# FACULTY OF AGRICULTURE & FORESTRY

## ORDINANCES

## &

## SYLLABUS

**For**

# B.Sc. AGRICULTURE (HONS.)

## (ANNUAL SYSTEM)
## Parts I—IV

**Examination : 2004**

# GURU NANAK DEV UNIVERSITY AMRITSAR

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# BACHELOR OF SCIENCE IN AGRICULTURE (HONOURS)

**Duration of the Course:**

The duration of B.Sc. Agriculture (Honours) course shall be of four years. The examinations shall be held in four parts viz First, Second, Third and Final years .These examinations shall be held once a year in the month of April. A supplementary examination shall be held in the month of September for candidates who are placed in compartment under the ordinances governing each cases.

**Eligibility:**

(A) A candidate who has passed Plus Two (Science) exam. of the Punjab School Education Board/C.B.S.E./I.C.S.E with 50% marks, or

(B) Any other examination recognised as equivalent to (a) above, by the G.N.D.U. (with atleast 50% marks in Science Group) is eligible to join the course.

(C) Only such candidate will be admitted who take the Entrance Test of PMT/CET as conducted by the Punjab Govt./GNDU Amritsar/College Test conducted by Khalsa College Amritsar or as the case may be. Provided further that such candidates must have obtained at least 15% marks in PMT/CET/College Test.

However, the admission against the 10 reserved seats for the students of Jammu & Kashmir shall be made on the basis of the entrance test conducted by the college itself as the residents of other states are not eligible for P.M.T/C.E.T. test in Punjab.

**Note:- Detailed Ordinances relating to examination for this class are contained in the Guru Nanak Dev University Calendar, Vol. II read with Syndicate decision amendments made from time to time.**

**Note : Page No. 2 gap.**

**Scheme of Studies**
**PART-I**

| Sr. No. | Course Code | Subject | Periods per week Th. | Pract. | Marks Th. | Pract. | Int Assess Th. | Pract. | Total Marks Th. | Pract. | Grand Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | B.Sc. A. Eng. | English as a communication skill | 3 | - | 80 | - | 20 | - | 100 | - | 100 |
| 2 | B.Sc. A. Pbi. Or | Punjabi as a commnication skill | 3 | - | 80 | - | 20 | - | 100 | - | 100 |
| | B.Sc. A. Pb. Hist. & Culture | Punjab History and Culture in lieu of Punjabi | | 3 | 80 | | 20 | - | 100 | - | 100 |
| 3 | B.Sc. A. Econ. | Introductory Economics | 4 | - | 80 | - | 20 | - | 100 | - | 100 |
| 4 | B.Sc. A. Soil | Intro. To soil including manures and fertilizers | 4 | 3 | 80 | 40 | 20 | 10 | 100 | 50 | 150 |
| 5 | B.Sc. A. Bio. Chem. | Bio-Chemistry and Agrochemicals | 4 | 3 | 80 | 40 | 20 | 10 | 100 | 50 | 150 |
| 6 | B.Sc. A. Agron. | Elements of Agronomy | 2 | 2 | 40 | 20 | 10 | 5 | 50 | 25 | 75 |
| 7 | B.Sc. A. Agromet | Introductory Agroclimatology | 2 | 2 | 40 | 20 | 10 | 5 | 50 | 25 | 75 |
| 8 | B.Sc. A. Math.A | Elementary algebra & Trignometry | 4 | - | 60 | - | 15 | - | 75 | 75 | 150 |
| 9 | B.Sc. A. Math.B Or | Elementary Calcusus | 4 | - | 60 | 15 | - | 75 | 75 | | |
| 10 | B.Sc. A. Botany | General Botany | 2 | 2 | 40 | 20 | 10 | 05 | 50 | 25 | 75 | 150 |
| | B.Sc. A. Zool. | General Zoology | 2 | 2 | 40 | 20 | 10 | 05 | 50 | 25 | 75 | |

**Total Marks : 900**

**Note : 1. Mathamatics for medical group students and Botany & Zoology for Non Medical students.**
**2. Each period will be 40 minutes duration.**

**Scheme of Studies**
**PART-II**

| Sr. No. | Course Code | Subject | Period per week | | Marks | | Int. Assess. | | Total Marks | | Grand total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Th. | Pract. | Th. | Pract. | Th. | Pract. | Th. | Pract. | |
| 1. | B.Sc. Ag. A.H. | Animal Hunsbandry | 4 | 3 | 80 | 40 | 20 | 10 | 100 | 50 | 150 |
| 2. | B.Sc. Ag. F.C. | Field Crops. | 4 | 3 | 80 | 40 | 20 | 10 | 100 | 50 | 150 |
| 3. | B.Sc. Ag. Bot. | Plant Physiology | 4 | 3 | 80 | 40 | 20 | 10 | 100 | 50 | 150 |
| 4. | B.Sc,. Ag. Soil | Principles of soil fertility and soil physics | 4 | 3 | 80 | 40 | 20 | 10 | 100 | 50 | 150 |
| 5. | B.Sc. Ag. Ento. | Economic Zoology & Eutomology | 4 | 3 | 80 | 40 | 20 | 10 | 100 | 50 | 150 |
| 6. | B.SC. Ag. Gent. | Principles of Genetics | 4 | 3 | 80 | 40 | 20 | 10 | 100 | 50 | 150 |
| 7. | B.Sc. Ag. Agric. Engg. | Farm power Machinery & Elementary Irrigation engineering | 4 | 3 | 80 | 40 | 20 | 10 | 100 | 50 | 150 |
| 8. | B.Sc. Ag. M.F. | Manures & Fertilisers | 3 | --- | 40 | --- | 10 | --- | 50 | --- | 50 |
| | **Total** | | **31** | **21** | **600** | **280** | **150** | **70** | **750** | **350** | **1100** |

**Scheme of Studies**
**Part-III**

| Sr. No. | Course Code | Subject | Period per week | | Marks | | Int. Assess. | | Total Marks | | Grand total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Th. | Pract. | Th. | Pract. | Th. | Pract. | Th. | Pract. | |
| 1. | B.Sc. A.Dairy | Dairying | 4 | 3 | 80 | 40 | 20 | 10 | 100 | 50 | 150 |
| 2. | B.Sc.A Irrg. | Soil & Water Management | 4 | 3 | 80 | 40 | 20 | 10 | 100 | 50 | 100 |
| 3. | B.Sc. A Econ. | Fundamental of Agricultural Eco. | 4 | --- | 80 | --- | 20 | --- | 100 | --- | 100 |
| 4. | B.Sc,. A Stat. | Elementary Analytical Geometry &Statistics and Matric Algebra. | 4 | --- | 80 | --- | 20 | --- | 100 | --- | 150 |
| 5. | B.Sc. A.P.B. | Plant Breeding & Introductory Seed Technology | 4 | 3 | 80 | 40 | 20 | 10 | 100 | 50 | 150 |
| 6. | B.SC. A.P.P. | Plant Pathology & Microbiology | 4 | 3 | 80 | 40 | 20 | 10 | 100 | 50 | 150 |
| 7. | B.Sc. A Hort. | General Horticulture | 4 | 3 | 80 | 40 | 20 | 10 | 100 | 50 | 150 |
| 8. | B.Sc. A Ento. | Agric Zoology & Entomology | 4 | 3 | 80 | 40 | 20 | 10 | 100 | 50 | 150 |
| | **Total** | | **32** | **18** | **640** | **240** | **160** | **80** | **800** | **300** | **1100** |

*B.Sc. AGRICULTURE (HONS.) ANNUAL SYSTEM*

**Scheme of Studies**

**Part-IV**

| Sr. No. | Course | Subject | Periods Per Week | | Marks | | Int. Asses. | | Total Marks | | Grand Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Th. | Pract. | Th. | Pract. | Th. | Pract. | Th. | Pract. | |
| 1. | B.Sc. A.F.M. | Farm Management and Production Management | 4 | 3 | 80 | 40 | 20 | 10 | 100 | 50 | 150 |
| 2. | B.Sc. A Ento. | Economic Entomology | 4 | 3 | 80 | 40 | 20 | 10 | 100 | 50 | 150 |
| 3. | B.Sc. A Ext. | Agricultural Extension | 4 | 3 | 80 | 40 | 20 | 10 | 100 | 50 | 150 |
| 4. | B.Sc. A Stat. | Agricultural Statistics | 4 | 3 | 80 | 40 | 20 | 10 | 100 | 50 | 150 |
| 5. | B.Sc. A Oleri & Flori | Olericulture, Floriculture & Land Scaping | 4 | 3 | 80 | 40 | 20 | 10 | 100 | 50 | 150 |
| | | Elective(I,II & III) Separate List of Each Elective (Agron, Soil, Hort. & Econ.) (for each elective) | 12 | 12 | 240 | 80 | 60 | 20 | 300 | 100 | 400 |
| | **TOTAL** | | **32** | **27** | **640** | **280** | **160** | **70** | **800** | **350** | **1150** |

| Sr. No. | Course | Subject | Periods Per Week | | Marks | | Int. Asses. | | Total Marks | | Grand Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Th. | Pract. | Th | Pract. | Th | Pract. | Th | Pract. | |
| **(FOR AGRONOMY ELECTIVE)** | | | | | | | | | | | |
| 1. | B.Sc. A Elect. I Agron. | Seed production technology weeds and weed control | 4 | 6 | 80 | 40 | 20 | 10 | 10 | 50 | 150 |
| 2. | B.Sc. A Elect. II Agron. | Crop Ecology & Crop Physiology | 4 | -- | 80 | 20 | -- | 100 | -- | | 100 |
| 3. | B.Sc. A Elect. III Agron. | Crop raising under special situation, fodder crops & Soil fertility | 4 | 6 | 80 | 40 | 20 | 10 | 10 | 50 | 150 |
| **(FOR SOIL ELECTIVE)** | | | | | | | | | | | |
| 1. | B.Sc. A Elect. I Soil. | Systematic study of soil in relation to Geology, Genesis, Classification, Hydrology & Erosion | 4 | 6 | 80 | 40 | 20 | 10 | 100 | 50 | 150 |
| 2. | B.Sc. A Elect. II Soil. | Fundamentals of soil chemistry fertility & Microbiology including water & Fertilizer testing | 4 | 6 | 80 | 40 | 20 | 10 | 100 | 50 | 150 |
| 3. | B.Sc. A Elect. III Soil. | General Physical Chemistry | 4 | -- | 80 | 20 | 100 | -- | | | 100 |

| Sr. No. | Course | Subject | Periods Per Week | | Marks | | Int. Asses. | | Total Marks | | Grand Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **(FOR HORTICULTURE ELECTIVE)** | | | | | | | | | | | |
| 1. | B.Sc. A Elect.-I Horticulture. | Fundamentals of fruit Production | 4 | 6 | 80 | 40 | 20 | 10 | 100 | 50 | 150 |
| 2. | B.Sc. A Elect.-II Horticulture. | Systematic Pomology, propogation and nursery management | 4 | 6 | 80 | 40 | 20 | 10 | 100 | 50 | 150 |
| 3. | B.Sc. A Elect.-III Horticulture. | Fruit Growing | 4 | -- | 80 | -- | 20 | 10 | 100 | -- | 100 |
| **(FOR ECONOMICS ELECTIVE)** | | | | | | | | | | | |
| 1. | B.Sc. A Elect.-I Agri. Economics. | Economic problems of Indian Agriculture & Rural Sociology | 4 | 6 | 80 | 40 | 20 | 10 | 100 | 50 | 150 |
| 2. | B.Sc. A Elect.-II Agri. Economics. | Agricultural Marketing & Co-operative | 4 | 6 | 80 | 40 | 20 | 10 | 100 | 50 | 150 |
| 3. | B.Sc. A Elect.-III Agri. Economics. | Micro & Macro Economics | 4 | -- | 80 | -- | 20 | -- | 100 | -- | 100 |

# English (Compulsory)

**Time: 3 Hours** **Max Marks (Th) : 80**
**Int. Assess : 20**
**Periods Per Week : 3**

**English Prose:** A Miscellany (GNDU Publication).
The following two essays are not to be studied

i) Of studies
ii) A Bachelor's Complaint

**Text** **40 Marks**

**1.** Comprehension of a paragraph from English prose short questions on the paragraph incorporating questions on vocabulary. Five short questions of 2 marks each with some choice. **(10 Marks)**

**2.** Five short questions (out of seven) from English Prose without a given passage. **(10 Marks)**

**3.** Two questions out of four on characters, incidents, situations and theme from English Prose. **10x2=20 Marks**

**Grammar** **40 Marks**

**4.** Paragraph Writing **(10 Marks)**

**5.** Translation of paragraph (comprising at least 5 sentences) from

Vernacular into English. **(10 Marks)**

**6.** Transformation of sentences **(5 Marks)**

**7.** Fill in the blanks (preposition, articles, conjunction etc.) **(5 Marks)**

**8.** Match the words. **(5 Marks)**

9. One word substitute. **(5 Marks)**

**Note : Words Pertaining to Science and Art and words connected with Nature study only are prescribed.**

## pj`bl l`zml

**sm~ : 3 Gt** **kl Ek : 100**
**iQarl : 80**
**ietrnl Essmlt : 20**

# islbs

1. d rg (sp`: hrijdr isG iFl Eq plqm isG srgDlE`)
   gr n`nk dv wnlvristl,Eimqsr |
2. lK (jlvnl prk q clq iviSA a~q)
3. pr` pV k pSn~ d a~qr

4. (a) mh`vr q EK`x
   (E) ivSr`m icn

## wint Eq Qlm

1. d rg (kivq` B`g)
   (a) psg sihq ivE`iKE` (d ivcl iek) 5 Ak
   (E) iks iek kvl dlE~ sgih ivc S`ml kivq`v~ ivcl ivc`r/
   iks iek kivq` d` ivS vsq (d ivcl iek) 15 Ak

2. d rg (kh`xl B`g)
   (a) psg sihq ivE`iKE` 5 Ak
   (E) iks iek kh`xl d` ivS` vsq/kldrl B`v/
   s`r/kh`xl kl` (d ivcl iek) 15 Ak

3. lK (jlvnl prk sm`ijk q clq iviSE~ aq (iqn ivcl iek) 20 Ak

4. pr` pV k pSn~ d a~qr 5 x 2=10 Ak

5. (a) mh`vr q EK`x 5 Ak
   (E) ivSr`m icn 5 Ak

# Punjab History & Culture (1450-1947)

**Time : 3 Hours** **Max. Marks : 80**
**Int. Assess : 20**
**Total Teaching Period : 75**

**Note : Instructions for the paper Setters/examiners :**
**Each question paper may consist of three sections as follows:-**

**Section A :** It will consist of 10 very short answer questions with answers to each question up to five lines in length. All questions will be compulsory. Each question will carry two marks; total weightage of the section being 20 marks.

**Section B :** It will consist of short answer questions with answers to each question up to two pages in length. Twelve questions will be set by the examiner and eight will be attempted by the candidates. Each question will carry six marks, total weightage of the section being 48 marks.

**Section B :** It will consist of essay type quesitons with answers to each question up to 5 pages in length. Four questions will be set by the examiner and the candidates will be required to attempt two. Each question will carry sixteen marks ; total weightage of the section being 32 marks.

1. Bhakti Movement
2. The Mughals and their Legacy.
3. Guru Nanak Dev and His Teachings
4. Development of Sikhism from Guru Angad Dev Ji, to Guru Tegh Bahadur Ji.
5. Guru Gobind Singh and Foundation of the Khalsa.
6. Banda Bahadur and Sikh struggle for Sovereignity.
7. Misle and Rise of Maharaja Ranjit Singh.
8. Ranjit Singh Sovereign of the Punjab.
9. Alglo-Sikh Wars and Annexation of the Punjab into British Empire.
10. Socio-Religious Reforms Movments Namdhari, Nirankari, Arya Samraj, Singh Sabha, Ahmadiya Movement.
11. Struggle for freedom.
12. Development of Punjabi language, literature, famous legends and social life

**Suggested Readings :**

Kirpal Singh (ed): History and Culture of the Punjab, Part-II, Punjabi University, Patiala 1990 (3rd ed).

Fauja Singh (ed) : History of Punjab Vol. III, Punjabi University, Patiala, 1987.

J.S.Grewal : The Sikhs of the Punjab, New Cambridge History of India, Cambridge University, Cambridge,1991.

J.S.Neki, : The Spiritual Heritage of the Punjab, Guru Nanak Dev University, Amritsar, 2000.

**B.Sc. A. ECO.** **Introductory Economics**

**Time : 3 Hours** **Max Marks : 80**
**Int. Assess : 20**
**Period 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 and 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 ten questions should be set, out of which the candidate should be required to attempt any five.**

Nature, definition, scope and importance of economics. Economics and other sciences. Basic economic concepts; National income and social accounting; Gross National product : Concepts and components. Method of computation problems and difficulties in computation especially in under developed countries. Consumption, utility analysis, consumer surplus, elasticity of demand, land, labour capital and organization, production cost demand and supply and factors affecting them. Forms of market structure and price determination under perfect competition and monopoly. Princing of factors of production.

## B.Sc. A- Soil Introduction to soil including manures and fertilizers

**Time: 3 Hours** **Max Marks : 80**
**Int. Assess : 20**
**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 and 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 ten questions should be set, out of which the candidate should be required to attempt any five.**

Soil in relation to agricultural production. Soil and society. Concepts of land, soil and soil sciences. Pedology and its relationship with other sciences. Earth crust in relation to soil components. Introduction to rocks and minerals. Weathering physical chemical and biological. Formation of parent material. Soil profile-horizon differentiation and development. Soil forming processes. Factors of soil formation.

Introduction to soil survey and classification. Soil of India and Punjab. Soil micro-organisms. Soil-organic matter-decomposition maintenance and effect on soil fertility. Organic manures and composting. Inorganic and biofertilizers and their use.

## Soil
## (Practical)

**Max. Marks Practical : 40**
**Time: 3 Hours** **Int. Assess : 10**
**Period Per Week : 3**

Demonstration of soils as source of water and nutrients for plants. Identification of important rocks and minerals. Collection and preparation of soil profile samples. Study of morphological characteristics. Examination of soil profile. Study of base and soil maps of Punjab and India. Identification of fertilizers. Analysis of urea, superphosphate and muriate of potash.

**B.Sc. A-Bio-Chem.** **Bio-Chemistry & Agrochemicals**

**Time : 3 Hours** **Max. Marks(Th.) : 80**
**Int. Assess : 20**
**Period 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 and 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 ten questions should be set, out of which the candidates should be required to attempt any five.**

Bio-chemistry and its scope in Agriculture. Bio-chemistry of carbohydrates, lipids, proteins, amino acids and Nucleic acids. Chemistry and Biochemical role of vitamins. Hormones and minerals elements. Enzymes and biological oxidation. Introduction of various classes of Agrochemicals. Chemistry of insecticides, various classes of weedicides, plant growth regulators and herbicides, factors influencing the effectiveness of insecticides. Formulation and toxicity of pesticides, Lethal dose, Elementary idea of mode of action of Agrochemicals.

## Bio-Chemistry
## (Practical)

**Time : 3 Hours** **Max. Marks (Pract.) : 40**
**Int. Assess : 10**
**Periods per week : 3**

Qualitative tests for carbohydrates. Estimation of reducing and non reducing sugar, separation of sugar by paper chromatography. Solubility test for lipids. Characterisation of Lipids by acid value, Sponification value of lodine value. Separation of lipids by thin layer chromatography. Qualitative test for proteins and amino acids. Estimation of ash in the feeding stuff, starch hydrolysis by salivary Amylase.

**B.Sc. A-Agron.** **Elements of Agronomy**

**Time: 3 Hours** **Max. Marks : 40**
**Int. Assess. (Th.) : 10**
**Periods per week : 2**

**Instructions for the Paper Setters**

1. **Question paper should be set strictly according to the syllabus.**
2. **The language of questions should be straight and 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 ten questions should be set, out of which the candidates should be required to attempt any five.**

Agronomy-its relationship with other sciences. Classification of crops. Tillage principles, requirements for different crops, minimum tillage and characteristics of good seedbed. Methods of sowing:- their suitability under different conditions; seeding practices in relation to king of seed, time of sowing, soil moisture, etc. Weed-characteristics, dissemination, competition for growth factors and losses caused by them. Common methods of weed control. Methods and scheduling of irrigation. Maintenance of fertility and productivity. Green manuring. Principles of crop rotation and intercropping. Maturity and harvesting of crops.

## Agronomy
## (Practical)

**Max. Marks (Pract.) : 20**
**Time : 3 Hours** **Int. Assess : 5**
**Periods per week : 2**

Identification of various crops, weed and their seeds. Working of hand tools, bullock- and tractor drawn implements. Calibration of seed drills. Identification, computation of doses and methods of application of fertilizers.

**B.Sc. A-Agromet.** **Introductory Agroclimatology**

**Time : 3 Hours** **Max. Marks (Theory) : 40**
**Int. Assess : 10**
**Periods per week : 2**

**Instructions for the Paper Setters**

1. **Question paper should be set strictly according to the syllabus.**
2. **The language of questions should be straight and 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 ten questions should be set, out of which the candidates should be required to attempt any five.**

The earth and its atmosphere, Environmental factors in agriculture. Elements and factors of climate. Latitudinal and seasons distribution of temperature and precipitation. Agroclimatology-definition and scope. The role of climate in soil and natural vegetation distribution. Impact of climatological factors in crop and livestock distribution in India. Effects of weather on sowing, growth, maturity and harvesting of crops. Weather hazards, their occurrence and impact on agriculture. Climatic classification. Climates of the world and their agricultural potentials with special reference to India.

## Agromet
**(Practical)**

**Time : 3 Hours** **Max. Marks (Pract.) : 20**
**(Int. Asses) : 5**
**Period per week pract. : 2**

Recording processing and presentation of climatic data on climographs, charts and maps. Interpretation of climate data in relation to crop production.

## B.Sc. A-Math 'A' Elementary Algebra & Trignometry

**(For the Student who have taken Medical in +2 class)**

**Max. Marks (Th.) : 60**
**Time : 3 Hours** **Int. Assess : 15**
**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 and 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 ten questions should be set, out of which the candidates should be required to attempt any five.**

Review of number system, complex numbers, De moiver's theorem. Theory of equation. Arithmatic, geometric and harmonic progression. Infinite series, partial fractions, logarithems, permutation, combination, bionomial theorem, Matrices and determinants, solutions of linear equations.

Review of elementary trigonometry, Graph of trignometric functions, additions and substraction formulae product and sum formulae, sine, cosine and projection formulae solution of triangles, area of a triangle, evaluating R, r, $r_1r_2r_3$

To give tutorials on exercises and applied problems related to the following topics: De Moivere's theorem, solution of equations, progression and series partial fraction, logarithimic calculations, binomial theorem, determinant, algebra of matrices and solution of equation through matrices, trigonometric problems.

**B.Sc. A-Math 'B'** **Elementary Calculus**

**Max. Marks Th. : 60**
**Int. Assess. : 15**
**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 and 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 ten questions should be set, out of which the candidates should be required to attempt any five.**

Function, limit, continuity, differentiation, geometrical interpretation of derivatives. Successive differentiations, maxima and minima, Tangent and normal. Integration and its simple application. Ordinary differential equations of first order and their applications. Phase-plane method of solution of ordinary differential equations. Stability and instability of solution, saddle point.

**To give tutorials on exercises and applied problems related to following topics :**
Differentiation and successive differentiations, maxima and minima, integration, solution of ordinary differential equations. Stability and instability of the solution of ordinary differential equations.

**B.Sc. A-Bot.** **General Botany**

**(For the student who have taken Non-medical in +2 class)**

**Time : 3 Hours** **Max. Marks Th : 40**
**Int. Assess : 10**
**Periods per week : 2**

**Instructions for the Paper Setters**

1. **Question paper should be set strictly according to the syllabus.**
2. **The language of questions should be straight and 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 ten questions should be set, out of which the candidates should be required to attempt any five.**

Plant kingdom, feature of each group : morphology of root, stem, Leaf, flower, inflorenscence: pollination and fertilization, fruit and seed, cell and tissue types, Internal structure of root, stem and leaf : plant taxonomy, system of classification : characteristics and economic importance cruciferrace. Mallaceac Rutaceae, Rosacead Leguminosae Cucurbitaceae Compositae, Solanaceae, Liliaceae and Graminae : Plant growth and development, seed germination, flowering fruit and ripening, senescence and abscission.

## Botany
## (Practical)

**Time : 3 Hours** **Max. Marks (Pract) : 20**
**Int. Assess : 5**
**Periods per week (Pract.) : 2**

Salient features of each group of plant kingdom : examination of morphology and modification of roots stem and leaves : flower and type o inflorescences : structure of various types of seeds and fruits; demonstration of cell structure and tissue types ; structure of monocot and dicot root, stem and leaf-permanent slides. Seed germination ; leaf abscission.

**B.Sc. A-Zool.** **Genral Zoology**

**(For the students who have taken non-medical in +2 class)**

**Time : 3 Hours** **Max. Marks Th. : 40**
**Int. Assess : 10**
**Periods per week : 2**

**Instructions For the Paper Setters**

1. **Question paper should be strictly according to the syllabus.**
2. **The language of questions should be straight and 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 ten questions should be set, out of which the candidates should be required to attempt any five.**

Binomial nomenclature, classification and general survey of animal kingdom Habits and habitat of animals of economic importance. Cell organelles their structure, chemistry and functions; cell division. Simple and compound tissues. Functional anatomy of digestive, respiratory circulatory, excretory nervous and reproductive, stystem of mammal Gamerogonesis, types of egg and sperm Development of frog up to three germinal layers. Communicable and non-communicable diseases, Ecto and endo parasites of man, Study of plant pests.

## Zoology
## (Practical)

**Time : 3 Hours** **Max. Marks Pract. : 20**
**Int. Assess : 5**
**Periods per week (Pract.) : 2**

Study of cell, cel division preparation of temporary mounts of muscels, nerve fibres and blood of frog and mammal. Histological studies of compound tissues of mammal. Identification and general survey of animal types of different groups. Study of life history of frog, Dissection of rabbit/rat to study general anatomy, Study of ecto-and endo parasites of man.

**B.Sc. A-A.H.** **Animal Husbandry**

**Time : 3 Hours** **Max. Marks Th. : 80**
**Int. Assess : 20**
**Periods per week : 4**

**Instructions For the Paper Setters**

1. **Question paper should be strictly according to the syllabus.**
2. **The language of questions should be straight and 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 ten questions should be set, out of which the candidates should be required to attempt any five.**

**General**
Importance of livestock to the Agriculture and its relation to National economy. Livestock census, Milk production in India. Per capita consumption of milk in India as compared with some western countries.

**Breeds**
**Study of important breeds of :**

i) Cow, i.e. Sahiwal, Harayana, Red Sindhi
ii) Exotic Cows, i.e. Holsterln, Eriesian, Jersey, Red Dane, Brown swiss, Ayrshire and Guernsey.
iii) Buffaloes i.e. Murrah, Nilli Surti, Mehsana.
iv) Important breeds of sheep, pig and poultry.

**Anatomy & Physiology**
Anatomy & physiology of udder. Theories of milk secretion. Formation of milk in the udder. Let down of milk. Digestive and Reproductive systems of cattle and poultry.

**Feeding Practices**
Classification of feeding stuffs. Study of roughages and concentrates, silage making & Hay making. General principles of feeding cattle, buffaloes and poultry. Feed requirements for work, milk, meat and egg production.
**Management**

i) General care of cattle, grooming, exercise, bathing, milking, observation of oestrum, drying, care during pregnancy and parturition, clean milk production.

ii) **Care of Calves :** Care and feeding of weaned calves, numbering tatooing, notching, branding and ear tagging, dehorning castration.

**Poultry**

Management of poultry farms. Poultry housing. Principles and methods of incubation, brooding and rearing of chicks. Broiler production. Grading, packing, transportation and marketing of eggs. Common poultry diseases and their control. Cost components of Poultry production.

**Breeding**
i) Principles of upgrading of cattles. Various systems of breeding i.e. inbreeding, crossbreeding. Importance of Sire & Dam.

ii) Aritificial Insemination, Merits and Demerits.

**Housing**
Location of dairy farm grouping of different farm buildings and type of dairy brans-sanitation, drainage of cattle sheds. Supply of clean and fresh water.

**Disease and Their Control**

Common infections and contagious diseases, their causes. Symptoms and treatment, Vaccination schedule.

## Animal Husbandry
## (Practical)

**Time : 3 Hours** **Max. Marks Pract. : 40**

**Int. Assess : 10**

**Periods per week Pract .: 3**

Study of external body parts of (i) Cow, (ii) Bull and (iii) Poultry bird.

Holding and methods of restraitn for cows, buffaloes for miling. Selection and judging of cows, buffaloes, heifers, bulls and bullocks. Finding out body weight of animal by formula.

**Numbering of Animals :** (a) Tatooing (b) Notching (c) Branding (d) Ear tags.

**Dehorning :-** Caustic touch, Hot iron method, Electric dehorner, Identification of feeds :

- Computation and preparation of rations for cow, buffaloes, Heifers, bulls and bullocks.

Methods of milking and milk recording.

Collection of semen, its evaluation and extention. (Demonstration only)

Techniques of insemination, pregnancy diagnosis. (Demonstration only)

Recording body temperature, pulse and respiration.

Indentification and use of common vety. Instruments

Cleaning sterlization and disinfection of utensil and Spremises.

Incubators, operations Brooding of chicks.

Visit to some scientific livestock far.

Visit to some poultry breeding farm.

**B.Sc. A-F.C.** **Field Crops**

**Time : 3 Hours** **Max. Marks Th. : 80**
**Int. Assess : 20**
**Periods per week : 4**

**Instructions For the Paper Setters**

1. **Question paper should be strictly according to the syllabus.**
2. **The language of questions should be straight and 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 ten questions should be set, out of which the candidates should be required to attempt any five.**

**Part-I**

(A) Scientific production of various Kharif & Rabi crops with special reference to their origin, history, distribution in the India and state.

Climatic requirements, varieties improved agronomic practices, harvestings and marketing of

| | | | |
|---|---|---|---|
| (1) | Cereals | : | Wheat, Maize, Rice, Barley |
| (2) | Millets | : | Bajra, Soghum |

**Part – II**

| | | | |
|---|---|---|---|
| (1) | Oilseeds | : | Toria, Sarson, Taramira, Gobhisarson, Groundnut, Seasamum, Lineseed, Sunflower. |
| (2) | Sugar Crop | : | Sugarcane and Sugar beet |
| (3) | Fibre Crops | : | Cotton, sunhemp, jute. |

**Part – III**

| | | | |
|---|---|---|---|
| (1) | Pulses | : | Gram, Mash, Soyabean, Lentil and Peas, Arhar, Cowpeas, Moong. |
| (2) | Medicinal Plants | : | Celary, Mentha and Isabgol. |
| (3) | Narcotics | : | Termeric |
| (4) | Tuber Crops | : | Potato |

**Part – IV**

| | | | |
|---|---|---|---|
| (1) | Fodder Crops | : | Barseem, Senji, Oats, Lucerne, Jawar, and Hybrid Nappier, Clusters, bean, Mertha, Guinea. |

## Field Crops
## (Practical)

**Time : 3 Hours** **Max. Marks Pract. : 40**
**Int. Assess : 10**
**Periods per week Pract. : 3**

1. Practical study of the methods of cultivation, preparation of seed/bed, application of manure, sowing dibling, transplanting, thinning, weeding, hoeing, ridging, earthing up, harvesting threshing and winnowing with reference to crop studies in theory. Recognition of crops and their important varieties. Preparation of seed materials, their real value. Judging of crops for maturity and yield. Quality tests of crops/such as lint in cotton, Juice in sugar crops.

2. The student will cultivate co-operatively block of land following a suitable rotation with all agronomic practices to maximize yield per acre.

3. Appraisement of yield and quality of crops-different methods employed.

4. Nursery raising-different methods.

5. Computation of dose of fertilizers for different crops given in theory.

**B.Sc. A-Bot.** **Plant Physiology**

**Time : 3 Hours** **Max. Marks Th. : 80**
**Int. Assess : 20**
**Periods per week : 4**

**Instructions For the Paper Setters**

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2. **The language of questions should be straight and 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 ten questions should be set, out of which the candidates should be required to attempt any five.**

1. **Diffusion, Osmosis and Imhibition :-**Introduction, Diffusion, Osmosis and Imhibition.

2. **Transpiration :-**Introduction, Transpiration, the stomatal Mechanism, Factors affecting the rate of transpiration. Significance of Transpiration, Guttation.

3. **Absorption and translocation of water :-** Introduction, Anantomy of Xylem tissue, Absorption of water, Mechanisms involved in the translocation of water, path of water.

4. **Respiration and Fermentation :-**Introduction, Adenosine, Triphosphate energy intermediate, Release of Energy, measurement of respiration. Factors affecting the rate of respiration.

5. **The pigments and structure of the photosynthetic apparatus :-** Introduction, History. The nature of light, pigments involved in photosynthesis. The Chloroplast.

6. **The light and Dark Reaction of Photosynthesis :-** Introuduction Radiant Energy, Free Radical, Transfer of Energy, Origion of Oxygen in photosynthetic. Emerson effect. Two pigment systems, photosynthesis unit, production of Assimilatory power, the carbon compound of photosynthesis versus Respiration, Measurement of photosynthesis.

7. **Factors affecting the rate of photosyntheis :-** Introduction, Limiting factors.

8. **Mineral salt absorption and Translocation :-** Introudction, Passive, Absorption, Active Transport, Factors, Affecting salt, Absorption, Translocation, Ascenty SAP

9. **Function of Essential Mineral Elements and System of Mineral Deficiency :-** Introduction, Nitrogen, Phosphorus, Calcium, Magnesium, Potassium, Sulphur, Iron, Manganese, Copper, Zinc, Boron, Molybdenum.

10. **Nitrogen Metabolism :-** Introduction, Nitrogen Nutrition, Amino Acids and Amides. The Proteins/ Nucleic Acids.

11. **The Natural Growth Hormones :-** Introduction, Definition, Distribution of Auxins, in the plant, Tranlocation of Auxin physiological effects, Bioassays, Biosynthesis of Auxin, Other plant Hormones.

12. **The Gibberllines, the Cytokinins and Ethylene :-**
Gibberellins, Kinetin and Cytokinins, Ethylene.

13. **Photoperiodism :-**Introduction, The Flowering response, per-ception of the photoperiodic stimulus and presence of Hormone, summary.

14. **Vernalization :-** Introduction, Vernalization and flowering, summary.

15. **Dormancy :-** Introduction, Advantages of Dormancy, Seed Dormancy, Bud Dormancy, Growth inhibiting substances, Summary.

## Plant Physiology
## (Practical)

**Time : 3 Hours** **Max. Marks Pract. : 40**
**Int. Assess : 10**
**Periods per week : 3**

Demonstration of diffusion, Osmosis, Plasmolysis, Preparation of osmotic solution. Translocatory tissues, Xylem and Phloem, Nutrient deficiency symptoms. Demonstration of role of light and evaluation of oxygen during photosyntheis. Demonstration of respiration-aerobic and anaerobic, respiration quotient, demonstration of plant movements, Seed germination and seed viability.

**B.Sc. A-Soil** **Principles of Soil Fertility & Soil Physics**

**Time : 3 Hours** **Max. Marks Th. : 80**
**Int. Assess : 20**
**Periods per week : 4**

**Instructions For the Paper Setters**

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2. **The language of questions should be straight and 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 ten questions should be set, out of which the candidates should be required to attempt any five.**

Historical developments. Important clay minerals & their properties, Ion exchange, Essential plant nutrients functions, deficiency symptoms, forms, availability and cycling in soil concept of nutrient response functions and critical levels. Soil reaction acid, saline and sodic soils, Quality of irrigation water.

Soil – a three phase system, Volume – mass relationships. Particle size distribution, Soil structure – significance and classification. Soil consistence and physical impedence to penetration. Soil water retention-mechanism, measurement, availability, soil moisture characteristics, movement infiltration and redistribution. Soil temperature- significance, energy balance at soil surface thermal properties Internal and seasonal fluctuations water and nutrient movement to roots.

## Soil
## (Practical)

**Time : 3 Hours** **Max. Marks Pract. : 40**
**Int. Assess : 10**
**Periods per week Pract. : 3**

Determination of soil $p^H$, electrical conductivity, organic carbon, Calcium Carbonate and gypsum requirement, Estimation of available nitrogen, phosphorus, potassium and sulphur in soils, Soil test reports

Determination of particle size distribution, dispersion ratio, particle density, bulk density, total porosity and air, porosity, Rate and height of capillary rise in soils. Aggregate analysis, Determination of soil water content, hydraulic conductivity, field capacity field and infiltration. Field measurement of soil temperature of profiles.

**B.Sc. A-Ento.** **Economic Zoology & Entomology**

**Time : 3 Hours** **Max. Marks Th. : 80**
**Int. Assess : 20**
**Periods per week : 4**

**Instructions For the Paper Setters**

1. **Question paper should be strictly according to the syllabus.**
2. **The language of questions should be straight and 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 ten questions should be set, out of which the candidates should be required to attempt any five.**

Introduction to useful and harmful animals with special reference to earthworm, Leeches., Moliuses, Frogs, Toads, Snakes, Lizards and other animals. External characters, habits habital and economic importance of birds and rodents; population dynamic and losses due to birds and rodents; in the fields, orchards, forests residential and industrial premises. Control measures for harmful birds and rodents. Conservation of useful animals and control measures.

**Fish Culture**

Introduction to fish and fisheries. Aquaculture-inland and Marine fisheries. Common Marine food fishes, Picciculture – Meaning and scope. Commonly culture fish and their food. Polyculture or composite culture and its technique. Management or nursery rearing and stocking ponds. Induces breeding techniques, fishing gears, Production of fish for consumption and preservation coservation of fish.

## Economic Zoology & Entomology (Practical)

**Time : 3 Hours** **Max. Marks Pract. : 40**
**Int. Assess : 10**
**Periods per week Pract. : 3**

Study of external characters of earthworm, Leech, Slugs. Frog, Toad, Rat, Snake, Wall Lizard, Sparrow, Pigeon, Crow, Parrot, Rat & Mice, Squirrerl & Monkey. The feeding habits of above animals. Identification of culturable fishes e.g. Rohu Mystus, etc. and their characters. Visit to fish department.

**B.Sc. A-Genet.** **Principles of Genetics**

**Time : 3 Hours** **Max. Marks : 80**
**Int. Assess : 20**
**Periods per week : 4**

**Instructions For the Paper Setters**

1. **Question paper should be strictly according to the syllabus.**
2. **The language of questions should be straight and 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 ten questions should be set, out of which the candidates should be required to attempt any five.**

Principles of inheritance, Gene interaction, Multiple allelism cell reproduction and its genetic significance, chromosomal theory of inheritance. Structure of chromosome. Linkage and crossing over Linkage maps. Sex-determination, sex-linked, sex-Influenced and sex limited inheritance. Numerical and structural change of chromosomes. Gene structure and function. Induction and detection of mutatuins. Genetic, regulations in prokaryotes and eukaryotes. Gene synthesis Genetic engineering, Genetics of mitochondria and chloroplasts Genetic disorders in men; Genetics and human welfare Quantitative inheritance. Genetic and environmental components of variations, Gene in population.

## Genetics
## (Practical)

**Time : 3 Hours** **Max. Marks : 40**
**Int. Assess : 10**
**Periods per week (Pract.) : 3**

Demonstration of chromosome structure study of cell division from permanent slides, pedigree analysis, chi-square test for genetic ratios, linkage maps. Analysis of continuous.

**B.Sc. A-Agri.Engg.** **Farm Power Machinery & Elementry Irrigation Engineering**

**Time : 3 Hours** **Max. Marks (Th.) : 80**
**Int. Assess : 20**
**Periods per week : 4**

**Instructions For the Paper Setters**

1. **Question paper should be strictly according to the syllabus.**
2. **The language of questions should be straight and 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 ten questions should be set, out of which the candidates should be required to attempt any five.**

**Farm Power Machinery:-** Source of farm power commonly used on farms with emphasis on tractors. Familiarization with different systems of tractor and their working principles. Introduction to operation and selection of farm machinery used for production and processing of crops. Study of primary, secondary and miscellaneous tillage equipment. Sowing and planting equipment, their calibration and adjustment. Intercultural tools, Familiarization with sprayers and dusters, their working and common adjustment. Introduction to harvesting machinery : mowers and reapers, root harvesting equipment. Study of threshers and combines. Introduction to levelling equipment. Cost operation of tractor machinery.

**Elementary Irrigation Engineering :** Source, quality, measurement, conveyance distribution and control of irrigation water on the farm. Irrigation methods and their evaluation, layout of farm drains, Water lifting devices, centrifugal pumps, their working principles and operations, pump selection, installations, repair and maintenance. Types of prime mover and drives. Open wells and tubewells, their design and construction.

## Agric. Engg.
## (Practical)

**Time : 3 Hours** **Max. Marks (Pract.) : 40**
**Int. Assess. : 10**

Familiarization and study of different systems of tractor, study and familiarization of different components/parts of farm machines and equipment and operational adjustment etc. Problem solving, Measurement of irrigation water, field evaluation of different irrigation systems. Study, installation, repair and maintenance of centrifugal pumps, filed test on discharge and draw down from tubewell.

**B.Sc. AM.F.** **Manures & Fertilizers**

**Time : 3 Hours** **Max. Marks. (Th.) : 40**
**Int. Assess. : 10**
**Period per week : 3**

**Instructions For the Paper Setters**

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2. **The language of questions should be straight and 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 ten questions should be set, out of which the candidates should be required to attempt any five.**

Minerals constituents of soil. Arnon's criteria of essentiality of the elements. Source, occurrence, distribution, behaviour functions. Mechanism of absorption, deficiency symptoms, Toxicity, FYM; composit green manuring and Bulky manures, Bio-fertilizers, Nitrogenous, Phosphatic, Potassic and complex fertilizers. Their manufacturing and behaviour in soil. Micronutrients and soil amendments. Introduction to fertilizer control order. Time & method of fertilizer. Application and doses of fertilizer for important crops.

## B.Sc. A-Dairy Dairying

**Time : 3 Hours** **Max. Marks (Th.) : 80**
**Int. Assess : 20**
**Periods per week (Th.) : 4**

**Instructions For the Paper Setters**

1. **Question paper should be strictly according to the syllabus.**
2. **The language of questions should be straight and 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 ten questions should be set, out of which the candidates should be required to attempt any five.**

**Milk: -**Definition, composition (Milk fat, milk proteins, lactose and minerals) Minor constituents of milk, Factors affecting the quality and yield of milk. Physical, chemical and nutritive properties of milk. Clostrum and its composition.

**Market Milk: -** Legal standards of standard milk, toned milk, double toned milk, flavoured milk, enriched milk or fortified milk, irradiated milk.

Adulteration of milk and its detection.

**Bacteriology of Milk: -** Size of bacteria, Reproduction, requirements for growth. Source of bacteria in milk. Acid producing and flavour producing bacteria.

**Dairy Operations: -** Straining, filtration, clarification, standardization homogenisation, pasteurisation and sterlisation.

**Milk Products**

**Cream: -** Selection of site for creamery. Grades of cream and their compostion, Factors affecting the fat contents of cream,.

**Butter: -** Neutralisation and ripening of cream for butter marking. Preparation of butter from sweet and ripened creams. Factors affecting the churnability of cream. Churning theories judging butter. Common defects, causes and remedies. Legal standards of butter.

**Ghee: -** Preparation of ghee from cream and from butter, by village method and pre-stratification method. Legal standards of ghee.

**Cheese: -** Quality of milk for cheese. Different types of soft and hard cheeses and paneer. Methods of preparation of cheddar cheese and paneer, Legal standards of paneer.

**Ice Cream:-** Mix composition, Methods of manufacture common defects. Transportation and marketing legal standards.

**Concentrated Milk:-** Evaporated milk, condensed milk and milk powders. Brief methods of their preparation.

**By Products:-** Buttermilk, Whey & Casein, composition & uses.

**FERMENTED PRODUCTS:-** Yoghurt Kumiss, Preparation and uses.

## Dairying
## (Practical)

**Time : 3 Hours** **Max. Marks (Pract.) : 40**
**Int. Assess : 10**
**Period per week (Pract.) : 3**

Sampling equipments, sampling of milk and milk products.
Organoleptic tests.
COB tests.
Testing of milk for fat % by Gerber's methods.
Determination of sp gravity by lactometer.
Determination of T.S. and SNF by formula using fat % and lactometer.
Determination of acidity in milk to asses its suitability for heat treatments.
Reporting on the quality and adulteration of milk.
Fitting and adjusting the cream separator.
Separation of cream by cream separator.
Butter making.
Preparation of Ghee from butter.
Preparation of Ghee from cream.
Preparation of Paneer.
Preparation of Khoa.
Ice cream making.
Preparation of flavoured sterilized milk.
Visit to Milk Plant Verka.
Visit to N.D.R.I. Karnal.

**B.Sc. A-Irrig.** **Soil & Water Management**

**Time : 3 Hours** **Max. Marks (Th.) = 80**
**Int. Assess. = 20**
**Periods per week (Th.) = 4**

**Instructions for the Paper Setters**

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2. **The language of question should be straight and simple.**
3. **Not mote than one question should be based on one topic.**
4. **The question paper should cover the while syllabus and questions should be evenly distributed.**
5. **At least ten questions should be set, out of which the candidates should be required to attempt any five.**

Role of water in crop production and availability of water to plants, irrigation and its needs for crop. Measurement of irrigation water, consumptive use of water, methods of moisture determination, water requirement of crop and water use efficiency. Calculation for depth of needed irrigations. Methods of scheduling irrigation to crop and irrigation efficiency. Source of irrigation and their extent in the country and state. Reducing water losses. Irrigation for frost protection, Irrigation management of crop in problem soils. Water quality and crop growth, Agronomic aspects of water management in dry land farming. Methods of water application. Flood furrow, sub surface, sprinkler irrigation and drip irrigation duty of water meanings formula.

**Drainage:** Dracy's law water logging or excess water causes and effects on crop. Principles of drainage, drainage criteria, surface and sub-surface drainage and methods of their layout.

**Conservation:** Erosion problems in Punjab and periphill hilly regions, the causes and effects of erosion, universal soil loss equation, run-off and erosion rates. Erosion control measures-Agronomic and mechanical soil conservation structures. Land use capability classification planning for soil and water conservation on agricultural forms, water-shed areas. Importance of forestry and wild life in soil conservation. Farm forestery.

**Soil and Water Management**
**(Practical)**

**Time = 3 Hours** **Max. Marks (Pract.) = 40**
**Int. Assess.= 10**
**Periods per week (Pract.) = 3**

1. Determination of soil moisture by different methods.
2. Determination of field capacity and permanent wilting point by field and laboratory methods.
3. Installation and working of tensiometer and Gypsum blocks.
4. Simple calculation to determine water deficit, time of irrigation area of irrigation and discharge need for irrigation etc.
5. Measurement of irrigation water by different methods.
6. Practice in layout for different methods.
7. Simple calculation relating to Darcy's law.
8. Determination of percent slope by different methods.
9. Classification of soil texture by fuel methods.
10. Use of dumpy level in the field and plane table survey.
11. Visit to areas affecting by erosion. Visit to soil conservation research and demonstration centers in Punjab, Haryana, Himachal Pradesh and allied areas.

**B.Sc. A-Econ. Fundamentals of Agricultural Economics**

**Time 3 Hours** **Max. Marks = 80**
**Int. Assess. = 20**
**Periods per week = 4**

**Instructions for the Paper Setters**

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2. **The language of question should be straight and simple.**
3. **Not mote than one question should be based on one topic.**
4. **The question paper should cover the while syllabus and questions should be evenly distributed.**
5. **At least ten questions should be set, out of which the candidates should be required to attempt any five.**

Definition of Agricultural economics, scope, relationship with other sciences.

Definition, concept and importance of Agricultural marketing. Types of markets, Regulation of markets. Methods of sale, markets functionaries.

Agricultural credit, important credit institutions. Classification of credit. Three Rs. of credit. Appraisal, credit acquisition & payment schedule.

Farm management its concept, scope and its relationship with other Agriculture sciences. Production relationship and theory of production.

Size of farm, large v/s small size and relationship between size & efficiency.

Land labour and capital in Agriculture.

Marketable surplus, marketed surplus and factor affecting marketable surplus.

Agricultural technology and transformation of traditional Agriculture.

Risk and uncertainty in Agriculture and its type.

**B.Sc. A-Stats. Elementary Analytical Geometry and Statistics and Matric Algebra**

**Time 3 Hours** **Max. Marks(Th.)=80**
**Int. Assess.=20**
**Periods per week(Th.)=4**

**Instructions for the Paper Setters**

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

Analytical geometry of two dimension, line, Matric algebra—Types of matrices, Operation of matrices—addition, subtraction and multiplication, Determinant of a matric, Inverse of matric, Rank of a matric. Definition, aim, significance, limitation and scope of statistics in agricultural science. Frequency distributin including tabulation and classification. Presentation and summerisation of statistical data by graphs and diagrams, histograms, frequency polygons and ogives. Measures of central tendency, A.M., G.M. Midion, Mode, Quartiles, Desiles and their relative merits and significance. Lorenz curves, Skewness and Kurtosis—Meanings and its measures. Elementary ideas of probability—Rules of addition and multiplication, conditional probability and expected value. Binomial Poisson and normal distribution, estimation of mean and variance. Bivariate populations—scatter diagrams and Pearson’s correlation coefficient. Linear Regression.

**B.Sc. A.P.B. Plant Breeding & Introductory Seed Technology**

**Time 3 Hours** **Max. Marks(Th.)=80**
**Int. Assess.=20**
**Periods per week=4**

**Instructions for the Paper Setters**

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

Definition and objective. Origin and domestication of common field crops. Role of genetics and related sciences in plant breeding. Morphology and patterns of variation in related species of crop plants (Wheat, Rice, Cotton, Sugarcane, Maize, Sarson). Causes and utilization of variation. Reproductive systems in crop plants and their relationship to breeding methods. Breeding methods in self and cross pollinated and vegetatively-propagated crops. Hetrosis, male sterility and self incompatibility and their utilization. Mutation, Polyploidy, inter-specific hybridization and tissue culture in relation to crop improvement. Procedures for release of new varieties.

**Introductory Seed Technology**
Seed characteristics. Seed quality. Factors affecting seed quality. Genetic constitution of varieties and genetic aspects of varietal deterioration. Procedure for determining extent of natural cross pollination and isolation distance. Classes of seed and their production procedures. Hybrid seed production. Seed act. Seed certifications. Grow-out test. Seed health and testing

**Plant Breeding**
**(Practical)**

**Time 3 Hours** **Max.Marks(Pract.)=40**
**Int. Assess. = 10**
**Periods per week(Pract.)=3**

Study of morphological and floral structure in crop plants mentioned in theory. Emasculation and pollination techniques in field crops. Determination of pollen viability. Field observation and varietal purity and roguing. Seed purity analysis, moisture determination, germination and viability test. Visit to seed production fields and seed processing plant.

**B.Sc. A-Path. Plant Pathology and Microbiology**

**Time 3 Hours** **Max. Marks(Th.)=80**
**Int. Assess.=20**
**Periods per week(Th.)=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 and simple.**
3. **Not more than one question should be based on one topic.**
4. **The question paper should be cover the whole syllabus and questions should be evenly distributed.**
5. **At lest ten questions should be set, out of which the candidates should be required to attempt any five.**

**General**
Introduction to microbiology and plant pathology, Mention of the major groups of microorganisms. Concept of disease in plants; Cause, and classification of plant diseases; Terminology in plant pathology, and general symptoms; Control of plant diseases: Prophylaxis, Exclusion, Protection, Eradication and Biological.

**Plant Pathogenic Fungi**
Morphology and reproduction, broad outline of any modern system of classification of fungi with characteristics of the main groups, study of representative fungal diseases of field, vegetable and fruit crops.

**Diseases Caused by Oomycetes**
Damping of seedlings; late blight of potatoes; Downy mildew of bajra; White blisters of crucifers, Downy mildew of grapes.

**Diseases Caused by Ascomycetes**
Leaf curl of peach; Powdery mildew of peas and grapevine; Ergot of bajra; Apple scab; Soft-rot of apples and stone fruits; False smut of paddy.

**Diseases Caused by Basidiomycetes**
Rusts of wheat, loose smut of wheat and barley; Covered smut of wheat and barley; Flag smut of wheat; Smut of sugarcane; Grain smut of sorghum; Karnal and Hill bunts of wheat

**Diseases Caused by Deuteromycetes**
Early blight of potatoes; Tikka disease of groundnuts; Gram blight; Red-rot of sugarcane; Anthracnose of mango; Helminthosporium leaf spot disease of paddy.

**Plant Pathogenic Bacteria**
Morphology and classification of plant pathogenic bacteria with characteristics of main groups. Study of representative bacterial diseases of plants:
Citrus canker; Angular leaf spot of cotton; Bacterial blight of paddy; Crown galls of apples and stone fruits; Common scab of potatoes; Bacterial rot (tundu disease) of wheat ears; Stalk rot of maize.

**Plant Viruses Viroids**
Characteristics of plant viruses; Composition and structure; Transmission of plant viruses; Representative crop diseases, caused by viruses and viroids: Mosaic and leaf curl of tomato, Yellow mosaic of legumes; Potato leaf roll; Vein-Mosaic of okra (Bhindi); Potato spindle tuber.

**Mycoplasma like organisms and PPLO**
Properties of mycoplasmas; True mycoplasmas, Mycoplasma like organisms of plants; Spiroplasmas; L-Form bacteria, Representative plant disease; Aster yellows; Brinjal little leaf; Corn stunt.

**Plant Parasitic Nematodes**

Characteristics of plant parasitic nematodes, morphology, Earcockle of wheat. Molya disease of barley, Root-knot of vegetable crops.

**Phanerogamic (Flowering plant) Parasites**

Dodder, Mistietoes, Striga.

**Physiological, OR Non-Parasitic Diseases**

Black tip of Mango. Khaira disease of paddy, Black heart of potato.

## Plant Pathology
## (Practical)

**Time 3 Hours** **Max. Marks(Pract.)=40**
**Int. Assess.=10**
**Periods per week(Pract.)=3**

**Microscopic study of common plant pathogens:**

Fungi, bacteria and nematodes. Measurement of microstructures; Counting of microorganisms. Laboratory isolation of plant pathogens from diseased host tissues and preparation of culture media; Staining of fungi and bacteria. Preparation of Bordeaux mixture, burgundy mixture and lime-sulphur. Collection and preservation of diseased plant specimens (field trips).

**B.Sc. A Horiculture** **General Horticulture**

**Time 3 Hours** **Max. Marks(Th.)=80**
**Int. Assess.=20**
**Periods per week(Th.)=4**

**Instructions for the Paper Setters**

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5. **At lest ten questions should be set, out of which the candidates should be required to attempt any five.**

**Part-I**

Fruits and their importance, Acreage, Production and distribution of fruits in Punjab and their economic importance. Climate as the limiting factor in Horticulture. Effects of temperature, rain-fall humidity and light. Selection of site and soils.

**Orchard soil management methods :** Growing of intercrop as green manure and cover crops milching-effects on soil moisture, Propagation of fruit plants by sexual and asexual methods. Preparation of land and layout-planting system and distances, wind breaks.

Training and pruning of particular fruit crops. Fruit thinning. Cultivation of the following fruit crops : Mango, Citrus, Pear, Peach Plum, Loquat, Gauva, Ber, Grape, Litchi and Papaya.

**Part-II**

Scope of fruit and vegetable preservation industries in Punjab. Needs and benefits of industrial fruit and vegetable preservation. Principles and methods of fruits and vegetable preservation.

Canning and bottling of fruits and vegetables. Picking, grading and packing of fruits. Preparation of squashes, juices, cordials, Jam Jellies, Marmalades, Chutneys, Pickles, Preserves and Tomato products.

**Horticulture**
**(Practical)**

**Time 3 Hours** **Max. Marks(Pract.)=40**
**Int. Assess.=10**
**Periods per week(Pract.)=3**

Practice in propagation methods, layout of orchard, transplanting, manuring, irrigation. Training and pruning of fruit plants. Identification of different fruits and their varieties. Canning of fruits and vegetables, preparation of fruit juices and squashes, Jams, Jellies & Marmalades : Tomato products, Pickles and Chutneys. Vinegar and Sun drying of fruit and vegetables-studies of cold storage and quick freezing practices and refrigeration.

**B.Sc. A Ento.** **Agricultural Zoology & Entomology**

**Time 3 Hours** **Max. Marks(Th.)=80**
**Int. Assess.=20**
**Periods per week(Th.)=4**

**Instructions for the Paper Setters**

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3. **Not more than one question should be based on one topic.**
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Entomology definition, Insects, their close relative, factors leading to the dominance of insects, Importance of insects to man and scope. Insect integument , moulting, metamorphosis, types of eggs, Larvae and dupae. Body regions, structure and segmentation of head, thorax, abdomen and their appendages. Modification of antenae, mouthparts, wings, legs and cerci, Study of internal anatomy of AK grasshopper viz : digestive, circulatory, respiratory, excretory, reproductive and nervous system; sense organs and endoskeleton, Elementary insect ecology including and understanding of biotic and abiotic factor influencing insect life. Classification of insect up to sub-order level with example of insects of economic importance.

**Agri. Zoology & Entomology**
**(Practical)**

**Time 3 Hours** **Max. Marks(Pract.)=40**
**Int. Assess.=10**
**Periods per week(Pract.)=3**

Study of example of arthropods. Types of egg, larvae and pupae. Study of internal and external anatomy of AK grasshopper. Study of various types of antenae, mouthparts, wing s legs and cerci Study of wing coupling mechanism,. Identification of main groups of insects up to important families.

Collection of insects, representing various sub-order and their preservation.
General acquaintance with equipment used in ecological studies.

**B.Sc. A.F.M.** **Farm Management & Production Management**

**Time 3 Hours** **Max. Marks(Th.)=80**
**Int. Assess.=20**
**Periods per week(Th.)=4**

**Instructions for the Paper Setters**

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

1. Importance, Meaning and Scope of Farm Management, its relationship with other agricultural sciences.
2. Nature Meaning and Scope of Production Economics, Concept of production function.
3. Factor–product relationship-maximization of net returns, Factor-Factor-Cost minimization and product, product relationship optimum product combination.
4. Economic Principles used in farm management i.e. principles of diminishing returns, costs, factor substitution, product substitution, equimarginal returns and time comparison.
5. Cost in agriculture, categories of cost, Relation of different costs & cost Function.
6. Management of different factors of production i.e. Land, Labour, Capital, Farm Power & Machinery and other forms of investment.
7. Systems of farming and types of farming Factors affecting types of a farming. Specialization and diversification in Agriculture.
8. Farm planning and budgeting. Resources use planning steps in farm planning and organization of farm business.
9. Nature and objectives of accounts and farm income.
10. Study of Economic problems in Indian agricultural production, marketing , credit etc. Place of Agriculture in five years plans.

**Farm Management**

**(Practical)**

**Time 3 Hours** **Max. Marks(Pract.)=40**
**Int. Assess.=10**
**Periods per week(Pract.)=3**

Visit to selected farms, Study their layout, organisation & operation. Exercise on alternate choice in farm management, Preparation of layout maps. Application of basic principles of farm management, enterprise budgets, labour and farm budgets and power budgets and farm records analysis.

**B.Sc. A. Ento.** **Economic Entomology**

**Time 3 Hours** **Max. Marks(Th.)=80**
**Int. Assess.=20**
**Periods per week(Th.)=4**

**Instructions for the Paper Setters**

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2. **The language of questions should be straight and simple.**
3. **Not more than one question should be based on one topic.**
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Definition of pest. Losses from pests of Agricultural crops and their products, Natural control and factors causing outbreak of pests of Agricultural importance. Principles and methods of pest control-physical mechanical cultural, biological, chemical, integrated, legal supervised control, pest management, economic injury and Economic threshold. Common pesticides, their formulation and methods of application, safe handling and antidotes.

Biology nature and extent of damage and control of the insect pests of sugarcane, cotton, cereals, Pulses, oil seeds, vegetables. Fodder, fruit trees, stored grains, Household and general insect. Pests like Termites, Hairy Caterpillar, Locuts.

Study of non-insect pests like nematodes, mites, birds flying foxes, rodents, monkeys, Jackals etc. A general account of useful birds and mammals and their encouragement.

Detailed account of Apiculture, sericulture and lac-culture. Insect pests and diseases of honey bees, silkworm, lac insects and their control Predators, Parasites pollinators.

Storage of farm products, common pests and their control. Study of pest control equipments, its classification. Principles of working, care & maintenance. Pest control organisation at State and National levels with a general account of the cordiantion at the International level.

Properties of pesticides, mode of entry and action, factors affecting toxicity, compatibility, synergism, repellents attractants, hormones, chemosterilants, pheromones antifeedants.

**Economic Entomology**

**(Practical)**

**Time 3 Hours** **Max. Marks(Pract.)=40**
**Int. Assess.=10**
**Periods per week(Pract.)=3**

Collection and preservation of insects. Rearing techniques and rearing of stored grain pests. Identification of various pests of field crops, vegetables, fruit trees and house hold products. Identification of pest damage in respect of field crops, vegetable in fruit trees. Preparation and application of various pesticides.

Study of different types of application equipment, including Sprayers Dusters, seed disease their structure, working, handling care and maintenance practice in field operation of the control of pests.

Identification of different species of honeybee and their castes. Handling and management of honeybee colonies for productive bee keeping. Extraction and processing of cocoons and their processing.

**B.Sc. A. Ext.** **Agricultural Extension**

**Time 3 Hours** **Max. Marks(Th.)=80**
**Int. Assess.=20**
**Periods per week(Th.)=4**

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2. **The language of questions should be straight and simple.**
3. **Not more than one question should be based on one topic.**
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5. **At lest ten questions should be set, out of which the candidates should be required to attempt any five.**

**A. Introduction to Education :-** Meaning, Nature, Philosophy, Importance, scope History. Principles and objectives of extension education. Similarities and dissimilarities between extension education and community development.

**B. Extension Teaching –Learning :-** Elements in extension teaching process, extension –Learning. Extension teaching process, factors affecting extension—teaching—learning. Extension teaching methods – their classification, effectiveness, choice and use. Audio visual aids—their classification and use.

**C. Programme Planning and Evolution :-** Programme planning—meaning, principles, steps in programme planning. Extension evaluation—Meaning, Importance, steps in extension evaluation, types of extension evaluation.

**D. Communication in Extension Education :-** Meaning, Nature modes and importance of communication, problems in communication and feed back, key-elements and their effectiveness in communication process.

**E. Extension Administration for Rural Development :-** Nature and principles of extension administration and supervision, role and qualities of a good extension worker, supervisors, and administrator. Concept of extension organisation. Rural development Post strategies and current approaches, organisational and operational programmes in India.

**F. Adoption and Diffusion of Innovations :-** Adoption period, adoption process, stages in adoption process, categories of adopters characteristics of Agricultural innovations, Diffusion of innovation in a social system.

**G. Rural Socialogy and Caste System :-** Rural sociology – Its meaning definition, scope and origin, relationship with other sciences, Rural—urban differences, caste system in India. Economic and political life of rural people, Rural social system beliefs, values and taboos.

**Agricultural Extension**

**(Practical)**

**Time 3 Hours** **Max. Marks(Pract.)=40**
**Int. Assess.=10**
**Periods per week(Pract.)=3**

Preparation and use of Audio—Visual Aids. To develop and evaluate extension programme, Acquiring skill in the preparation use of various audio visual aids and equipments. Use of selected teaching methods—individuals, Group and Mass in field situation.

Visit to Agricultural extension and rural development agencies to study their organisational set up and programmes.

**B.Sc. A. Stats.** **Agricultural Statistics**

**Time 3 Hours** **Max. Marks(Th.) = 80**
**Int. Assess. = 20**
**Periods per week(Th.) = 4**

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**Sampling Methods :** Planning and execution of surveys, sampling VS census, principle of survey. Simple random sampling (with and without replacement) stratified random sampling, Ratio method of estimation, land utilization surveys. Estimation of crop yield, concept of sampling and non-sampling error.

**Agricultural Economics—Statistics :** Analysis of time series data, estimation of linear trend, periodic and random variations, fifting of exponential curve Y=ab*.

Index numbers, Laspeyre's Poasche's and fisher formula, requirement of an ideal index and its uses.

Analysis of variance one way and two way (without interaction, fixed effect models).

**Principle of Experimental Design**

Uniformity trials—size and shape of plot, Role of Randomisation local control and replication, Choosing of a good experimental site.

Layout and analysis of completely Randomised design, Randomised block design, Latin square design including one missing value. Factorial experiments, their advantages over simple experiments. Definition of main effect and interaction in $2^2$ and $2^3$ experiments. Partitioning of degree of freedom by Yate's method, elementary idea about confounding.

Split plot design and analysis of covariance with one con-comitant variable.

Practical consideration of laying out experiments in cultivator's field.

**Statistics**

**(Practical)**

**Time 3 Hours** **Max. Marks(Pract.)=40**
**Int. Assess.=10**
**Periods per week(Pract.)=3**

1. Experiment on simple random sampling with and without replacement.
2. Experiment of stratified random sampling.
3. Experiment on ratio method of sampling.
4. Fitting of linear trend to time-series data.
5. Fitting of exponential trend to time-series data.
6. Calculation of index numbers.
7. Analysis of variance one way and two way.
8. Analysis of completely randomised design.
9. Analysis of randomised block design.
10. Analysis of Latin Square design.
11. Analysis of $2^2$ factorial experiments.
12. Analysis of $2^3$ factorial experiments.
13. Analysis of split plot design.
14. Analysis of coyeriance.

**B.Sc. A. Oleri. Olericulture, Floriculture & Land Scaping**

**Time 3 Hours** **Max. Marks(Th.)=80**
**Int. Assess.=20**
**Periods per week(Th.)**=4

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3. **Not more than one question should be based on one topic.**
4. **The question paper should be cover the whole syllabus and questions should be evenly distributed.**
5. **At lest ten questions should be set, out of which the candidates should be required to attempt any five.**

**Olericulture:-** Scope and importance of vegetable growing in Punjab and role in Human diet.

Climate and soil factors effecting the growth of vegetable seeds; vegetable forcing; Kitchen gardening methods, Cellender of operations, programme for the continuous supply of vegetable throughout the year. Problems of commercial vegetable growing in Punjab, Cultivation practices for important winter and summer vegetables crops of Punjab.

**Floriculture :** Importance and scope of floriculture in Punjab seed production and multiplication of ornamental plants; general cultivation of important winter, summer, and Rainy seasons annuals Bulbous plants viz Canna, Amarylis, Dahlia, Gladious Gerbera Crysanthemum, their culture, procurement and storge in bulbs. Cultivation of important ornamental trees, shrubs, hedges and climbers. Cultivation of succulent plants as Bryophllem, Sanserveria, Euphorbia and cacti. Cultivation of Roses, Cultivation of indoor plants.

**Land Scaping :-** Principles and concept of Landscape gardening. Famous gardens of India and their special features of layout. Preparation of landscape plants for schools; Colleges, Public places, Highways and Domesticated places and study of Plants used, terrace gardening, Establishment and maintenance of lawns.

**Olericulture, Floriculture & Land Scaping**
**(Practical)**

**Time 3 Hours** **Max. Marks(Pract.)=40**
**Int. Assess.=10**
**Periods per week(Pract.)=3**

a. Propagation of ornamental plants through seeds cuttage, Layerage and graftage.
b. Identification of the plant materials given in the syllabus.
c. Preparation of layout plans and land scaping of park, bungalow and school promises etc.
d. Practice is prepational of different types of flower beds and making the maintenance lawns.
e. Planting, training and trimming of shrubs, hedges and climbers. Identification of different kinds and varieties of vegetables given in the syllabus.
f. Practices in vegetable growing, Laying out a kitchen garden and growing vegetables in window boxes and pots.

**Agronomy Elective-I**

**Seed production technology : Weeds and weed Control**

**Time 3 Hours** **Max. Marks(Th.)=80**
**Int. Assess.=20**
**Periods per week(Th.)=4**
**Pract. = 6**

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Seed and its characteristics, Agronomic practices for raising quality seed of cereal, pulses, oil crops, tubers, sugarcane, sugar beat, fodder crops and hybrid maize from inbred lines. Multiplication of breeder's seed.

Physiology of seed development, dormancy, viability, maturity, germination and seedling vigor. Environmental factors effecting seed quality. Seed certification-Standards and inspection. Seed processing-Cleaning, treating, packing, storage and marketing. Seed industry and seed act.

Farm plans according to resources management, crops & live-stock selection. Cropping scheme for farm and dairy live stock, Farm power, labour , implements, machinery etc. requirements of the farm. Farm production in relation to marketing requirements.

Advantages and disadvantages of weeds. (Medical, feeding and manurial values of weeds; weeds compete with crops for water, light and mineral nutrients; weeds impair the quality of farm products; weeds reduce the quality and quantity of live stock production; weeds harbour many fungs, bacterial diseases and insect pests; weeds impair the health of human beings; weeds increase the cost of labour and equipments).

Weeds—summer, winter, annual biannual, perennial and equatic weeds.

Weeds—Reproduction and dissemination (weeds having monoceious, dioecious and rhizomes). Dormancy in weed seeds.

Control of weeds—Preventive, cultural Mechanical floading and by adapting suitable rotation. Eradication of weeds by chemical, biological, singeing. (Brunning) methods. Weeds—soil and crop association. Scope of chemical weed control. Classification of Herbicides, properties and function of Herbicides. Application of selective, non selective and combination herbicides; Hazards of chemicals weedicides.

**Agronomy Elective-I**

**(Practical)**

**Time 3 Hours** **Max. Marks(Pract.)=40**
**Int. Assess.=10**
**Periods per week(Pract.)=6**

Seed analysis for purity and germination. Breaking of dormancy. Tests for viability. Sowing and maintenance of seed production fields of important crops. Visit to commercial seed production fields, seed processing plants and seed sale agencies.

Identification of terrestrial and aquatic weeds control in field crops. Methods of herbicide application and computation of dosages, Caliberation of spray pumps. Observing crop symptoms due to faculty application of weedicides. Precautions for safe use of weedicides and useful antidotes. Visit to weed control experiments and equatic weeds sites. Preparation of Herbarium and identification of weeds.

**Agronomy Elective-II**

**Time 3 Hours** **Max. Marks(Th.)=80**
**Int. Assess.=20**
**Periods per week(Th.)=4**

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**Ecology :** Its relevance to man, concept of ecosystem and biosphere , biochemical cycle; energy transfer in ecosystem, netural resources, their use and management, land use in agriculture and forestry sources of pollution, environmental conservation and health.

**Crop Ecology :** Its scope and importance in Agriculture environmental complex, micro environment of plants, physical and social environment as factors of crop distribution and production. Climatic elements as factors of crop growth; impact of changing environment on cropping pattern; plants as indicators of environment; modifications of microlimate.

**Crop Physiology :** Physiology processes in crop and effect of moisture stress plant water growth and development; phasic development and factors affecting it Application of photoperiodism thermoperiodism and vernalization in crop productions, manipulation of conditions for optimizing germination yield and economic components; root development under variable environments; use of growth regulators for controlling growth of flowering, abscission, desication of fruiting etc. Physiologically and naturally determining of criteria for crop harvest.

Management of water logged, erraded, saline, alkali and acidic soils. Soil and water conservation measures. Preparation of crop maps, diagrams and charts. Measurements of climatic elements and microclimate, determination of relationship between climate and vegetation; working out the ecological optimum for different crops in India. Delineation of Agroclimatic regions of India.

Study of an ecosystem like a pond and a forest, differentiating artificial and natural ecosystem. Measurement of growth rates and rooting patterns under different situation; emrgence studies under different soil moisture, temperature and thermal regimes; determination of physiological maturity in the field of crops and vegetables and study of nutrient deficiencies in potted plants.

**Agronomy Elective-III**

**Time 3 Hours** **Max. Marks(Th.)=80**
**Int. Assess.=20**
**Periods per week(Th.)=4**

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Dry farming, ley farming, shifting cultivation, Ranching specialised and diversified farming, family cooperative farming and collective farming their occurance, merits and demerits. Cropping system their characteristics and management. Cropping pattern. Farm selection and farm layout. Mixed cropping, rotation of crops, role of fodder crops and pasture in farm economy.

Raising of different fodders fodder quality, fodder preservation and factors affecting quality of preserved fodder-silage-making and hay making.

**Plant Nutrients**—Criterial essentiality functions, deficiency symptoms. Nutrient transformation and availability. Methods of soil fertility evaluation.

Time and mode of fertilizer application crop response to fertilizers. Fertilizer use efficiency. Concept of integrated fertilizer use and water management in soils. Nutrient removal by crops. Maintenance of soil fertility.

**Agronomy Elective-III**

**(Practical)**

**Time 3 Hours** **Max. Marks(Parct.)=40**
**Int. Assess.=10**
**Periods per week(Pract.)=6**

Farm layout plans, Cropping schemes, Estimation of crop yields. Preparation of fodder production plans for different animals units and farm situations. Silage and hay making.

Fertilizer—Time and mode of application; Detection of deficient symptoms. Mulching for moisture conservation, water harvesting techniques. Use of implements in soil conservation. Visits to the problem areas.

**B.Sc. A Elective-I (Soil). Soil Elective-I**

**Systematic study of soils in relation to Geology Genesis, Classification, Hydrology and Erosion**

**Time 3 Hours** **Max. Marks(Th.)=80**
**Int. Assess.=20**
**Periods per week(Th.)=4**

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5. **At lest ten questions should be set, out of which the candidates should be required to attempt any five.**

Mineral and rock weathering in relation to soil formation weathering sequences of minerals. Introduction to structural geology. Geological time scale. Geology of three major physiographic units of India. Factors of soil formation and their dynamics, pedogenic processes, Soil genesis concepts. Genesis of major soil orders of India w.e.f. Black soils, Laterites, saline-sodic soils, calcareous, soil and soils developed on alluvium. Procedures in survey and mapping. Genetic, taxonomic and FAO soil classification systems-Merits, demerits and criteria. Introduction to world soils.

Soil—a water reserver, Volume-mass relations. Computation of depletion and accretion of profile water. Forces of water retention. Soil water potential-components and measurement. Soil moisture characteristics. Saturated and unsaturated water movement. Infiltration and redistribution. Components of field water balance. Evaporation in the presence and absence of water table. Criteria of scheduling irrigation. Recent concepts—of water availability. Run off-factors affecting and measurement. Soil erosion-significance, types, causes factors affecting and control measures.

**Soil Elective-I**
**(Practical)**
**Identification of Rocks and Minerals**

**Time 3 Hours** **Max.Marks(Pract.)=40**
**Int. Assess.=10**
**Periods per week(Pract.)=6**

Interpretation of geological maps. Characterisation and classification of soil profiles. Detailed soil survery-preparation of interpretive maps and writing of report of a project area. Determination of soil moisture, particle density, bulk density, infiltration, drainage characteristics, advancement of wetting front in homogenous and layered columns, saturated, and unsaturated hydraulic conductivity. Measurement of rainfall, Frequency & probability analysis of long term rainfall data. Measurement of run off and soil loss. Estimation of soil loss by wind erosion. Determination of mechanical and chemical composition of wind blown and eroded sediments.

**B.Sc. A Elective-II (Soil) Fundamentals of Soil Chemistry Fertility and Microbiology including water and fertilizer testing**

**Time 3 Hours** **Max. Marks(Th.)=80**
**Int. Assess.=20**
**Periods per week(Th.)=4**

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3. **Not more than one question should be based on one topic.**
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5. **At lest ten questions should be set, out of which the candidates should be required to attempt any five.**

Soil colloids –nature, properties, origin of charges and their significance, Cation and anion exchange phenomena. Introduction to ionic adsorption, desorption and fixation. Soil reaction, Acid, saline, salinesodic and soils-distribution. Characterisation, gensis and amelioration. Plants reaction to soil salinity, sodicity and acidity. Plant nutrients-criteria of essentiality, functions, deficiency symptoms, content and distribution in soil. Nutrient removal by crops. Methods of soil fertility evaluation. Fertilizers and their fate in soil, Current fertilizers consumption and future trends.

Soil testing-importance and problems, Principles in the determination of soil pH, electrical conductivity, available nitrogen, phosphorus, potassium and sulphur in soils. Fertilizer analysis, Quality of irrigation water. Soil microbiology importance and historical developments. Micro and macro-organisms in soils-classification distribution and activities. Mycorrhiza, Nutritional and biochemical aspects of growth of microbes. Role of microbes in biochemical decomposition of organic manures and farm wastes.

**Elective II (Soil)**

**(Practical)**

**Time 3 Hours** **Max. Marks(Pract.)=40**
**Int. Assess.=10**
**Periods per week(Pract.)=6**

Determination of the effect on dilution and salinity on soil pH, Active and potential acidity. Soluble salts in soil Lime and Gypusum requirements. Nutrient adsorption and fixation capacities of soils. Analysis of soil for different form of nitrogen, phosphorus, potassium and sulphur. Plant analysis for total nitrogen, phosphorus and Potassium. Preparation of standard solutions. Collections of soil, irrigation water and fertilizer samples. Colorimetric and flame photometric methods. Analysis of soil for fertilizer recommendation and suitability for orchard plantation. Analysis of irrigation water. Analysis of fertilizers for quality control. Use of microbiological laboratory wares. Media preparation. Quantitative estimation of bacteria, fungi, acitnomycetes and blue green algae.

**B.Sc. A Elective-III (Soil)** **General Physical Chemistry**

**Time 3 Hours** **Max. Marks(Th.)=80**
**Int. Assess.=20**
**Periods per week(Th.)=4**

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5. **At lest ten questions should be set, out of which the candidates should be required to attempt any five.**

**General Physical Chemistry**

Kinetic theory of gasses, Maxwell law of distribution of velocities and colloids, preparation and properties. Zeta potential and its measurements, origion on charge of colloidal particle. Emulsion and gels, Adsorption and different adsorption isotherms. Application of colloids and absorption, macromolecules, varieties of macromolecules, molecular weight of polymeric the number average and weight average molecular weight. Methods of molecular weight determination of macromolecules, chemicals and ionic equallibria acids, basic pH, Buffer solution and Henderson’s equation, salts hydrolysis, solubility products and its application. Theory of indicators. Theory of ionization, photo-chemistry, Radio-activity and theory of pex,dilute solution and colligative properties.

**B.Sc. A Elective I (Horticulture)**
**Fundamentals of Fruit Production**

**Time 3 Hours** **Max. Marks(Th.)=80**
**Int. Assess.=20**
**Periods per week(Th.)=4**

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4. **The question paper should be cover the whole syllabus and questions should be evenly distributed.**
5. **At lest ten questions should be set, out of which the candidates should be required to attempt any five.**

Climate 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. Winter injuries, seed and bud dormancy. Protection of fruit against adverse climatic conditions, water requirement of fruit crops and factors influencing it. Critical period of water supply, wilting point, wilting co-efficient and wilting of fruit plants under field conditions. Available moisture and drought resist. Adoption of roots to moisture conditions. Factors influencing rate of transpiration and moisture absorption. The response of fruits plants to varying conditions of soil moisture and humidity. Influence on new shoot formation, vegetative growth, yield and fruit development and cropping time and method of irrigation. Orchard soil management methods. Their relation to moisture conservation and nutrient supply. Different type of soils. Nutrients and their availability. Soil improvements and maintenance of organic matter in the soil. Macro and micro elements. Detection of nutrient deficiency in the orchards. Method and time of application, Role of different elements in Horticulture.

Training and pruning of fruits. Method of training Difference between training and pruning. Principles of pruning. Pruning as a necessary evil. Bearing habits of fruit plants.

Response of amount and severity of pruning. Pruning methods and their impact on size colour quality and yield of fruits. Season of pruning.

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. Indices for determing maturity standards of fruits. Post harvest handling of fruits. Physical and bio-chemical aspects; Harvesting and field handling. Packing, Transportation, marketing and storage aspects. Physiological and pathological disorders during storage.

**Elective-I Horticulture**

**(Practical)**

**Time 3 Hours** **Max. Marks(Pract.)=40**
**Int. Assess.=10**
**Periods per week(Th.)=6**

Identification and description of fruit varieties. Layout, planting, irrigation systems and cultural practices in the orchard. Protection of fruit plants against heat and cold. Collection of leaf and soil samples, fertilization needs and nutrition deficiency symptoms. Bearing habits and types of inflorescence in fruit plants. Training, pruning, ringing and thinning methods. Judging of maturity standard in fruits. Picking, packing, grading and storage of fruits and yield estimation of orchards.

**B.Sc. A Elective-II (Horticulture)**

## SYSTEMATIC POMOLOGY, PROPAGATION AND NURSERY MANAGEMENT

**Time 3 Hours** **Max. Marks(Th.)=80**
**Int. Assess.=20**
**Periods per week(Th.)=4**

**Note : Examiner should set at least 3 or 4 questions from Part A and five questions from Part B. Students will have to attempt 2 questions from Part A and 3 from Part B.**

### PART-A

**SYSTEMATIC POMOLOGY**

Introduction significance, History, Principles of Systematic pomology Plant Nomenclature, Identification.

Description classification of fruits of order Rosales, Rhamnales, Sapindales, Myrtales, Geraniales, Palmales with special reference to fruits grown under Punjab conditions.

### PART – B

**PLANT PROPAGATION AND NURSERY MANAGEMENT**

**Introduction**

Media, its propagation structures, mist propagation.

Apomisix, its types and significance in fruit crops.

Seed dormancy its types regulation of germination, environmental and dormancy factors affecting seed germination preconditioning seeds to stimulate germination.

Importance of asexual propagation, clone, genetic variation in asexually propagated plants.

**Cuttage** : Anatomical development of roots and shoots, Physiological, basis of root initiation effect of leaves and buds, polarity, factors affecting regeneration. Type of cuttings, treatment of cutting and techniques of propagation by cuttings.

**Layering :** Factors affecting layering procedure characteristics and uses of layering.

**Graftage :** Techniques types of Budding and Grafting terminology classification of grafting according to placement, Herbaceous, Nurse root and Nurse seed grafting. Top Working Double working micro budding crown grafting.

Reasons for grafting and budding formation of graft union healing process in budding, Factors influencing the healing of graft union, graft hybrids, polarity, limits of grafting, selection storage of bud wood scion.

Graft in compatibility, Stionic influences.

Propagation by specialized stems and Roots with special reference to fruit corps.

Aseptic Methods of micro-propagation. General techniques for preparing cultures for micro propagation procedures for culturing various tissues and organs.

Propagation Methods and Root stocks for important fruit crops Apple; Citrus, mango, Pear, Peach, Plum, Guava etc.

**ELECTIVE-II HORTICULTURE**

**(PRACTICAL)**

**Time 3 Hours** **Max. Marks(Pract.) = 40**
**Int. Assess.=10**
**Periods per week(Pract.)=6**

Identification and description of important fruit species and identification of nuceller seedlings in citrus.

Fruit types, their description, edible portions and time of ripening.

Pollen viability and germination, stigma receptivity and polenation studies in fruits. Extraction drying and storage of seeds and testing seed viability.

Stratification and other seed treatments. Preparation of seed beds, seed sowing, practices in plant propagation techniques like cutting, layering, budding and grafting methods. Application of growth regulators in propagation methods.

Packing-transplanting, and after care of nursery plants and other nursery managements, Insect, pests, disease and weed control in nurseries and orchards.

Preparation of wound infectant solutions like grafting wax, bourdaux, paste, paint and white wash mixtures.

Visits to various fruit research stations and nurseries.

**B.Sc. A Elective III (Horticulture)**

## FRUIT GROWING

**Time 3 Hours** **Max. Marks(Th.)=80**
**Int. Assess. =20**
**Periods per week(Th.)= 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 and simple.**
3. **Not more than one question should be based on one topic.**
4. **The question paper should be cover the whole syllabus and questions should be evenly distributed.**
5. **At lest ten questions should be set, out of which the candidates should be required to attempt any five.**

**Fruit Growing :-**

A. Importance, scope and development of Horticulture in India with special reference to Punjab. Challenges to be faced by the fruit Industry.

B. Detailed studies of following fruit crops regarding their importance, origin, distribution, cultivation and progress of work in India with special reference to Punjab.

1. **Tropical and subtropical fruits :** Mango, Citrus, Grapes, Papaya, Guava, Litchi, Loquat, Ber, Phalsa, Pomegranate and Amla.
2. **Temperate Fruits :** Pear, Peach, Plum and Almond.

**B.Sc. A Elective-I** **Agriculture Economics**

**Time 3 Hours** **Max. Marks(Th.)=80**
**Int. Assess.=20**
**Periods per week(Th.)=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 and simple.**
3. **Not more than one question should be based on one topic.**
4. **The question paper should be cover the whole syllabus and questions should be evenly distributed.**
5. **At lest ten questions should be set, out of which the candidates should be required to attempt any five.**

**Economic Problems of Indian Agriculture**

Importance of agriculture in Indian economy, comparison with other countries. Significant economic problems in Indian agriculture production and productivity. Meaning and scope of Agric. Economics. Contribution of Agriculture to National Income Per capita income, comparison with other countries. Cause of low yield of Agricultural production in terms of development of resources and their exploitation. Fragmentation and consolidation of holding, size of holding ,systems of tenure, recent land legislation and enforcement. Unemployment and under employment, their causes and remedies. Rural Indebtedness, causes, effects and measures to control. Farm mechanisation, types, scope, arguments for and against mechanisation.

**Elective-I Agricultural Economics**

**(Practical)**

**Time 3 Hours** **Max. Marks(Pract.)=40**
**Int. Assess.=10**
**Periods per week(Pract.)=6**

**Assign to term of five students each a village to obtain by visit :-**

1. (a) Distribution of cultivated land to various size groups of farm.
   (b) Degree of change of ownership and tenancy.
   (c) Cropping pattern and agriculture inputs.
2. Study of the family budget of two farmers from different states. Tabulation of information to show the major items or expenses, food and clothing habits, housing and other facilities, preparations of a 100 word report.
3. Preparation of questionares and schedule for an economic survey.

**B.Sc. A Elective-II** **Agriculture Economics**

**Agriculture Marketing and Co-operative**

**Time 3 Hours** **Max. Marks(Th.)=80**
**Int. Assess.=20**
**Periods per week(Th.)=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 and simple.**
3. **Not more than one question should be based on one topic**
4. **The question paper should be cover the whole syllabus and questions should be evenly distributed.**
5. **At lest ten questions should be set, out of which the candidates should be required to attempt any five.**

What is co-operation, principles of co-operation. Co-operation in the National planning. History and development of co-operation before partition. Various committees and group on co-operation. Organisation, financial structure and general working of following co-operative Societies.

1. Primary Agriculture Credit Societies.
2. Multiple Societies.
3. Large size Primary credit societies.
4. Labour co-operative society.
5. Agriculture service co-operative society.

Co-operative farming, meaning objectives and types of co-operative farming. Merits and demerits of co-operative farming.

Co-operative marketing.

Credit, its importance in Agriculture, Role of agencies supplying rural credit.

Study of co-operative movement in Canada, Germany, Japan and England.

Definition and importance of Agriculture markets, types of markets and defects in Agricultural marketing, Methods of study, functional, Institutional and commodity approach.

**Marketing functions and Services :** Assembling, Processing, Distribution, Packing, Standardisation and Grading and Transportation.

**Elective-II Agriculture Economics**

**(Practical)**

**Time 3 Hours** **Max. Marks(Pract.)=40**
**Int. Assess.=10**
**Periods per week(Pract.)=6**

1. Visit to wholesale and retail shops (mandis) to study marketing methods and practices with respect to major agricultural commodities, preparation of a report.
2. Visit to market committee to know the facilities provided to the farmers to know the various market charges paid by farmers & buyers and to know the standard unit of per unit of various commodities.
3. Visit to co-operative societies to get first hand knowledge of their methods of working, preparation of a report.

**B.Sc. A. Elective-III Agri. Economics**

**Fundamentals of Micro & Macro Economics**

**Time 3 Hours** **Max. Marks(Th.)=80**
**Int. Assess.=20**
**Periods per week(Th.)=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 and simple.**
3. **Not more than one question should be based on one topic.**
4. **The question paper should be cover the whole syllabus and questions should be evenly distributed.**
5. **At lest ten questions should be set, out of which the candidates should be required to attempt any five.**

**Micro Economics :**

Nature and scope of economic analysis, micro and macroanalysis. Theory of consumer behaviour, comperative study of marginal utility and indifference curves analysis. Elasticities of demand and supply; functions of price mechanism in a modern economy; importance of business firm as a decision making unit, revenue and cost curves of a firm. Equilibrium of a firm and industry; determination of price and out put of commodities, under different market situation i.e. perfect competition, monopoly and monopolistic competition.

**Macro Economics :**

Importance and scope. Basic concepts. National income accounting. Simple Keynesian model of income determination. Shifts in aggregate spending and multiplier. Theories of consumption and investment. Wages and employment policies. Measures of full employment process, causes and remedies of inflation.