship management in retail business. Supply chain management concept, definition and importance. Elements of physical distribution systems, building and operating supply chains in agribusiness. Role of IT in supply chain management. Customers buying behavior including the buying process, purchasing the merchandise or service, post purchase evaluating types of buying decisions.

## B.Sc. Agriculture (Hons.) Semester-VIII

**AGE-422** **Macro Economic Analysis**

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

**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:**

Macro Economics: meaning, definition, importance, limitations, scope and integration of micro and macro analysis. Basic macroeconomic concepts. National income: meaning, definition, types, measurement and social accounting. Circular flow of money. Simple Keynesian model of income determination, shifts in aggregate demand. Multiplier. Theories of consumption and investment. Income determination model including money and interest. Monetary policy: meaning, instruments, indicators, lags and effectiveness. Fiscal policy: meaning, definition, different tools and limitations. Wage and employment policies: meaning, need, demand and supply of labor, measures of full employment, relationship between level of employment and output. Inflation and recession: process, causes, types and remedies.

## B.Sc. Agriculture (Hons.) Semester-VIII

**AGE-423 Economic problems of Agriculture in India**

**Time: 3 Hours** **Max. Marks: 150**
**Theory: 100**
**Practical: 50**
**Periods per Week 4+6**

**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:**

Trends in agriculture production &productivity. Deceleration of agriculture growth rates in India, causes and effective measures to check it. Land reforms: Objectives, Measures, Achievements and shortcomings. Cooperative forming-Meaning objectives, types, merits & demerits, success and failure of cooperative sector in India. Rural indebtness: causes, effects, government measure to control it. Recommendations of Dr. Radha Krishnan's and RBI report on indebtness. Rural poverty; measurement and poverty alleviation programmes. Agriculture labor in India problems and remedies. Agricultural taxation: case for agricultural taxation, case for special treatment.

**Practical:**

Visit to wholesale & retail Mandis to study Marketing methods and practices with respect to major Agriculture commodities, Preparation of report, Visit to market committee to know the facilities provided to the farmers, various market charges paid by farmers & buyers, Preparation of family budget of two farmers, Tabulation of information to show the major items of expenses, food & clothing habits, housing & other facilities, Preparation of report.

**B.Sc. Agriculture (Hons.) Semester-VIII**

**EXT-424 Visual and Graphic Communication**

**Time: 3 Hours** **Max. Marks: 150**
**Theory: 100**
**Practical: 50**
**Periods per Week 4+6**

**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:**

Definition, characteristics, classification, principles and role of visuals in communication. Contribution of visual perception in learning process. Planning, preparation, presentation and evaluation of visual aids, low-cost visuals, photographs and pictures. Computer based digitized visual materials. Use of drawing techniques for visuals. Selection and use of animation tools in transfer of technology. Preparation and use of resource map for extension work. Designing of visuals for print and electronic media. Scope and importance of journalism in agriculture.

**Practical:**

Preparation and use of visual aids. Generating computer aided presentation of graphics. Scanning of visuals, image editing and script writing for radio & TV. Developing agricultural video films. Visit to animation, print and electronic media centers. Writing of news items, articles, success stories etc. for print and electronic media. Presentation and evaluation of visuals.

**B.Sc. Agriculture (Hons.) Semester-VIII**

**PPL- 421 Biocontrol and Integrated Disease Management**

**Time: 3 Hours** **Max. Marks: 150**

**Theory: 100**

**Practical: 50**

**Periods per Week 4+6**

**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:**

History and principles underlying host resistance, chemical, physical, cultural, biological and legislative measures of plant disease management. Scope and factors affecting biological control. Mechanisms of bio-control. Characterization of bioagents and their commercial formulations. Limitations of biocontrol. Commercial production and distribution system. Integrated disease management. Historical developments and classification of fungicides and antibiotics. Mode of action, uptake , translocation, disease control and factors affecting their efficacy and field performance. Registration, commercial development and compatibility of fungicides with other chemicals. General account of plant protection appliances. Development of resistance in pathogens against fungicides .Non-target effects of fungicide use. Methods of screening for disease resistance. Seed certification standards and phytosanitory measures.

**Practical**:

Isolation and Identification of bio-control agents. Evaluation of bio-control agents against plant pathogens in vitro and in vivo. Production and application procedures. Laboratory evaluation of fungicides and antibiotics by various methods against different groups of pathogens. Methods of application of fungitoxicants. Absorption, translocation and persistence of different fungitoxicants. Integration of bio-control agents with other methods of plant disease control.

**B.Sc. Agriculture (Hons.) Semester-VIII**

**ENT-422 Biocontrol and Integrated Pest Management**

**Time: 3 Hours** **Max. Marks: 150**

**Theory: 100**

**Practical: 50**

**Periods per Week 4+6**

**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:**

History and concept of biological control, different groups of biological control agents and biopesticidesmacrobials (parasitoids and predators), microbials (bacteria, viruses, fungi, protozoa and nematodes) and botanical- neem, pyrethrum, nicotine, rotenone and others, their use in pest management along with advantages and limitations. Methods of mass production for each of these groups. National and international agencies dealing with biological control. IPM-history, definition and concept. Concept of economic threshold. Pest monitoring and surveillance. Different tools of IPM including physical, mechanical, cultural, biological (parasite and predators, microbial agents), host plant resistance, botanical, chemical, biorationals and biotechnological approaches. Integration of different IPM tactics. Decision making systems. Potential of IPM, its implementation and constraints. Successful example in IPM.

**Practical**:

Identification of important groups of parasitoids, predators and microbial control agents. Laboratory multiplication of parasitoids, predators and microbial control agents. Determination of economic threshold levels. Demonstration of cultural and mechanical control measures of different pests. Use of pheromones, colour, sticky and light traps for monitoring and surveillance of pests. Study of IPM module in cotton, rice, sugarcane, maize, fruits and vegetables

**B.Sc. Agriculture (Hons.) Semester-VIII**

**ENT-423 Pesticides and Plant Protection Equipment**

**Time: 3 Hours** **Max. Marks: 150**

**Theory: 100**

**Practical: 50**

**Periods per Week 4+6**

**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:**

Pesticides- classification, properties, entry and mode of action. Formulations and toxicity of pesticides. Factors affecting toxicity of pesticides.Compatibility and synergism. Antidotes. Problems associated with the use of pesticides. Role of repellents, attractants, pheromones, hormones, chemosterilants and antifeedants in pest control. Pest control equipment - history of development, classification, constructional features, principles of working, operation, maintenance and selection. Planning of pest control operations.

**Practical**:

Familiarization with different formulations of pesticides, their preparation and use. Toxicity to insects and plants. Calculation of dosages of pesticides and fumigants. Practice in the use of various types of pest-control equipments. Study of factors affecting efficacy of pesticide spray. Calibrations of plant protection equipments. Common troubles in the use of pest-control equipment and their remedies. Estimation of pesticide residue in food commodities.

## B.Sc. Agriculture (Hons.) Semester-VIII

**PPL-424** **Plant Disease Diagnosis**

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

**Periods per Week =6**

**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:**

Field diagnosis of important diseases of Rabi and Kharif crops, vegetables, fruits , forest and ornamental plants. Estimation of losses and methods for assessing the intensity of diseases like angular leaf spot of cotton, Tikka disease of groundnut, yellow mosaic of beans , downy mildew of bajra, rusts and loose smut of wheat, Alternaria blight, downy mildew of mustard and powdery mildew of pea. Methods of soil sterilization for raising healthy nursery plants. Solar-heat treatment. Methods of producing virus-free citrus and potato. Diagnosis and differentiation of disorders due to viruses, nutritional imbalances, genetic variations and toxaemias. Types of chemicals used for the control of plant diseases and methods of their application. Cultural and biological methods of plant disease control.

## B.Sc. Agriculture (Hons.) Semester-VIII

**Training components and schedule…..**

Students required to submit a report w.r.t their training duly assigned by their training and teacher incharge