

FACULTY OF AGRICULTURE & FORESTRY

SYLLABUS

For

**B.Sc. AGRICULTURE (HONS.)
(Semester: I & II)**

**(Part: II, III & IV)
(ANNUAL SYSTEM)**

Examination: 2012-13



GURU NANAK DEV UNIVERSITY AMRITSAR

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*B.Sc. AGRICULTURE (HONS.)***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 case.

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.

Scheme of Studies
B.Sc. Agriculture (Hons) Semester-I

Sr. No.	Course Code	Subject	Periods per Week		Marks		Int. Assessment		Total Marks		Grand Total
			Th.	Pract.	Th.	Pract	Th.	Pract.	Th.	Pract	
1.	Agron.104	Introductory Agriculture	4	3	40	20	10	05	50	25	75
2.	Agromet 102	Introductory Agrometerology	4	3	40	20	10	05	50	25	75
3.	Eng-102	English Compulsory-I	4	0	50	--	--	--	50	--	50
4.	Micro 101	Elementary Microbiology	4	3	40	20	10	05	50	25	75
5.	Pbi 101/	Punjabi (Compulsory)/ Basic Punjabi (Mudhli Punjabi)	4	0	50	--	--	--	50	--	50
6.	Soils 103	Introduction to Soil Science	4	3	40	20	10	05	50	25	75
7.	Eco.101	Principles of Agriculture Economics	4	0	40	--	10	--	50	--	50
8.	Bot 103 /	Basic Botany /	2	2	40	20	10	05	50	25	75
	Maths 104	Basic Maths	4	0	60	--	15	--	75	--	75

Note:

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

B.Sc. Agriculture (Hons) Semester-II

Sr. No.	Course Code	Subject	Periods per Week		Marks		Int. Assessment		Total Marks		Grand Total
			Th.	Pract.	Th.	Pract	Th.	Pract.	Th.	Pract	
1.	Agron 106	Water Management and Micro Irrigation	4	3	40	20	10	5	50	25	75
2.	CSE 101	Introduction to Computer Application	3	3	20	20	5	5	25	25	50
3.	Ext. 101	Dimensions to Agriculture Extension	4	3	40	20	10	5	50	25	75
4.	PBG 103	Principles of Genetics	4	3	40	20	10	5	50	25	75
5.	Soils 104	Soil Chemistry, Soil Fertility and Nutrient Management	4	3	40	20	10	5	50	25	75
6.	Veg. 101	Vegetable Production Technology	4	3	40	20	10	5	50	25	75
7.	Zoo 103/ Maths 108	Basic Zoology/ Basic Maths-II	2	2	20	20	5	5	25	25	50
			4	0	40	--	10	--	50	--	50
8.	PBI 102/	Punjabi (Compulsory)/ Basic Punjabi (Mudhli Punjabi)	--	--	50	--	--	--	50	--	50
9.	Eng-103	English Compulsory-II	4	0	50	--	--	--	50	--	50

Note:

1. Mathematics for those students who have passed 10+2 (Medical)
2. Zoology for those students who have passed 10 +2 (Non Medical)

Scheme of Studies**B.Sc. Agriculture (Hons) Part: II (Annual System)**

Sr. No.	Course Code	Subject	Periods per week		Marks		Int. Assessment		Total Marks		Grand Total
			Th.	Pract.	Th.	Pract.	Th.	Pract.	Th.	Pract.	
1	B.Sc. Agric . A. H.	Animal Husbandry	4	3	80	40	20	10	100	50	150
2	B.Sc. Agric. F.C.	Field Crops	4	3	80	40	20	10	100	50	150
3	B.Sc. Agric. Bot.	Plant Physiology	4	3	80	40	20	10	100	50	150
4	B.Sc. Agric. Soil	Introduction to Soil Fertility & Conservation	4	3	80	40	20	10	100	50	150
5	B.Sc. Agric .Comp.	Computer Fundamental, Window Vista and MS-Office- 2003	4	3	80	40	20	10	100	50	150
6	B.Sc. Agric. Genet.	Principles of Genetics	4	3	80	40	20	10	100	50	150
7	B.Sc. Agric. Agric. Engg.	Farm Power Machinery and Elementary Irrigation Engineering	4	3	80	40	20	10	100	50	150
8	B.Sc. Agric. M.F.	Manures & Fertilizers	3	--	40	--	10	--	50	--	50
9	*EVS										
		Total	31	21	600	280	150	70	750	350	1100

Total Marks: 1100**Note:** Marks of *Evs will not be included in the Grand Marks.

Scheme of Studies**B.Sc. Agriculture (Hons) Part: III (Annual System)**

Sr. No.	Course Code	Subject	Periods per week		Marks		Int. Assessment		Total Marks		Grand Total
			Th.	Pract.	Th.	Pract.	Th.	Pract.	Th.	Pract.	
1	B.Sc. Agric . Dairy.	Dairying.	4	3	80	40	20	10	100	50	150
2	B.Sc. Agric. Irrig.	Soil & Water Management	4	3	80	40	20	10	100	50	150
3	B.Sc. Agric. Econ.	Fundamentals of Agricultural Economics	4	--	80	--	20	--	100	--	100
4	B.Sc. Agric. Stats.	Basic Statistics	4	--	80	--	20	--	100	--	100
5	B.Sc. Agric. P.B.	Plant Breeding & Introductory Seed Technology	4	3	80	40	20	10	100	50	150
6	B.Sc. Agric. Pl. Path.	Introduction to Plant Pathogens, Plant Diseases and their Management	4	3	80	40	20	10	100	50	150
7	B.Sc. Agric. Hort.	General Horticulture	4	3	80	40	20	10	100	50	150
8	B.Sc. Agric. Ento.	Economic Zoology, Fish Culture and Agric. Entomology	4	3	80	40	20	10	100	50	150
		Total	32	18	640	240	160	60	800	300	1100

Total Marks: 1100

Scheme of Studies**B.Sc. Agriculture (Hons) Part-IV (Annual System)**

Sr. No.	Course Code	Subject	Periods per week		Marks		Int. Assessment		Total Marks		Grand Total
			Th.	Pract.	Th.	Pract.	Th.	Pract.	Th.	Pract.	
1	B.Sc. Agric . F.M	Farm Management & Production Economics	4	3	80	40	20	10	100	50	150
2	B.Sc. Agric. Ento.	Economic Entomology	4	3	80	40	20	10	100	50	150
3	B.Sc. Agric. Ext.	Agricultural Extension	4	3	80	40	20	10	100	50	150
4	B.Sc. Agric. Stats.	Agricultural Statistics	4	3	80	40	20	10	100	50	150
5	B.Sc. Agric. Oleri & Flori.	Olericulture, Floriculture & Landscaping.	4	3	80	40	20	10	100	50	150
	Elective (I, II & III) Separate list of each elective (Agron, Soil, Hort & Agric. Econ.)		12	12	240	80	60	20	300	100	400
		Total	32	27	640	280	160	70	800	350	1150

Total Marks: 1150

Scheme of Studies**B.Sc. Agriculture (Hons) Part-IV (Annual System)
(For Agronomy Elective)**

Sr. No.	Course Code	Subject	Periods per week		Marks		Int. Assessment		Total Marks		Grand Total
			Th.	Pract.	Th.	Pract.	Th.	Pract.	Th.	Pract.	
1	B.Sc. Agric. Elect-I (Agron.)	Seed Production Technology	4	6	80	40	20	10	100	50	150
2	B.Sc. Agric. Elect-II (Agron.)	Ecology and Crop Physiology.	4	6	80	40	20	10	100	50	150
3	B.Sc. Agric. Elect-III (Agron.)	Crop Production under Special Situation: Soil Fertility and Fertilizer use	4	--	80	--	20	--	100	--	100

(For Soil Elective)

Sr. No.	Course Code	Subject	Periods per week		Marks		Int. Assessment		Total Marks		Grand Total
			Th.	Pract.	Th.	Pract.	Th.	Pract.	Th.	Pract.	
1	B.Sc. Agric. Elect-I (Soil.)	Systematic Study of Soils in Relation to Geology, Genesis, Classification Hydrology & Erosion.	4	6	80	40	20	10	100	50	150
2	B.Sc. Agric. Elect-II (Soil.)	Fundamentals of Soil Chemistry, Fertility, Biology & Bio- Chemistry including Water & Fertilizer Testing.	4	6	80	40	20	10	100	50	150
3	B.Sc. Agric. Elect-III (Soil.)	General Physical Chemistry	4	--	80	--	20	--	100	--	100

(For Horticulture Elective)

Sr. No.	Course Code	Subject	Periods per week		Marks		Int. Assessment		Total Marks		Grand Total
			Th.	Pract.	Th.	Pract.	Th.	Pract.	Th.	Pract.	
1	B.Sc. Agric. Elect-I (Hort.)	Fundamentals of Fruit Production.	4	6	80	40	20	10	100	50	150
2	B.Sc. Agric. Elect-II (Hort.)	Systematic Pomology, Propagation & Nursery Management.	4	6	80	40	20	10	100	50	150
3	B.Sc. Agric. Elect-III (Hort.)	Fruit Growing.	4	--	80	--	20	--	100	--	100

B.Sc. Agriculture (Hons) Part-IV (Annual System)**For Agric. Economics Elective**

Sr. No.	Course Code	Subject	Periods per week		Marks		Int. Assessment		Total Marks		Grand Total
			Th.	Pract.	Th.	Pract.	Th.	Pract.	Th.	Pract.	
1	B.Sc. Agric. Elect-I (Agric. Econ.)	Economic Problems of Indian Agriculture & Rural Sociology.	4	6	80	40	20	10	100	50	150
2	B.Sc. Agric. Elect-II (Agric. Econ.)	Agricultural Marketing & Co-operative.	4	6	80	40	20	10	100	50	150
3	B.Sc. Agric. Elect-III (Agric. Econ.)	Micro & Macro Economics	4	--	80	--	20	--	100	--	100

Agron. 104: Introductory Agriculture**Time: 3 Hours****Max. Marks: 75****Theory: 40****Practical: 20****Int. Assess: 10+5 (15)****Periods per week 4+3 (7)****Instructions for the Paper Setters:**

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

Art, science and business of crop production. Basic elements and factors affecting crop production. History of agricultural development. Ancient Indian agriculture in civilization era. Chronological agricultural technology development in India. Agricultural growth. Contrasting food chains. Diversity in physiography- soil groups, marine, livestock and water. Liabilities- soil and weather factors. Dry and irrigated agriculture. Farming systems approach. Nutritional and rural life standards.

Practical:

Identification of various crops, and their seeds; Weeds- identification and Control measures; Working of Agricultural implements: Calibration of seed drills; Identification, computation of Doses and methods of application of fertilizer; farm visit for acutance with field problems.

Agromet. 102: Introductory Agrometeorology**Time: 3 Hours****Max. Marks: 75****Theory: 40****Practical: 20****Int. Assess: 10+5 (15)****Periods per week 4+3 (7)****Instructions for the Paper Setters:**

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

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

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

Eng: 102 ENGLISH (COMPULSORY)

Time Allowed: 3 Hours

Total Marks: 50

Texts Prescribed:

1. Tales of Life (Guru Nanak Dev University, Amritsar)
2. Prose for Young Learners (Guru Nanak Dev University, Amritsar)
3. Murphy's English Grammar, (Raymond Murphy), 3rd Ed. CUP 2004, Rept. 2005.

Course Contents:

- 1) Stories at Sr.No.1,2,3,5,6 from *Tales of Life*.
- 2) Essays at Sr.No.1,2,3,5,6 from *Prose for Young Learners*.
- 3) Unit 1-37 from *Murphy's English Grammar*.

Division of Marks:

Section-A:

Twenty (20) questions on the usage of grammar related to units 1-37 of Murphy's English Grammar. All questions will be compulsory.
($\frac{1}{2} \times 20 = 10$ Marks)

Section-B:

- I. Eight (8) questions from the two literary texts (four from Tales, four from Prose). The students will be required to attempt any five choosing at least two questions from each prescribed text. The answers should not exceed 15 lines each. (3x5=15 Marks)
- II. Eight (8) questions on vocabulary testing meaning and usage of items glossed in the two prescribed text. All questions will be compulsory. ($\frac{1}{2} \times 8 = 4$ Marks)
- III. Translation of a short passage from English to Hindi/Punjabi

OR

Precise of a short passage (only for foreign students who do not know Punjabi/Hindi. (5 Marks)

Section-C:

- I. There will be two questions one from each literary text. The students will be required to answer any one. (1x8=8 Marks)
- II. Writing a paragraph (1 out of 2) (1x8=8 Marks)

Micro 101: Elementary Microbiology**Time: 3 Hours****Max. Marks: 75****Theory: 40****Practical: 20****Int. Assess: 10+5 (15)****Periods per week: 4+3 (7)****Instructions for the Paper Setters**

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

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

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

PBL: 101 ਪੰਜਾਬੀ (ਲਾਜ਼ਮੀ)

ਸਮਾਂ : 3 ਘੰਟੇ

ਕੁਲ ਅੰਕ : 50

ਪਾਠ-ਕ੍ਰਮ ਅਤੇ ਪਾਠ-ਪੁਸਤਕਾਂ

1. **ਗਿਆਨ ਮਾਲਾ** (ਵਿਗਿਆਨਕ ਤੇ ਸਮਾਜ-ਵਿਗਿਆਨਕ ਲੇਖਾਂ ਦਾ ਸੰਗ੍ਰਹਿ)
(ਸੰਪ. ਡਾ. ਸਤਿੰਦਰ ਸਿੰਘ, ਪ੍ਰੋ. ਮਹਿੰਦਰ ਸਿੰਘ ਬਨਵੈਤ), ਗੁਰੂ ਨਾਨਕ ਦੇਵ ਯੂਨੀਵਰਸਿਟੀ, ਅੰਮ੍ਰਿਤਸਰ, 2007.
ਲੇਖ : ਪਹੀਆ ਪ੍ਰਦੂਸ਼ਣ, ਭਰੂਣ ਹੱਤਿਆ ਦੇ ਦੇਸ਼ ਵਿਚ, ਨਾਰੀ ਸ਼ਕਤੀ, ਵਾਤਾਵਰਣੀ ਪ੍ਰਦੂਸ਼ਣ ਅਤੇ ਮਨੁੱਖ, ਏਡਜ਼ : ਇਕ ਰੰਭੀਰ ਸੰਕਟ।
2. **ਪੰਜਾਬ ਦੇ ਮਹਾਨ ਕਲਾਕਾਰ** (ਬਲਵੰਤ ਗਾਰਗੀ), ਗੁਰੂ ਨਾਨਕ ਦੇਵ ਯੂਨੀਵਰਸਿਟੀ, ਅੰਮ੍ਰਿਤਸਰ।
ਲੇਖ : ਅੰਮ੍ਰਿਤਾ ਸ਼ੇਰਗਿਲ, ਕੇ.ਐਲ. ਸਹਿਗਲ, ਬੜੇ ਗੁਲਾਮ ਅਲੀ ਖਾਂ, ਸੋਭਾ ਸਿੰਘ, ਪ੍ਰਿਥਵੀਰਾਜ ਕਪੂਰ, ਭਾਈ ਸਮੁੰਦ ਸਿੰਘ
3. **ਪੈਰੂਾ ਰਚਨਾ**
4. **ਪੈਰੂਾ ਪੜ੍ਹ ਕੇ ਪ੍ਰਸ਼ਨਾਂ ਦੇ ਉੱਤਰ।**
5. (ੳ) **ਪੰਜਾਬੀ ਧੁਨੀ ਵਿਉਂਤ** : ਉਚਾਰਨ ਅੰਗ, ਉਚਾਰਨ ਸਥਾਨ ਤੇ ਵਿਧੀਆਂ, ਸਵਰ, ਵਿਅੰਜਨ, ਸੁਰ।
(ਅ) **ਭਾਸ਼ਾ ਵੰਨਗੀਆਂ** : ਭਾਸ਼ਾ ਦਾ ਟਕਸਾਲੀ ਰੂਪ, ਭਾਸ਼ਾ ਅਤੇ ਉਪ-ਭਾਸ਼ਾ ਦਾ ਅੰਤਰ, ਪੰਜਾਬੀ ਉਪਭਾਸ਼ਾਵਾਂ ਦੇ ਪਛਾਣ-ਚਿੰਨ੍ਹ।
6. **ਮਾਤ ਭਾਸ਼ਾ ਦਾ ਅਧਿਆਪਨ**
(ੳ) ਪਹਿਲੀ ਭਾਸ਼ਾ ਦੇ ਤੌਰ ਉੱਤੇ
(ਅ) ਦੂਜੀ ਭਾਸ਼ਾ ਦੇ ਤੌਰ ਉੱਤੇ

ਅੰਕ-ਵੰਡ ਅਤੇ ਪਰੀਖਿਅਕ ਲਈ ਹਦਾਇਤਾਂ

1. ਕਿਸੇ ਨਿਬੰਧ ਦਾ ਸਾਰ ਜਾਂ ਉਸਦਾ ਵਿਸ਼ਾ ਵਸਤੂ (ਦੋ ਵਿਚੋਂ ਇਕ) । 10 ਅੰਕ
2. ਵਾਰਤਕ ਰੂਪ : ਰੇਖਾ ਚਿਤਰ, ਨਾਇਕ ਬਿੰਬ, ਕਲਾਤਮਕ ਗੁਣ, ਰੇਖਾ ਚਿਤਰ ਸਾਹਿਤ ਨੂੰ ਦੇਣ । 10 ਅੰਕ
3. ਪੈਰੂਾ ਰਚਨਾ : ਤਿੰਨ ਵਿਸ਼ਿਆਂ ਵਿਚੋਂ ਕਿਸੇ ਇਕ ਉਤੇ ਪੈਰੂਾ ਲਿਖਣ ਲਈ ਕਿਹਾ ਜਾਵੇ । 5 ਅੰਕ
4. ਪੈਰੂਾ ਦੇ ਕੇ ਉਸ ਬਾਰੇ ਪੰਜ ਪ੍ਰਸ਼ਨਾਂ ਦੇ ਉੱਤਰ । 5 ਅੰਕ
5. ਨੰਬਰ 5 ਉਤੇ ਦਿੱਤੀ ਵਿਆਕਰਨ ਦੇ ਆਧਾਰ ਤੇ ਵਰਣਨਾਤਮਕ ਪ੍ਰਸ਼ਨ 10 ਅੰਕ
6. ਨੰਬਰ 6 ਵਿਚ ਮਾਤ ਭਾਸ਼ਾ ਦੇ ਪਹਿਲੀ ਭਾਸ਼ਾ ਅਤੇ ਦੂਜੀ ਭਾਸ਼ਾ ਵਜੋਂ ਅਧਿਆਪਨ, ਮਹੱਤਵ ਅਤੇ ਸਮੱਸਿਆਵਾਂ ਬਾਰੇ ਚਾਰ ਪ੍ਰਸ਼ਨ ਪੁੱਛੇ ਜਾਣਗੇ, ਜਿਨ੍ਹਾਂ ਵਿਚੋਂ ਵਿਦਿਆਰਥੀ ਨੇ ਦੋ ਦਾ ਉੱਤਰ ਦੇਣਾ ਹੋਵੇਗਾ। 5×2=10 ਅੰਕ

ਮੁੱਢਲੀ ਪੰਜਾਬੀ

(In lieu of Punjabi Compulsory)

gkm-eqw

;wKL fszB xzN/

50

e[b nzeL

1H	gzikph GkFk, r[ow[yh fbgh r[ow[yh fbgh L pDso ns/ soshp	20
nze		
2H	r[ow[yh nkoE'rqkch ;Po pDso ns/ T[ukoB ftnziB pDso ns/ T[ukoB	15
nze		
3H	gzikph Fpd-pDso ;kXkoB Fpd fJe T[ukoyzvh Fpd	15
nzze		

:{fBN ns/ Ehw

- 1H gzikph GkFk L BkweoD ns/ ;zy/g ikD gSkD, r[ow[yh fbgh L BkweoD, r[ow[yh toDwkbkl g?_sh nZyoh, nZyo eqw, ;Po tkje (T n J), brK wksoK, g?o ftu fpzdh tkb/ toD, g?o ftu g?D tkb/ toD, fpzdh, fN`gh, n`Xe.
- 2H r[ow[yh nkoE'rqkch ns/ T[ukoBl ;PoK dh pDso ns/ T[ukoB (bx{-dhox ;Po)l ;Po ns/ brK wksoKl ftnziBK dh pDso ns/ T[ukoBl g?o ftu g?D tkb/ toDK (j, o, t) dk T[ukoB l b ns/ ba dk T[ukoBl G, X, Y, M, x dk T[ukoBl g?o ftu fpzdh tkb/ toDK dk T[ukoB.
- 3H gzikph Fpd-pDso L ;kXkoB Fpdl fJe`bk ;Po (fit/_ nk)l ;Po ns/ ftnziB (fit/_ nko)l ftnziB ns/ ;Po (fit/_ gk)l ftnziB ;Po ftnziB (fit/_ gko)l e'Frs Fpd (fit/_ xo, gh)l ftnkeoDe Fpd (fit/_ ~, B/)l gzikph Fpd ouBk-1l fbzr-g[fbzr, fJe tuB-pj[tuBl fB`s tos'_ dh gzikph Fpdktbh-1L ykD-ghD, ;kekdkoh, o[`sK, wjhfbnK, frDsh, w";w nkfd Bkb ;zpzfXs.

nze-tzv ns/ gohfyne bJh jdkfJsK L

- 1H :{fBN gfj bk ft`u'_ d' toDBkswe gqFB g[`S/ ikDr/ fiBQK ftu'_
ftfdnkoEh B/ fJe dk T[`so d/Dk j't/rk.
(15 nzae)

2H :{fBN d{ik ns/ shik ftu'_ uko gqFB (jo fJe Gkr ftu'_ d'-d' gqFB) g[S/ ikDr/ fiBQK ftu'_ ftdnkoEh B/ d' gqFBK dk (jo Gkr ftu'_ fJe-fJe gqFB), T[so d/Dk j't/rk.

(10x2=20 nze)

3H :{fBN gfj bk, d{ik ns/ shik ftu'_ ;zy/g T[so tkb/ S/ gqFB (jo fJe Gkr ftu'_ d'-d' gqFB) g[S/ ikDr/ fiBQK ftu'_ ftdnkoEh B/ fszB gqFBK (jo Gkr ftu'_ fJe-fJe gqFB) dk T[so d/Dk j't/rk.

(05x3=15 nze)

Soils 103: Introduction to Soil Science**Time: 3 Hours****Max. Marks: 75****Theory: 40****Practical: 20****Int. Assess: 10+5 (15)****Periods per week: 4+3 (7)****Instructions for the Paper Setters:**

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

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

Practical

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

Econ. 101: Principles of Agricultural Economics

Time: 3 Hours

Max. Marks: 50

Theory: 40

Int. Assess: 10

Periods per week 4+0

Instructions for the paper setters:

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

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

National Income- Concepts, measurement. Inflation – Meaning, definition, kinds of inflation.

Bot. 103: Basic Botany

Time: 3 Hours

Max. Marks: 75
Theory: 40
Practical: 20
Int. Assess: 10+5 (15)
Periods per week 2+2 (4)

Instructions for the Paper Setters:

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

Plant kingdom- features of each group. Morphology of root, stem, leaf, flower and inflorescence. Pollination and fertilization. Fruit and seed. Cell structure. Tissue types. Internal structure of root, stem and leaf. Plant taxonomy and systems of classification. Characteristic features and economic importance of Cruciferae, Malvaceae, Leguminosae, Cucurbitaceae, Solanaceae and Gramineae.

Practical

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

Math. 104: Basic Mathematics-I**Time: 3 Hours****Max. Marks: 75****Theory: 60****Int. Assess: 15****Periods per week 4+0****Instructions for the paper setters:**

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

Complex numbers. Geometric series. Logarithms. Binomial theorem for positive index. Trigonometric identities and allied angles, graphs of trigonometric functions, addition and subtraction formulae, sum and product formulae, multiple and sub-multiple angles.

Agron. 106: Water Management and Micro Irrigation**Time: 3 Hours****Max. Marks: 75****Theory: 40****Practical: 20****Int. Assess: 10+5****Periods per week: 4+3****Instructions for the paper setters:**

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

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

Practical

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

CSE 101: Introduction to Computer Applications**Time: 3 Hours****Max. Marks: 50****Theory: 20****Practical: 20****Int. Assess: 5+5 (10)****Periods per week 3+3: (6)****Instructions for the paper setters:**

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

Introduction, anatomy and classification of computers. Input and output devices. Units of memory. Hardware and software. Types of processors. Booting of computer. Computer viruses, worms and vaccines and security system. Operating system- Disk Operating System (DOS), WINDOWS and Linux. Basic DOS commands. WINDOWS- Graphical User Interface (GUI), desktop and its elements. Windows Explorer. Anatomy of a window, title bar, minimum, maximum and close buttons. Scroll bars, menus and toolbars. Internet- World Wide Web (WWW)- concepts, web browsing and electronic mail.

Practical:

Applications- MS Office- MSWORD- Word processing and units of document, features of word-processing packages. Creating, editing, formatting and saving a document in MS WORD. MS EXCEL- electronic spreadsheets, concept, packages. Creating, editing and saving a spreadsheet. Use of basic in-built statistical and other functions and writing expressions. Use of data analysis tools, correlation and regression, t-test for two-samples with one-way classification. Creating graphs. MS POWER POINT- features of Power Point Package. MSACCESS- concept of database. Units of database. Creating database- illustration through examples.

Ext. 101: Dimensions of Agricultural Extension**Time: 3 Hours****Max. Marks: 75****Theory: 40****Practical: 20****Int. Assess: 10+5 (15)****Periods per week 4+3: (7)****Instructions for the paper setters:**

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

Education–Meaning and types. Extension Education and Agricultural Extension- meaning, objectives, principles and philosophy. Importance and problems of rural development. Agricultural and rural development programmes of pre and post independence era. Powers, functions and organizational set-up of three tier Panchayati Raj System. New trends in extension education and privatization of extension. Women development programmes. Emergence of broad based extension.

Practical

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

PBG 103: Principles of Genetics**Time: 3 Hours****Max. Marks: 75****Theory= 40****Practical = 20****Int. Assess: 10+5 (15)****Periods per week 4+3: (7)****Instructions for the paper setters:**

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

Mendel's laws of inheritance. Types of gene action. Qualitative and quantitative traits. Multiple factor hypothesis. Cytoplasmic inheritance. Mutations - Methods of inducing mutations and detection of sex linked and autosomal mutations. CIB technique. Gene expression and differential gene activation, Lac operon and fine structure of gene. Ultra structure of cell and cell organelles and their functions. Study of chromosome structure, morphology, number and types. Karyotype and Idiogram, Mitosis and meiosis. DNA and its structure, function, types, modes of replication and repair. RNA and its structure, function and types. Transcription. Translation - Genetic code and outline of protein synthesis. Crossing over and factors affecting it. Mechanism of crossing over and cytological proof of crossing over. Linkage and estimation of linkage. Numerical chromosomal aberrations and evolution of different crop species like cotton, wheat, tobacco, triticale and *Brassicacae*. Structural chromosomal aberrations.

Practical

Microscopy. Preparation and use of fixatives and stains for light microscopy. Identification of various stages of mitosis and meiosis. Monohybrid, Dihybrid and Trihybrid ratios and their modifications. Chi-square analysis and Interaction of factors. Epistatic factors, additive factors and Inhibitory factors. Linkage- two point and three point test cross. Induction of polyploidy using colchicines. Induction of chromosomal aberrations using chemicals.

Soils 104: Soil Chemistry, Soil Fertility and Nutrient Management**Time: 3 Hours****Max. Marks: 75****Theory: 40****Practical: 20****Int. Assess: 10+5 (15)****Periods per week 4+3: (7)****Instructions for the paper setters:**

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

Soil as a source of plant nutrients. Essential and beneficial elements- criteria of essentiality, forms of nutrients in soil, mechanisms of nutrient transport to plants. Factors affecting nutrient availability to plants. Measures to overcome deficiencies and toxicities. Problem soils- acid, salt affected and calcareous soils, characteristics, nutrient availabilities, Reclamation- mechanical, chemical and biological methods. Fertilizer and insecticides and their effect on soil, water and air. Irrigation water- quality of irrigation water and its appraisal. Soil fertility- approaches for soil fertility evaluation. Methods of soil testing. Critical levels of different nutrients in soil. Plant analysis- DRIS approach, critical levels in plants. Rapid tissue tests. Indicator plants. Biological methods of soil fertility evaluation. Soil test based fertilizer recommendations to crops. Factors influencing nutrient use efficiency (NUE) in respect of N, P, K, S, Fe and Zn fertilizers. Source, method and scheduling of nutrients for different soils and crops grown under rainfed and irrigated conditions.

Practical

Principles of analytical instruments and their calibration and applications, Colorimetry and flame photometry. Estimation of available N, P, K, S and Zn in soils. pH, Electrical Conductivity, carbonates, bicarbonates, Ca^{++} and Mg^{++} in soil and water. Lime requirement and gypsum requirement of problem soils. Estimation of N, P and K in plants.

Veg. 101: Vegetable Production Technology**Time: 3 Hours****Max. Marks: 75****Theory: 40****Practical: 20****Int. Assess: 10+5 (15)****Periods per week 4+3: (7)****Instructions for the paper setters:**

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

Importance of Olericulture. Vegetable gardens. Vegetable origin, classification, area, production and varieties. Package of practices of tomato, brinjal, chillies and okra. Cucurbitaceous vegetables-- cucumber, ridge gourd, ash gourd, snake gourd, bottle gourd, bitter gourd and melons. Cole crops - cabbage, cauliflower and knol-khol. Bulb crops - onion and garlic. Beans and peas - French beans, cluster beans, dolichos beans, peas and cowpea. Tuber crops - potato, sweet potato, tapioca, colocasia, yams. Root crops - carrot, radish, turnip and beet root. Leafy vegetables - amaranthus, palak, methi. Perennial vegetables - drumstick, coccinia and curry leaf.

Practical

Planning and layout of kitchen garden. Identification of important vegetable seeds and plants. Raising of vegetable nurseries. Transplanting of vegetable seedlings in main field. Layout of kitchen garden and maintenance. Seed extraction in tomato and brinjal. Visit to commercial vegetable farms. Intercultural operations in vegetable plots. Sowing of potato, solanaceous fruit crops, root crops and cucurbitaceous vegetables. Seed production in vegetable crops. Harvesting indices of different vegetable crops. Grading and packing of vegetables.

Eng: 103 ENGLISH (COMPULSORY)**Time Allowed: 3 Hours****Total Marks: 50****Texts Prescribed:**

1. Tales of Life (Guru Nanak Dev University, Amritsar)
2. Prose for Young Learners (Guru Nanak Dev University, Amritsar)
3. Murphy's English Grammar, (Raymond Murphy), 3rd Ed. CUP 2004, Rept. 2005.

Course Contents

- 1) Stories at Sr.No.7,9,10,11,12 from *Tales of Life*.
- 2) Essays at Sr.No.7,8,9,10,11 from *Prose for Young Learners*.
- 3) Unit 121-136, 69-91 from *Murphy's English Grammar*.

Division of Marks:**Section-A:**

Twenty (20) questions on the usage of grammar related to units 121-136, 69-91 of Murphy's English Grammar. All questions will be compulsory.
($\frac{1}{2} \times 20 = 10$ Marks)

Section-B:

- I. Eight (8) questions from the two literary texts (four from Tales, four from Prose). The students will be required to attempt any five choosing at least two questions from each prescribed text. The answers should not exceed 15 lines each. (3x5=15 Marks)
- II. Eight (8) questions on vocabulary testing meaning and usage of items glossed in the two prescribed text. All questions will be compulsory. ($\frac{1}{2} \times 8 = 4$ Marks)
- III. A personal letter (1 out of 2) (5 Marks)

Section-C:

- I. There will be two questions one from each literary text. The students will be required to answer any one. (1x8=8 Marks)
- II. Comprehension of a passage (about 200 words) selected from either of the prescribed books of *Prose* or *Tales*. (4 short questions of 2 marks each) (4x2=8 Marks)

PBI: 102 ਪੰਜਾਬੀ (ਲਾਜ਼ਮੀ)

ਸਮਾਂ : 3 ਘੰਟੇ

ਕੁਲ ਅੰਕ : 50

ਪਾਠ-ਕ੍ਰਮ ਅਤੇ ਪਾਠ-ਪੁਸਤਕਾਂ

1. **ਗਿਆਨ ਮਾਲਾ** (ਵਿਗਿਆਨਕ ਤੇ ਸਮਾਜ-ਵਿਗਿਆਨਕ ਲੇਖਾਂ ਦਾ ਸੰਗ੍ਰਹਿ)
(ਸੰਪ. ਡਾ. ਸਤਿੰਦਰ ਸਿੰਘ, ਪ੍ਰੋ. ਮਹਿੰਦਰ ਸਿੰਘ ਬਨਵੈਤ), ਗੁਰੂ ਨਾਨਕ ਦੇਵ ਯੂਨੀਵਰਸਿਟੀ, ਅੰਮ੍ਰਿਤਸਰ, 2007 ।
ਲੇਖ : ਸਾਹਿਤ ਤੇ ਲੋਕ ਸਾਹਿਤ, ਔਖਾਂ, ਅਚੇਤਨ ਦਾ ਗੁਣ ਤੇ ਸੁਭਾਅ, ਕੰਪਿਊਟਰ ਅਤੇ ਇੰਟਰਨੈੱਟ, ਮਨੁੱਖੀ ਅਧਿਕਾਰ।
2. **ਪੰਜਾਬ ਦੇ ਮਹਾਨ ਕਲਾਕਾਰ** (ਬਲਵੰਤ ਗਾਰਗੀ), ਗੁਰੂ ਨਾਨਕ ਦੇਵ ਯੂਨੀਵਰਸਿਟੀ, ਅੰਮ੍ਰਿਤਸਰ।
ਲੇਖ : ਸਤੀਸ਼ ਗੁਜਰਾਲ, ਗੁਰਚਰਨ ਸਿੰਘ, ਠਾਕੁਰ ਸਿੰਘ, ਬਲਰਾਜ ਸਾਹਨੀ, ਸੁਰਿੰਦਰ ਕੌਰ।
3. **ਸ਼ਬਦ-ਬਣਤਰ ਅਤੇ ਸ਼ਬਦ ਰਚਨਾ** : ਪਰਿਭਾਸ਼ਾ, ਮੁੱਢਲੇ ਸੰਕਲਪ
4. **ਸ਼ਬਦ ਸ਼੍ਰੇਣੀਆਂ**
5. **ਪੈਰ੍ਹਾ ਰਚਨਾ**
6. **ਪੈਰ੍ਹਾ ਪੜ੍ਹ ਕੇ ਪ੍ਰਸ਼ਨਾਂ ਦੇ ਉੱਤਰ**
7. **ਮੁਹਾਵਰੇ ਅਤੇ ਅਖਾਣ**

ਅੰਕ ਵੰਡ ਅਤੇ ਪਰੀਖਿਅਕ ਲਈ ਹਦਾਇਤਾਂ

1. ਕਿਸੇ ਨਿਬੰਧ ਦਾ ਸਾਰ ਜਾਂ ਉਸਦਾ ਵਿਸ਼ਾ ਵਸਤੂ (ਦੋ ਵਿਚੋਂ ਇਕ) । 10 ਅੰਕ
2. ਵਾਰਤਕ ਰੂਪ : ਰੇਖਾ ਚਿਤਰ, ਨਾਇਕ ਬਿੰਬ, ਕਲਾਤਮਕ ਗੁਣ, ਰੇਖਾ ਚਿਤਰ ਸਾਹਿਤ ਨੂੰ ਦੇਣ 10 ਅੰਕ
- 3-4. 3-4 ਨੰਬਰ ਉੱਤੇ ਦਿੱਤੀ ਵਿਆਕਰਣ ਦੇ ਆਧਾਰ ਤੇ ਵਰਣਨਾਤਮਕ ਪ੍ਰਸ਼ਨ। 10 ਅੰਕ
5. ਪੈਰ੍ਹਾ ਰਚਨਾ : ਤਿੰਨ ਵਿਸ਼ਿਆਂ ਵਿਚੋਂ ਕਿਸੇ ਇਕ ਉੱਤੇ ਪੈਰ੍ਹਾ ਲਿਖਣ ਲਈ ਕਿਹਾ ਜਾਵੇ । 5 ਅੰਕ
6. ਪੈਰ੍ਹਾ ਦੇ ਕੇ ਉਸ ਬਾਰੇ ਪੰਜ ਪ੍ਰਸ਼ਨਾਂ ਦੇ ਉੱਤਰ 5 ਅੰਕ
7. ਨੰਬਰ 7 ਵਿਚ ਅੱਠ ਅਖਾਣ ਅਤੇ ਅੱਠ ਮੁਹਾਵਰੇ ਪੁੱਛੇ ਜਾਣਗੇ, ਜਿਨ੍ਹਾਂ ਵਿਚੋਂ ਵਿਦਿਆਰਥੀ ਨੇ ਪੰਜ-ਪੰਜ ਨੂੰ ਵਾਕਾਂ ਵਿਚ ਵਰਤ ਕੇ ਅਰਥ ਸਪੱਸ਼ਟ ਕਰਨੇ ਹੋਣਗੇ 5+5= 10 ਅੰਕ

ਮੁੱਢਲੀ ਪੰਜਾਬੀ

(In the lieu of Compulsory Punjabi)

;w?;No d{ik

	gkm-eqw	
;wKL fszB xzN/		e[b nzeL 50
1H	gzikph Fpd-pDso, ;z:[es ns/ fwFos Fpd pj[T[ukoyzvh Fpd	20 nze
2H	gzikph tke pDso ;kXkoB tke L fe;wK ;z:[es tke L fe;wK fwFos tke L fe;wK	15 nze
3H	gqekoih gzikph fu`mh gZso g?ok ouBk ;zy/g ouBk nykD ns/ w[jkto/	15 nzze

:{fBN ns/ Ehw

- 1H gzikph Fpd pDso L ;z:[es Fpdl ;wk;h Fpd (fit/_ b'e ;Gk)l d'iksh Fpd (fit/_ ekbk f;nkj)l d'jo/ Fpd\$d[joo[esh (fit/_ X{VQ XkV\$Go Go), fwFos FpdK dh pDso\$f;oiBkl nr/soK okjh_ (fit/_ T[g GkFk), fgS/soK okjh_ (fit/_ ozrbk), gzikph Fpd ouBk-2L gVBkth_ o{g, fefonk\$;jfkJe fefonk d/ o{gl fB`s tos'_ dh gzikph Fpdktbh-2L wkoehN\$pk}ko, tgko, XzfdnK Bkb ;zpzfXs.
- 2H gzikph tke pDso L eosk eow fefonkl ;kXkoB tke, fpnkBhnk, gqFBtkue, nkfrnktkue, ;z:[es ns/ fwFos tkeK dhnK fe;wKl ;[szso ns/ nXhB T[gtkel ;wkB (s/\$ns/) ns/ nXhB (i'\$fe) :ieK dh tos'_l gzikph tkeK dh tos'_ L ftfGzB ;wkie\$;fGnkukoe gq;fEshnK d/ nzsorsl xo ftu, pk}ko ftu, w/b/ ftu, F'fgzr wkb\$;Bw/ ftu, ftnkj ftu, Xkofwe ;EkBK ftu, d';sK Bkb nkfd.
- 3H fJ; :{fBN ftu fu`mh g`so (fB`ih\$d\soh\$tgkoe), g?ok ouBK, ;zy/g ouBk ns/ nykD w[jktonK dh tos'_ okjh_ ftfdnkoEh dh GkFkJh :rsk ~ gofynk ikt/rk.

nze-tzv ns/ gohfyne bJh jdkfJsK L

- 1H :{fBN gfj bk ft`u'_ d' toDBkswe gqFB g[`S/ ikDr/ fiBQK ftu'_ ftfdnkoEh B/ fJe dk T[`so d/Dk j't/rk.
(15 nzae)
- 2H :{fBN d{ik ftu'_ d' gqFB g[`S/ ikDr/ fiBQK ftu'_ ftfdnkoEh B/ fJe dk T[`so d/Dk j't/rk.
(10 nze)
- 3H :{fBN gfj bk ns/ d{ik ftu'_ ;zy/g T[`so tkb/ uko gqFB (jo fJe Gkr ftu'_ d'-d' gqFB) g[`S/ ikDr/ fiBQK ftu'_ ftfdnkoEh B/ d' gqFBK (jo Gkr ftu'_ fJe-fJe gqFB) dk T[`so d/Dk j't/rk.
(5x2=10 nze)

- 4H fB`ih, d\soh ns/ tgkoe fu`mh L ftfdnkoEh ~ d' ft`u'_ fe;/ fJe ftF/ s/
fu`mh fbyD bJh fejk ikt/rk. (5
nze)
- 5H ftfdnkoEh ~ fszB ftfFnK ft`u'_ fe;/ fJe s/ g?ok fbyD bJh iK e'Jh g?ok d/
e/ T[; pko/ gzi gqFBK d/ T[`so d/D bJh fejk ikt/rk. (5
nze)
- 6H n`m nykD\$w[jkto/ g[`S/ ikDr/ fiBQK ftu'_ ftfdnkoEh ~ fe;/ gziK ~
tkeK ftu tos e/ noE ;gFN eoB bJh fejk ikt/rk. (5
nze)

Zoo. 103: Basic Zoology**Time: 3 Hours****Max. Marks: 50****Theory: 20****Practical =20****Int. Assess: 5+5 (10)****Periods per week 2+2 (4)****Instructions for the paper setters:**

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

Cell structure, cell division, biomolecules. Simple and compound tissues. Functional organization of various systems of a mammal. Gametogenesis and development of frog up to three germinal layers. Binomial nomenclature, classification and general survey of animal kingdom. Common ecto and endoparasites of man and domestic animals.

Practical

Study of cell structure and cell division. Microscopic study of histological preparations of simple and compound tissues. Anatomy of a mammal. Slides of frog development. General survey of animal kingdom up to classes.

Math. 108: Basic Mathematics-II**Time: 3 Hours****Max. Marks: 50****Theory: 40****Int. Assess.: 10+0****Periods per week: 4+0****Instructions for the Paper Setters:**

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

Definition of function. Limit. Continuity. Differentiation, successive differentiation, geometrical interpretation of derivative. Indefinite integration, integration by substitution. Partial fractions and their use in integration. Integration by parts.

B.Sc. Agric-A.H.

Animal Husbandry

Time: 3 Hours

Max. Marks: 100

Theory: 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 eight 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) Cows, i.e. Sahiwal, Haryana, Red Sindhi
- ii) Cows, i.e. Holstein, Friesian Jersey, Red Dane, Brown swiss, Ayrshire and Guernsey.
- iii) Buffaloes i.e. Murrah, Nili 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 oestrus, drying, care during pregnancy and parturition, clean milk production.
- ii) **Care of Calves** : Care and feeding of weaned calves, numbering tattooing, 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 cattle. Various systems of breeding i.e. inbreeding, crossbreeding. Importance of Sire & Dam.
- ii) Artificial Insemination, Merits and Demerits.

Housing

Location of dairy farm grouping of different farm buildings and type of dairy buildings. Sanitation, drainage of cattle sheds. Supply of clean and fresh water.

Disease and Their Control

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

Animal Husbandry
(Practical)

Time: 3 Hours

Max. Marks: 50

Practical: 40

Int. Assess.: 10

Periods per week Practical: 3

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

Handling cows, buffaloes for milking. Selection and judging of cows, buffaloes, heifers, bulls and bullocks. Finding out body weight of animal by formula.

Identification of Farm Animals : (a) Tattooing (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 extension.

(Demonstration only)

Artificial Techniques of insemination, pregnancy diagnosis.

(Demonstration only)

Recording body temperature, pulse and respiration.

Identification and use of common vety. Instruments

Cleaning sterilization and disinfection of utensil milk.

Incubators and Brooding operations of chicks.

Visit to some scientific livestock farm.

Visit to some poultry breeding farm.

B.Sc Agric. F.C
Time: 3 Hours

Field Crops

Max. Marks: 100

Theory: 80

Int. Assess.: 20

Periods per week (Th): 04

Instructions for the paper setters:

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

Part-I

Scientific Production of Kharif and Rabi crops with special reference to their origin, history, distribution, climatic requirements, varieties, agronomic practices for sustained production, seed production, harvesting, processing, quality characteristics and uses.

Kharif Crops- Rice, maize, pearl millet, sorghum, cotton, sunhemp, jute, groundnut, sisamum, sunflower, soyabean, castor, mung bean, urd bean, pigeon pea, cow pea, cluster bean, sudan grass, tosinte, guinea grass, napier bajra hybrid, mentha, turmeric, palma rosa and other cymbopogons.

Rabi Crops- Wheat, barley, oats, winter maize, lentil, field pea, rape seed and mustard, linseed, sugar cane, potato, tobacco, tea, berseem, Lucerne, senji, mentha, ryegrass, celery, isbogol, coriander, fennel and dilseed.

Management of pastures, grasslands and silvi pastoral systems. Silage and hay making.

Suggested Readings:

1. Principles of Field Crops Production – Marin Leonard Stamp.
2. Rabi & Kharif Crops- PAU Ludhiana.

Field Crops (Practical)

Time: 3 Hours

Max. Marks = 50

Practical = 40

Int. Assess.: = 10

Periods per week (Pract): 03

Identification of Kharif and Rabi crops based on morphological and seed characteristics. Seed bed preparation, treatment of seed, sowing, fertilizer application. Nursery raising and transplanting in rice, planting, earthing up and propping of sugarcane. Important Rabi and Kharif weeds and their control. Intercultivation and rogueing. Judging of crop maturity. Harvesting, threshing and processing. Components of cost of production. Silage and hay making.

B.Sc. Agric-Bot.

Plant Physiology

Time : 3 Hours

Max. Marks : 100

Theory : 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 eight 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 :-** Introduction, Radiant Energy, Free Radical, Transfer of Energy, Origin of Oxygen in photosynthesis. Emerson effect. Two pigment systems, photosynthetic unit, production of Assimilatory power, the carbon compound of photosynthesis versus Respiration, Measurement of photosynthesis.
 7. **Factors affecting the rate of photosynthesis :-** Introduction, Limiting factors.

8. **Mineral salt absorption and Translocation :** Introduction, Passive Absorption, Active Transport, Factors affecting salt absorption, Translocation, Ascent of sap.
9. **Function of Essential Mineral Elements and Symptoms 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, Translocation of Auxin & physiological effects, Bioassays, Biosynthesis of Auxin, Other plant Hormones.
12. **The Gibberellins, the Cytokinins and Ethylene:** Gibberellins, Kinetin and Cytokinins, Ethylene.
13. **Photoperiodism:-** Introduction, The Flowering response, perception of the photoperiodic stimulus and presence of floral 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: 50

Practical: 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 evolution of oxygen during photosynthesis. Demonstration of respiration-aerobic and anaerobic, respiration quotient, demonstration of plant movements, Seed germination and seed viability.

B.Sc Agric.-Soil Introduction to Soil Fertility and Conservation.

Time: 3 Hours

Max. Marks : 100

Theory : 80

Int. Assess. : 20

Periods per week (Theory) : 4

Instructions for the paper setters

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

Historical developments. Important clay minerals and their properties. Ion exchange. Essential Plant nutrients, their functions and 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 Microorganisms. Soil organic matter- decomposition, maintenance and effect on soil fertility. Organic manures and composting. Fertilizer control order. Inorganic and biofertilizers and their use. Integrated nutrient management. Soil water-retention mechanism, measurement and availability. Soil moisture characteristics, movement, infiltration and redistribution. Water and nutrient movement to roots. Soil erosion- types, effects, causes and control. Soil- water- air pollution.

Suggested Readings:

1. Brady NC & Weil RR. 2002. Nature and Properties of Soils. 13th Ed. Pearson Edu.
2. Sekhon GS. (Ed). 2002. Fundamentals of Soil Science. Indian Soc. Soil Sc.
3. Oswal MC. 1994. Soil Physics. Oxford & IBH.
4. Martin Alexander. Soil Microbiology. John Wiley.
5. Yawalkar KS, Agarwal J.P & Bokde. S. 1996. Manures & Fertilizers 8th Ed.
6. Das Dilip Kumar 1997. Introductory Soil Science.

Soil
(Practical)

Time: 3 Hours

Max. Marks =50

Practical =40

Int. Assess. =10

Periods per week (Pract): 03

Determination of soil pH, electrical conductivity, organic carbon, calcium carbonate and gypsum requirement. Estimation of available nitrogen, phosphorus, potassium and sulphur in soils. Soil test reports. Identification of fertilizers. Analysis of urea, superphosphate and muriate of potash. Clinical diagnosis of nutrient deficiencies and toxicities in plants. Determination of soil water content, hydraulic conductivity, field capacity and infiltration. Visit to soil conservation works.

B.Sc. Agric.-Comp.:- Computer Fundamental, Window Vista and MS-Office-2003

Time : 3 Hours

Max. Marks : 100

Theory : 80

Int. Assess. : 20

Periods per week : 04

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 eight questions should be set, out of which the candidates should be required to attempt any five.**

1. **Computer Fundamental:** Basic concept of Computer System, Functional Units and their interrelation, Communication with the computer, Milestones in hardware and software, Primary and Secondary Storage Devices, Input/Output Devices, Flow Chart, Decision Tables, Pseudo Codes and Algorithms.
2. **Windows – Vista:** History of Windows and introduction of Windows Vista, Desktop, User Interface action, icon on desktop, closing windows, renaming icons, folders, shortest, format of a window, Control Panel, Window-Explorer.
3. **MS-Word 2003:** Overview, Creating, Saving, Opening, Importing, Exporting and Inserting files, Formatting Pages, Paragraphs and Sections, Indents and out dents, Creating lists and Numbering. Heading Styles: Fonts and Font size, Editing, Positioning and viewing texts, Finding and replacing text, Inserting page breaks, Page numbers, Book Marks, Symbols and Dates, Using tabs and tables, Header, Footer and Printing.
4. **MS-Excel 2003:** Worksheet Overview, Entering information, Worksheet creation, Opening and Saving Workbook, Formatting numbers and texts, Protecting cells, Creating graph, Charts and Printing Operations.
5. **MS-PowerPoint 2003:** Introduction to MS-PowerPoint, PowerPoint Elements, Exploring PowerPoint Menu, Opening and Closing Menus, Working with Dialog boxes, Adding text, Adding Title, Moving text area, Resizing text boxes, Adding art, Starting a new Slide, Starting a Slide Show, Saving Presentation, Printing Slides, Views, Formatting and Enhancing text, Creating Graphs, Displaying Slide Show and Adding Multi-media, Adding slide transitions.

Practical: Computer Fundamental

Time : 3 Hours

Max. Marks : 50

Practical : 40

Int. Assess. : 10

Periods per week (Practical) : 3

Based on Window Vista, MS-Word 2003, MS-Excel 2003, MS-PowerPoint 2003.

B.Sc. Agric-Genet.

Principles of Genetics

Time : 3 Hours

Max. Marks : 100

Theory : 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 eight 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 mutations. 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 ; Genes in population.

Genetics
(Practical)

Time : 3 Hours

Max. Marks : 50

Practical : 40

Int. Assess : 10

Periods per week (Practical) : 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 variations.

**B.Sc. Agric. Engg. Farm Power Machinery & Elementry Irrigation
Engineering**

Time : 3 Hours

Max. Marks : 100

Theory : 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 eight 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 : Powers 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 : 50

Practical : 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, field test on discharge and draw down from tubewell.

B.Sc. Agric. M.F.

Manures & Fertilizers

Time : 3 Hours

Max. Marks : 50

Theory : 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 eight questions should be set, out of which the candidates should be required to attempt any five.**

Mineral constituents of soil. Arnon's criteria of essentiality of the elements. Source, occurrence, distribution, behaviour & functions. Mechanism of absorption, deficiency symptoms & Toxicity, FYM; compost Green manuring, Bulky manures and 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.

Environmental Studies (Compulsory Paper)

Theory Lectures: 50 Hours

Time: 3 Hours

M. Marks: 100

Section–A (30 Marks): It will consist of ten short answer type questions. Candidates will be required to attempt six questions, each question carrying five marks. Answer to any of the questions should not exceed two pages.

Section–B (45 Marks): It will consist of six essay type questions. Candidates will be required to attempt three questions, each question carrying fifteen marks. Answer to any of the questions should not exceed four pages.

Section–C (25 Marks): It will consist of two questions. Candidate will be required to attempt one question only. Answer to the question should not exceed 5 pages. In this section the students will be required to write on the environment of an area/ ecosystem/ village industry/ disaster/ mine/ dam/ agriculture field/ waste management/ hospital etc. with its salient features, limitations, their implications and suggestion for improvement.

1. **The multidisciplinary nature of environmental studies:** Definition, scope & its importance, Need for public awareness.
2. **Natural resources:** Natural resources and associated problems.
 - a) **Forest resources:** Use of over exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.
 - b) **Water resources:** Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.
 - c) **Mineral resources:** Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
 - d) **Food resources:** World food problems, change caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problem, salinity, case studies.
 - e) **Energy resources:** Growing of energy needs, renewable and non-renewable energy resources, use of alternate energy sources, case studies.
 - f) **Land resources:** Land as a resource, land degradation, soil erosion and desertification.
 - g) Role of an individual in conservation of natural resources, Equitable use of resources for sustainable lifestyles.
3. **Ecosystem:**
 Concept of an ecosystem, Structure and function of an ecosystem, Producers, consumers and decomposers, Energy flow in the ecosystem, Ecological succession, Food chains, food webs and ecological pyramids.
 Introduction, types, characteristic features, structure and function of the following ecosystems:
 - a. Forest ecosystem
 - b. Grassland ecosystem
 - c. Desert ecosystem
 - d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries).
4. **Biodiversity and its Conservation:**
Definition: Genetic, species and ecosystem diversity, Biogeographical classification of India.
Value of Biodiversity: Consumptive use; productive use, social, ethical, aesthetic and option values.
 Biodiversity of global, National and local levels, India as mega-diversity nation "Hot-spots of biodiversity".
Threats to Biodiversity: Habitat loss, poaching of wild life, man wildlife conflicts
 Endangered and endemic species of India.
Conservation of Biodiversity: In situ and Ex-situ conservation of biodiversity.

5. Environmental Pollution:

Definition, Causes, effects and control measures of:

- a) Air Pollution
- b) Water Pollution
- c) Soil Pollution
- d) Marine Pollution
- e) Noise Pollution
- f) Thermal Pollution
- g) Nuclear Hazards

Solid Waste Management: Causes, effects and control measures of urban and industrial wastes.

Role of an individual in prevention of pollution.

Pollution case studies Disaster Management: Floods, Earthquake, Cyclone and Landslides

6. Social Issues and Environment:

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

7. Human population and the environment

- * Population growth, variation among nations
- * Population explosion-Family welfare programme
- * Environment and human health
- * Human rights
- * Value education
- * HIV / AIDS
- * Women and child welfare
- * Role of information technology in environment :and human health
- * Case studies

* **Road Safety Rules & Regulations:** Use of Safety Devices while Driving, Do's and Don'ts while Driving, Role of Citizens or Public Participation, Responsibilities of Public under Motor Vehicle Act, 1988, General Traffic Signs

* **Accident & First Aid:** First Aid to Road Accident Victims, Calling Patrolling Police & Ambulance

- 8. Field Work:** Visit to a local area to document environmental assets—river / forest / grassland / hill / mountain. Visit to a local polluted site—Urban / Rural / Industrial / Agricultural. Study of common plants, insects, birds. Study of simple ecosystems—pond, river, hill slopes, etc. (Field work equal to 5 lecture hours)

References:

1. Agarwal, K. C. 2001. Environmental Biology, Nidhi Publications Ltd. Bikaner.
2. Bharucha, E. 2005. Textbook of Environmental Studies, Universities Press, Hyderabad.
3. Bharucha, E. 2004. The Biodiversity of India, Mapin Publishing Pvt. Ltd. Ahmedabad.
4. Brunner, R. C. 1989. Hazardous Waste Incineration, McGraw Hill Inc. New York.
5. Clark, R. S. 2000. Marine Pollution, Clarendon Press Oxford.
6. Cunningham, W. P., Cooper, T. H., Gorhani, E. & Hepworth, M. T. 2001. Environmental Encyclopedia, Jaico Publications House, Mumbai.
7. De, A. K. 1989. Environmental Chemistry, Wiley Eastern Ltd.
8. Down to Earth, Centre for Science and Environment, New Delhi.
9. Hawkins, R. E. 2000. Encyclopedia of Indian Natural History, Bombay Natural History Society.
10. Heywood, V. H & Weston, R. T. 1995. Global Biodiversity Assessment, Cambridge House, Delhi.
11. Jadhav, H. & Bhosale, V. M. 1995. Environmental Protection and Laws. Himalaya Pub.
12. Joseph, K. and Nagendran, R. 2004. Essentials of Environmental Studies, Pearson Education (Singapore) Pte. Ltd., Delhi.
13. Kaushik, A. & Kaushik, C. P. 2004. Perspective in Environmental Studies, New Age International (P) Ltd, New Delhi.
14. Miller, T. G. Jr. 2000. Environmental Science, Wadsworth Publishing Co.
15. Odum, E. P. 1971. Fundamentals of Ecology. W.B. Saunders Co. USA.
16. Rajagopalan, R. 2005. Environmental Studies from Crisis to Cure. Oxford University Press, New Delhi.

17. Sharma, B. K. 2001. Environmental Chemistry. Geol Publishing House, Meerut.
18. Sharma, J. P. 2004. Comprehensive Environmental Studies, Laxmi Publications (P) Ltd, New Delhi.
19. Sharma, P. D. 2005. Ecology and Environment, Rastogi Publications, Meerut.
20. Subramanian, V. 2002. A Text Book in Environmental Sciences, Narosa Publishing House, New Delhi.
21. Survey of the Environment. 2005. The Hindu.
22. Tiwari, S. C. 2003. Concepts of Modern Ecology, Bishen Singh Mahendra Pal Singh, Dehra Dun.
23. Townsend, C., Harper, J. and Michael, B. 2001. Essentials of Ecology, Blackwell Science.
24. Booklet on Safe Driving. Sukhmani Society (Suvidha Centre), District Court Complex, Amritsar.

B.Sc. Agric-Dairy

Dairying

Time : 3 Hours

Max. Marks : 100

Theory : 80

Int. Assess. : 20

Periods per week (Theory) : 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 eight 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. Colstrum 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: - Type of bacteria, Acid producing and flavour producing bacteria, Multiplication, requirements for growth and source of bacteria in milk.

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

Milk Products

Cream: - Selection of site for creamery. Types of cream and their composition, Factors affecting the fat contents of cream. Production of cream by gravity methods and by mechanical cream separator.

Butter: - Neutralisation and ripening of cream for butter making. 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:- Composition, Methods of manufacture and common defects. 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 : 50

Practical : 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 specific gravity by lactometer.

Determination of T.S. and SNF by formula using fat % and lactometer.

Determination of acidity in milk to assess 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 Agric. Irrig.

Soil and Water Management.

Time: 3 Hours

Max. Marks: 100

Theory: 80

Int. Assess.: 20

Periods per week: 04

Instructions for the Paper Setters:

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

Role of water in crop production. Availability of water to plants: Irrigation and its need for crop: Measurement of irrigation water; Consumptive use of water: Methods of moisture determination: Water requirement and water use efficiency: Methods and scheduling of irrigation to crop and irrigation efficiency: source of irrigation and their extent in state and country: Irrigation for frost protection: Irrigation management of crops in problem soils: Water quality and crop growth: Agronomic aspects of water management in dry land farming.

Excess water: causes and effects on crop growth. Principles of drainage: drainage criteria; surface and sub surface drainage.

Erosion problems in Punjab and periphilly hilly regions; the causes and effects of erosion. Erosion control measures—agronomic and mechanical soil conservation structure. Land use capability classification, planning for soil and water conservation on agriculture farms, water-shed areas. Importance of forestry and wild life in soil and water conservation

Practical: Soil and Water Management.

Time: 3 Hours

Max. Marks = 50

Practical: = 40

Int. Assess.: = 10

Periods per week (Pract): 03

Determination of soil moisture by different methods.

Determination of field capacity and permanent wilting point by field and laboratory methods.

Installation and working of Tensiometer and Gypsum blocks.

Calculation to determine moisture deficit, time of irrigation and irrigation discharge etc.

Measurement of irrigation water by different methods

Layout for different irrigation methods.

Calculation relating to Darcy's law

Determination of percent slope by different methods.

Classifications of soil texture by feel methods.

Use of dumpy level in the field and plan table survey.

Visit of areas affected by erosion. Visit to soil conservation research and demonstration centers in Punjab, Haryana, Himachal Pradesh and allied areas

B.Sc Agric. Agric. Econ. Fundamentals of Agricultural Economics

Time : 3 Hours

Max. Marks : 100

Theory : 80

Int. Assess : 20

Periods per week : 04

Instructions for the paper setters

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

1. Definition of Agricultural Economics, Scope and relationship with other sciences.
2. Definition, concept and importance of Agricultural Marketing. Classification of markets. Regulation of markets. Methods of sale, Market functionaries.
3. Agricultural Finance: Need, Classification of credit, Three R's of credit. Important credit institutions – Cooperatives, Commercial Bank RRB's, role of NABARD. Self help groups, joint liability groups, service Area Approach, Lead Bank Scheme, Kisan Credit Card, NGO's in rural financing, Micro Financing, Infrastructural programmes for weaker section, Credit guarantee scheme.
4. Agricultural Price Policy- Objectives, positive and negative price policy. Agricultural Price Policy in India- objectives, price stabilization and price support measures.
5. Size of farm, large v/s small size and relationship between size and efficiency.
6. Marketable surplus, Marketed Surplus. Supply response of Marketed Surplus to prices. Backward slopping supply curve.
7. Modern Agricultural Technologies- Their nature, impact on output employment and income distribution.
8. Risk and uncertainty in Agriculture- Types. Price and Income stabilization measures.
9. Recent development in International Agricultural trade and implications for developing countries.

Suggested Readings:-

1. Leading Issues in Agricultural Economics – R.N. Soni.
2. Agricultural Economics – R.K. Lekhi and Joginder Singh.
3. Agricultural Finance - Lee & Murray.
4. Agricultural Price Policy – A.S. Kahlon & D.S. Tyagi.
5. Agricultural Marketing in India- S.S Acharya & N.L. Aggarwal.
6. Agricultural Price Policy in Economics development- Rajbans Kaur.

B.Sc Agric. Stats

Basic Statistics

Time: 3 Hours

Max. Marks: 100

Theory= 80

Int. Assess : 20

Periods per week (Th): 04

Instructions for the paper setters

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

Definition, aim, significance, limitation and scope of statistics in Agricultural science. Frequency distribution including tabulation and classification. Presentation and summarisation of statistical data by graphs and diagrams, histograms, frequency polygons and ogives. Measures of central tendency, A.M, G.M, Median, Mode, Quartiles, Deciles and their relative merits and significance. Lorenz curves, Skewness and Kurtosis. 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 population- scatter diagram and Pearson's correlation coefficient, Rank Correlation coefficient. Linear Regression- Regression equations and regression lines. Difference between correlation and regression analysis.

Suggested Readings:

- 1) Fundamentals of Statistics – S.C. Gupta.
- 2) Statistical Methods – S.P. Gupta.
- 3) Basic Statistics – B.L. Aggarwal.
- 4) Statistical Methods for Research Workers – Sukhminder Singh & Others.

B.Sc. Agric. P.B. Plant Breeding & Introductory Seed Technology

Time 3 Hours

Max. Marks : 100

Theory : 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 be cover the whole syllabus and questions should be evenly distributed.**
- 5. At least eight questions should be set (6 from part A & 4 from part B), out of which the candidates should be required to attempt 3 from part A & 2 from part B.**

Part-A (Attempt 3 out of 6 question)

Definition and objectives. 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. Heterosis, 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.

Part-B (Attempt 2 out of 4 question)

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 : 50

Practical : 40

Int. Assess. : 10

Periods per week(Practical) : 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 Agric. Pl.Path: Introduction to Plant Pathogens, Plant Diseases and their Management

Time: 3 Hours

Max. Marks: 100

Theory: 80

Int. Assess.: 20

Periods per week (Th): 04

Instructions for the Paper Setters:

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

Introduction to Plant Pathogens:

Nature and general characteristics of different plant pathogens; Economic uses of bacterial and fungi; Broad out line of their classification; Study of important genera of plant pathogens, namely Pythium, Phytophthora, Peronospora, Sclorospora, Albugo, Taphrina, Aspergillus, Erysiphe, Claviceps, Ustilago, Urocystis, Neovossia Puccinia, Ganoderma Alternaria, Drechsleal, Pyricularia, Ascochyta, Fusarium Colletotrichum, Cercospora, Xanthomonas, Pseudomonas, Erwinia, Clavibacter, Streptomyces, Agrobacterium, Anguina, Meloidogyne, Heterorera, Verused and Mycoplasma, Cuscuta Orobanche and Striga

Plant Diseases and their Management:

Concept of diseases: Losses caused by diseases: Study of important diseases of field, vegetable and fruits crops with special emphasis on symptomatology, perpetuation and control of diseases – smuts, smuts, bunts and tundu of wheat, ergot and green-ear of bajra, bacterial blight and khara disease of rice, stalk rot and downy mildew of maize, red rot of sugarcane, tikka disease of groundnut, pythium rot of sunflower bacterial blight of cotton; Citrus canker; Anthracnose of grapes: Mango malformation; Powdery and downy mildew of cucurbits, early blight, late blight and common scab of potato; Mosaic and leaf curl of tomato; Mosaic of okra; damping off and root knot of vegetable; stem rot of berseem; leaf spots and smuts of sorghum; anthracnose of cowpeas and smuts of oats. Disease control for sustainable agriculture

Practical: Plant Pathology**Time: 3 Hours****Max. Marks: 50****Practical: 40****Int. Assess.: 10****Periods per week (Pract): 03**

Study of characteristics of various genera of fungi, bacteria, nematodes and phanerogamic parasites; Familiarization with symptoms caused by different pathogens;

Diagnosis, macro microscopic study of diseased plant specimens; To work out doses preparation and application of fungicidal materials.

B.Sc. Agric Horticulture**General Horticulture****Time 3 Hours****Max. Marks : 100****Theory : 80****Int. Assess. : 20****Periods per week (Theory) : 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 eight 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, rainfall humidity and light. Selection of site and soils.

Orchard soil management methods : Growing of intercrops as green manure and cover crops mulching and its effects on soil moisture, Propagation of fruit plants by sexual and asexual methods. Preparation of land layout, planting system, planting distances and 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 fruit 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 : 50****Practical : 40****Int. Assess. : 10****Periods per week (Practical) : 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 squashes, Jams, Jellies, Marmalades, Tomato products, Pickles and Chutneys. Vinegar and Sun drying of fruits and vegetables. Studies of cold storage and quick freezing practices and refrigeration.

B.Sc Agric. Ento. Economic Zoology, Fish Culture and Agric. Entomology**Time: 3 Hours****Max. Marks: 100****Theory: 80****Int. Assess: 20****Periods per week (Th): 04****Instructions for the paper setters:**

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

A: Economic Zoology and fish culture:

Introduction to useful and harmful animals; External characters, habits, habitat and economics importance of birds and rodents. Control measures for harmful birds and rodents; conservation of useful animals. Introduction to pisci culture –meaning and scope; Commonly cultured fishes and their food; poly culture or composite culture and its technique; Management or nursery rearing and stocking ponds; induced breeding technique; fishing gears, production of fish, preservation and conservation of fish

B: Agric. Entomology:

Entomology definition; Insects, factors leading to the dominance of insects, importance and scope; insect integument, moulting, metamorphosis types of eggs, larvae and pupae; body regions, structure and segmentation of head, thorax, abdomen and appendages; Modification and functions of antennae, 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 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

Practical: Economic Zoology, fish culture and Agric. Entomology**Time: 3 Hours****Max. Marks: 50****Practical: 40****Int. Assess.: 10****Periods per week (Pract): 03**

Study of external characters of earthworm, frog, rat, wall lizard, sparrow, pigeon, crow, parrot, mice, squirrel and monkey; feeding habits of above animals; Identification of culture able fishes e.g. Rohu *Mystus*, etc. and their characters; visit to fish pond.

Study of example of arthropods: Type of egg; larvae and pupae; Morphology and anatomy of AK grasshopper; Study of various types of antennae, mouth parts, wings, 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 Agric. F.M Farm Management and Production Economics

Time: 3 Hours

Max. Marks: 100

Theory= 80

Int. Assess : 20

Periods per week: 04

Instructions for the paper setters:

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

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, Factor-Factor, Cost minimization and Product-Product relationship, optimum product combination.
4. Economics Principles used in Farm management i.e. Principles of diminishing return, costs, factor substitution, product substitution, equimarginal returns and time comparison. Theory and application.
5. Categories of cost, relationship of different costs and cost functions.
6. Management of different factors of production i.e. land, labour, capital, farm power and machinery. Natural resource management especially land and water.
7. Systems of farming and types of farming. Factors affecting types of farming. Specialisation and diversification in agriculture.
8. Farm Planning and Budgeting, methods of valuating farm resources, steps in farm planning and organization of farm business. Concept of linear programming.
9. Nature and objectives of accounts and farm income. Computer application in maintenance of accounts.
10. Study of Economic problems in Indian Agricultural production, marketing, credit etc. Place of Agriculture in five year plans.

Suggested Readings:-

1. Fundamentals of Farm Business Management- S.S. Johl and T.R. Kapoor.
2. Agricultural Production Function- Earl O' Heady & Dillon.
3. Agricultural Economics – R.K. Lekhi & Joginder Singh.
4. Farm Business Management – Peter H. Calkins & Densi D. Di Pietre.
5. Production Conditions in Indian Agriculture- K. Bhardwaj.

Farm Management
(Practical)

Time: 3 Hours

Max. Marks = 50

Practical =40

Int. Assess. =10

Periods per week (Pract): 03

Visit to selected farms, study their layout, organization and 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 record analysis. Computerisation of land records and preparation of balance sheets.

B.Sc. Agric. Ento.

Economic Entomology

Time 3 Hours

Max. Marks : 100

Theory : 80

Int. Assess. : 20

Periods per week (Theory) : 4

Instructions for the Paper Setters

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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 least eight questions should be set, out of which the candidates should be required to attempt any five.**

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, Locusts.

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 : 50

Practical : 40

Int. Assess. : 10

Periods per week (Practical) : 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 household 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 practices in field operation of the pests control.

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. Agric. Ext.

Agricultural Extension

Time 3 Hours

Max. Marks : 100

Theory : 80

Int. Assess. : 20

Periods per week (Theory) : 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 least eight questions should be set, out of which the candidates should be required to attempt any five.**
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- A. Introduction to Extension 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 Evaluation :-** 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 Sociology 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 : 50

Practical : 40

Int. Assess. : 10

Periods per week (Practical) : 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 contact in field situation.

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

B.Sc Agric. Stats

Agricultural Statistics

Time: 3 Hours

Max. Marks: 100

Theory: 80

Int. Assess: 20

Periods per week (Th): 04

Instructions for the paper setters

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- 2. The language of questions should be straight & simple.**
- 3. Not more than one question should be based on one topic.**
- 4. The question paper should cover the whole syllabus and questions should be evenly distributed.**
- 5. At least eight questions should be set, out of which the candidates should be required to attempt any five.**
- 6. Scientific Calculator shall be allowed.**

Sampling and Sample Designs: Sample v/s census, Theoretical basis of sampling, Methods of sampling: Simple random sampling (with and without replacement), stratified random sampling, systematic sampling, multistage sampling, cluster sampling, quota sampling. Planning and execution of surveys, sampling and non- sampling errors.

Analysis of time series data, estimation of linear trend, periodic and random variations, fitting of exponential curve $Y = ab^x$.

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

Statistical inference: Procedure of testing hypothesis, Type I and Type II errors, two tailed and one tailed test of hypothesis, Sampling distribution and standard error. Tests of significance for single mean and difference of means in large and small samples.

Principle of Experimental design: Uniformity trials- size and shape of plot, role of Randomisation, local control and replication.

Layout and analysis of completely randomised design, Randomised block design, Latin square design including one missing value.

Suggested Readings:

- 1) Fundamentals of Statistics – S.C. Gupta.
- 2) Statistical Methods – S.P. Gupta.
- 3) A Handbook of Agricultural Statistics – Dr. S.R.S. Chandel.
- 4) Statistical Methods for Research Workers – Sukhminder Singh & Others.

Statistics
(Practical)

Time: 3 Hours

Max. Marks: 50
Practical: 40
Int. Assess.: 10
Periods per week (Pract): 03

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. Test of significance for single mean in small and large samples.
8. Test of significance for difference of means in small and large samples.
9. Analysis of variance one way and two way.
10. Analysis of completely randomised design.
11. Analysis of randomized block design.
12. Analysis of Latin square design.
13. Analysis of RBD with one missing value.
14. Analysis of LSD with one missing value.

B.Sc. Agric. Oleri.
Time 3 Hours

Olericulture, Floriculture & Land Scaping

Max. Marks: 100

Theory: 80

Int. Assess. : 20

Periods per week (Theory): 4

Instructions for the Paper Setters

1. Question paper should be set strictly according to the syllabus.
1. The language of questions should be straight and simple.
2. Not more than one question should be based on one topic.
3. The question paper should be cover the whole syllabus and questions should be evenly distributed.
4. At least eight 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, Callender 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, Gladiolus Gerbera Crysanthemum, their culture, procurement and storage of bulbs. Cultivation of important ornamental trees, shrubs, hedges and climbers. Cultivation of succulent plants as Bryophllem, Sanseveria, 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 plans for schools; Colleges, Public places, Highways and Domesticated places and study of Plants used, terrace gardening, Establishment and maintenance of lawns.

Suggested Readings:

1. Vegetable Growing in India – DVS Chauhan
2. Introductory Ornamental Horticulture – JS Arora
3. Package of Practices for Vegetable Crops – PAU Ludhiana
4. Package of Practices for Flowers Crops – PAU Ludhiana
5. Vegetable Gardening – WCS Cooper
6. Vegetable Growing – James S Shoemaker and Thomas Baker
7. Commercial Floriculture – S Prasad and U Kumar

Olericulture, Floriculture & Landscapping.
(Practical)

Time: 3 Hours

Max. Marks : 50

Practical : 40

Int. Assess. : 10

Periods per week (Pract.): 03

1. Propagation of ornamental plants through seeds cuttage, layerage and graftage.
2. Identification of the plant materials given in the syllabus.
3. Preparation of layout plans and landscaping of park, bungalows and school premises etc.
4. Practice in preparation of different types of flower beds, making the maintenance of lawns.
5. Planting, training and trimming of shrubs, hedges and climbers.
6. Identification of different kinds and varieties of vegetables given in the syllabus.
7. Practices in vegetable growing, laying out a kitchen garden and growing vegetables in window boxes and pots.

Additions in Practical-

1. Sowing and transplanting of vegetable crops
2. Vegetable nursery production and vegetable forcing techniques.
3. Nutrient deficiency symptoms in vegetables.
4. Diseases and Disorders of vegetable crops.

B.Sc Agric. Elective- I (Agron). Agron Elective- I
Seed Production Technology

Time: 3 Hours

Max. Marks: 100

Theory: 80

Int. Assess.: 20

Periods per week (Th): 04

Instructions for the paper setters:

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

Seed and its characteristics, Agronomic practices for raising quality seed of cereals, pulses, oil seeds, tuber, sugar and fodder crops and production of hybrid maize seed in multiplication of breeder's seed.

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

Weeds- Harmful and useful aspects, characteristics, reproduction, dissemination, dormancy, establishment and persistence. Crop weed competition, common summer, winter, perennial and aquatic weeds. Methods of weed control–preventive, mechanical, chemical, biological and integrated. Herbicides usage in different crops orchards, forests, public lands and water courses. Weeds and crop association. Classification of herbicides, properties and functions. Application of selective and non- selective herbicides. Hazards of chemical weeding.

Suggested Readings:

1. Weed Control- O.P. Gupta.
2. Seed Technology- Rattan Lal Aggarwal.
3. Principles of Agronomy- S.R. Reddy
4. Principles of Agronomy- Reddy & Reddy

Agronomy Elective- I
(Practical)

Time: 3 Hours

Max. Marks: 50

Practical: 40

Int. Assess.: 10

Periods per week (Pract): 06

Seeds identification, seed analysis for purity and germination. Breaking of dormancy, tests for viability. Sowing and maintenance of seed production field of important crops. Visits to commercial seed production fields, seed processing plants and seed sale agencies. Planning for establishment of seed production farms.

Identification of terrestrial and aquatic weeds and their seeds. Weed survey. Reproductive potential of annual and perennial weeds. Weed control in field crops. Methods of herbicide application and computation of dosage. Calibration of spray pumps. Identification of crop symptoms due to faulty weedicides. Application. Precaution for safe use of weedicides and useful antidotes. Visit to weed control experiments and aquatic weed sites. Project planning for consultancy/ custom services for chemical weed control in crops.

B.Sc Agric. Elective- II (Agron). Agron Elective- II
Ecology and Crop Physiology

Time: 3 Hours

Max. Marks: 100

Theory: 80

Int. Assess.: 20

Periods per week (Th): 04

Instructions for the paper setters:

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

Ecology and its relevance to man. Concept of ecosystem and energy flow. Food chains and energy output relationships. Agro- ecosystem and Agro- ecological zones of India. Efficient food producing systems.

Farming systems arable, pastoral, lay farming, shifting cultivation, ranching and agro-forestry systems, energy and fuel wood plantation. Specialised and diversified farming.. Factors affecting choice of farming systems. Cropping systems, their characteristics and management. Cropping patterns. Farm selection, size of the farm and farm layout, cropping schemes and crop plan. Resource management in relation to farm cropping system. Crop yield appraisals.

Physiological processes in crop growth and development. Photosynthesis and respiration in relation to crop canopy. Phasic development- photoperiodism, thermoperiodism and vernalisation in crop production. Manipulation of conditions for optimizing germination, growth and economics components. Root development under variable environments. Use of growth regulators for modifying growth, flowering, abscission, desiccation and fruiting. Physiological maturity and criteria for crop harvest and storage. Biological nitrogen fixation.

Suggested Readings:

1. Principles of Agricultural Ecology - G.S. Dhaliwal & D.S. Kaler.
2. Principles & Practices of Agronomy- P. Balasubramaniam & S.P. Palaniappar.
3. Manures & Fertilizer- K.S. Yawalkas, J.P. Aggarwal, S. Bokde.
4. Nature & Properties of Soil- N.C. Braddy.

Agronomy Elective- II
(Practical)

Time: 3 Hours

Max. Marks: 50

Practical: 40

Int. Assess.: 10

Periods per week (Pract): 06

Analysis of Crop ecosystem components. Light measurement in pure and mixed crop stand. Modifications in crop environment. Measuring temperature, light and moisture effects. Preparation of farm layout plans. Different intensity crop rotations and cropping schemes. Estimating crop yields. Working out ecological optimum crop zones. Energy budgeting in different crops and cropping systems. Project making for establishment of crop production farms under different situations.

Braking of seed dormancy. Seedling emergence in relation to sowing depth and moisture regimes. Growth rate and fruiting patterns under different situations. Nutrient deficiency symptoms. Growth regulators for manipulation of crop growth. Nodulation studies in legumes. Judging of physiological maturity of field crops.

Testing seed germination under salt affected, acidic and dryland conditions. Mulching for moisture conservation and temperature regulation. Use of anti transpirants, water harvesting techniques, fertilizer application, use of implements in soil conservation. Estimation of soil loss by wind and water erosion. Visit to the problem area. Making fodder production plan.

B.Sc Agric. Elective-III (Agron). Agron Elective- III

Crop Production under special situations: Soil Fertility and Fertilizers use

Time: 3 Hours

Max. Marks: 100

Theory: 80

Int. Assess.: 20

Periods per week (Th): 04

Instructions for the paper setters:

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

Dry Farming: extent, and problems. Distribution of low rainfall areas. Effect of moisture stress on physiological processes. Plant water relationships, special characteristics of plants, seed treatments, water conservation characteristics, fertilizer management, mixed cropping, crop and variety selection, crop sequences, use of mulches and chemicals to save water and crop diversification in dry farming. Contingency crop planning for aberrant weather conditions. Problematic soils, crop management problems of water logged, saline, alkali soils; agronomic practices with special reference to crop rotations, planting techniques, irrigation management, weed control and fertilizer use in problematic soils.

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

Raising fodders- Role of fodder crops and pastures in farm economy, raising of different fodders, fodder quality, fodder preservation and factors affecting quality of preserved fodder, silage and hay making.

Suggested Readings:

1. Principles of Crop Production - S.R. Reddy.
2. Principles of Agronomy- Reddy & Reddy.
3. Principles of Agronomy- S.R. Reddy.
4. Principles of Agricultural Geology- G.S. Dhaliwal & D.S. Kaler.
5. Name & Properties of Soil- N.C. Braddy.

B.Sc Agric. Elective- I (Soil) Soil Elective- I
Systematic Study of Soils in Relation to Geology, Genesis,
Classification, Hydrology & Erosion.

Time: 3 Hours

Max. Marks: 100

Theory: 80

Int. Assess : 20

Periods per week (Th): 04

Instructions for the paper setters

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

Structure of earth. Minerals & rocks- classification, origin, properties and distribution. Mineral and rock weathering in relation to soil formation. Weathering sequence of minerals. Geochemical behaviour of elements. Fluvial, glacial, marine, lacustrine and Aeolian landforms. Soil landscape relationship and its application in soil mapping. Geological time scale. Geology and soils of three major physiographic units of India. Soil genesis concepts. Pedogenic processes and their relationship with plant growth. Pedon, poly-pedon, profile, horizons and their nomenclature. Factors of soil formation and their dynamics. FAO/ UNESCO World soil reference system. Soil Taxonomy- epipedons, diagnostic surface and sub- surface horizons and other diagnostic features, soil moisture and temperature regimes, categories of the system and their criteria. Soils of India and their placement in Soil Taxonomy. Soil survey and mapping. Land capability and land irrigability classification.

Soil- a water reservoir. Volume- mass relations. Computation of depletion and accretion of profile water. Forces of water retention. Soil water potential- components and distribution above and below water table. Soil moisture characteristics. Saturated and unsaturated water movement, infiltration and redistribution. Components of field water balance and their computation. Evaporation in the presence and absence of water table. Criteria for scheduling irrigation. Recent concepts of water availability. Drip and sprinkler irrigation. Soil erosion- significance, causes, types and process. Water erosion- rainfall characteristics, effect of rain drop, overland flow, topography, vegetation and soil properties. Runoff- factors affecting and its measurement. Universal soil loss equation- interpretation and evaluation of contributing factors. Wind erosion – factors affecting, estimation of soil loss and control measures.

Suggested Readings:

1. Boul SW, Hole ED, MacCraken RJ 1995. Soil Genesis and Classification. 3rd Ed. Iowa State Univ. Press.
2. Sehgal J. 2002. Pedology- Concepts and Applications. Kalyan Publ.
3. Brady NC & Weil RR. 2002. Nature and Properties of Soils. 13th Ed. Pearson Edu.
4. Likens GE & Bormann FH. 1995. Geochemistry. 2nd Ed. Springer Verlag.
5. Muthyayya VD 1988- A Text Book of Geology. Oxford & IBH.
6. Hillel D. 1971. Soil & Water: Physical Principles & Processes. Academic Press.
7. Baver LD, Gardner, WH & Gardner WR. 1972, Soil Physics, John Wiley & Sons.
8. Ghildyal BP and Tripathi R.P 1987. Soil Physics. Wiley Eastern Limited.

Soil Elective- I**(Practical)****Time: 3 Hours****Max. Marks: 50****Practical: 40****Int. Assess.: 10****Periods per week (Pract.): 06**

Use of petrological microscope. Identification of rocks and minerals. Crystal systems. Study of landform with models. Interpretation of geological maps.

Characterization and classification of soil profiles developed on different landforms. Use of aerial photographs and remote sensing in soil resource mapping. Detailed soil survey, preparation of interpretive maps based on soil survey and land use capability classification to know suitability of soils for growing different crops and writing of report of a project area. Determination of soil particle density, bulk density, moisture, infiltration and drainage characteristics in field, advancement of wetting front in homogeneous and layered soil columns, unsaturated hydraulic conductivity and evaporation measurements. In situ measurement of soil water by neutron probe and soil matric potential by tensiometer. Measurement of rainfall. Frequency and probability analysis of long term rainfall data. Measurement of runoff and soil loss. Determination of clay, dispersion, erosion ratios, and erosion index of soil. Estimation of soil loss by wind erosion. Determination of mechanical and chemical composition of wind blown and water eroded sediments. Field excursions.

B.Sc Agric. Elective- II (Soil).

**Fundamentals of Soil Chemistry, Fertility, Biology and Biochemistry
including Water and Fertilizer Testing.**

Time: 3 Hours

Max. Marks: 100

Theory: 80

Int. Asst.: 20

Periods per week (Th): 04

Instructions for the paper setters

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

Soil Colloids- nature, properties, origin of charge and their significance. Cation and anion exchange phenomena and their importance. Introduction to ionic adsorption, desorption and fixation. Soil Reaction. Acid, saline, saline sodic, sodic and calcareous soils- distribution, characterization, genesis and amelioration. Plant reaction to soil salinity, sodicity and acidity. Plant nutrients- criteria of essentiality, functions, deficiency symptoms, contents and distribution in soils. Nutrient transformations, retention and availability. Nutrient interactions. Methods of soil fertility evaluation. Fertilizers and their fate in soils. Crop responses to fertilizers. Fertilizer use efficiency. Concept of integrated fertilizer use and water management in soils. Current fertilizer consumption, future trends and needs. Nutrient removal by crops. Maintenance of soil fertility.

Soil biology and biochemistry- importance and historical developments. Micro and Macro organisms in soils- classification, distribution and activities. Mycorrhiza. Nutritional and biochemical aspects of growth of microbes. Antibiotics production in soil. Role of microbes in biochemical decomposition of organic manures and farm wastes, composting and vermicomposting. Biochemistry of humus formation and biogas production. Pesticide metabolism. Soil testing – importance and problems. Principles in the determination of soil pH, EC, available nitrogen, phosphorus, potassium, sulphur in soils. Fertilizer analysis. Quality of irrigation water.

Suggested Readings:

1. Bear FE. 1964. Chemistry of Soils. Oxford & IBH.
2. Mengel K & Kirby EA. 2006. Principles of Plant Nutrition. 5th Ed. Springer (India) Pvt. Ltd.
3. Van Elsas. 2007. Modern Soil Microbiology. CRC Press. SOILS 509
4. Halvin JL., Tisdale SL, Beaton JD & Nelson WL 2006. Soil Fertility and Fertilizers:
 1. An Introduction to Nutrient Management 7th Ed. Prentice Hall.
 5. Brady NC & Weil RR. 2002. Nature and Properties of Soils. 13th Ed. Pearson Edu.
 6. Kannaiyan S, Kumar K & Govindarajan K. 2004. Biofertilizers Technology. Scientific Publ.
 7. Jackson ML. 1973. Soil Chemical Analysis. Prentice Hall.

Soil Elective- II**(Practical)****Time: 3 Hours****Max. Marks: 50****Practical: 40****Int. Assess.: 10****Periods per week (Pract): 06**

Determination of the effect of dilution and salinity on soil pH. Active and potential acidity. Cation and anion exchange capacity and exchangeable cations. Soluble salts in soils. Lime and gypsum requirements. Nutrient adsorption and fixation capacities of soils. Customers service for reclaiming saline sodic soils. Analysis of soils for different forms of nitrogen, phosphorus, potassium and sulphur. Determination of DTPA extractable micronutrients. Plant analysis for total nitrogen, phosphorus and potassium. Collection of soil, irrigation water and fertilizer samples. Preparation of standard solutions. Colorimetric and flame photometric methods. Analysis of soil for fertilizer recommendations and suitability for orchard plantation. Analysis of irrigation water. Analysis of fertilizer for quality control. Planning and formulation of project on establishment of soil, water and plant testing laboratories. Use of microbiological laboratory wares. Media preparation. Quantitative estimation of bacteria, fungi, actinomycetes, blue green algae, Nitrosomonas, Nitrobacter, Azotobacter and Rhizobium. Activities of denitrifier. Measurement of decomposition of soil organic matter. Preparation of enriched compost, biofertilizers and vermiculture.

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

Time : 3 Hours

Max. Marks : 100

Theory : 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 cover the whole syllabus and questions should be evenly distributed.**
- 5. At least eight questions should be set, out of which the candidates should be required to attempt any five.**

General Physical Chemistry

Kinetic theory of gasses, Maxwell law of distribution of Velocities, Colloids, preparation and properties. Zeta potential and its measurements, Origion of charge on colloidal particle. Emulsion and gels, Adsorption and different adsorption isotherms. Application of Colloids and Absorption, Macromolecules, varieties of macromolecules, Molecular weight of polymers, Number average and weight average molecular weight. Methods of molecular weight determination of macromolecules, Chemical Equilibrium, Ionic Equilibria Acids and Bases pH value, Buffer sulation and Hendeson's equation, Salt Hydrolysis, Solubility product and its applications. Theory of Indicators, Photochemistry, Radio-activity, Isotopes and Isobars.

B.Sc. Agric. Elective-I (Horticulture)
Fundamentals of Fruit Production

Time : 3 Hours

Max. Marks : 100

Theory : 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 cover the whole syllabus and questions should be evenly distributed.**
- 5. At least eight questions should be set, out of which the candidates should be required to attempt any five.**

Climatic classification of fruits in Punjab & India. Climate as a limiting factor in Horticulture, Principles of orchard planning, selection of site for establishing an orchard. Winter killing and hardiness. 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 resistant. 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 types of soils. Nutrients and their availability. Soil improvement 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 determining 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.

Pollen viability and germination; stigma receptivity and pollination studies in fruits.

Suggested Readings:

1. Basic Horticulture – Jatinder Singh
2. Fruit Growing – Dr.JS Bal
3. Package of Practices for Fruit Crops – PAU Ludhiana
4. A Text Book of Pomology Vol-I – TK Chattopadhyaya
5. Fundamentals of Fruit Production – VR Gardener, FC Bradford and HD Hooker
1. 6. Fruit Physiology and Production – Amar Singh
2. 7. Horticulture Science – Jules and Janick
3. 8. The Pruning of Fruit Trees and Vines – JC Bakshi, DK Uppal and HN Khajuria

Elective-I Horticulture

(Practical)

Time : 3 Hours

Max. Marks : 50

Practical : 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. Agric. Elective-II (Horticulture)

**SYSTEMATIC POMOLOGY, PROPAGATION AND
NURSERY MANAGEMENT**

Time : 3 Hours

Max. Marks : 100

Theory : 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 and 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.

Apomisis, its types and significance in fruit crops.

Seed dormancy, its types, regulation of germination, environmental and dormancy factors affecting seed germination, preconditioning of 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 incompatibility, 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.

Physiological basis of dwarfing.

Suggested Readings:

1. Plant Propagation Principles and Practices – HT Hartman, DE Kester, Fred T Davies Jr. and RL Geneve
2. Plant Propagation – RR Sharma
3. Vegetative Propagation of Plants – KK Nanda and VK Kochhar
4. Propagation of Horticultural Plants – GW Adriance and FR Brison
5. Plant Taxonomy – OP Sharma
6. Modern Systematic Pomology – QB Zielinski
7. Practical Manuals of Various Universities on Systematic Pomology

ELECTIVE-II HORTICULTURE
(PRACTICAL)

Time : 3 Hours

Max. Marks : 50

Practical : 40

Int. Assess. : 10

Periods per week (Practical) : 6

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

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

Pollen viability and germination, stigma receptivity and pollination 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, bourdeaux, paste, paint and white wash mixtures.

Visits to various fruit research stations and nurseries.

Pollen viability and germination; stigma receptivity and pollination studies in fruits.

B.Sc. Agric. Elective III (Horticulture)

FRUIT GROWING

Time : 3 Hours

Max. Marks : 100

Theory : 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 cover the whole syllabus and questions should be evenly distributed.
5. At least eight questions should be set, out of which the candidates should be required to attempt any five.

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 Fruits:** Mango, Citrus, Grapes, Papaya, Guava, Litchi, Loquat, Ber, Phalsa, Pomegranate and Amla.
 2. **Temperate Fruits:** Pear, Peach, Plum and Almond, apple, cherry, olive, persimmon.
 3. **Plantation Crop:** Coconut, Cashewnut.

Cultivation of Tea and Rubber

Suggested Readings:

1. Fruit Growing – Dr.JS Bal
2. Package of Practices for Fruit Crops – PAU Ludhiana
3. A Text Book of Pomology Vol. II-IV – TK Chattopadhyaya
4. Temperate Fruits – TK Bose (ed.)
5. Fruits Tropical and Sub-Tropical Vol.-1 – TK Bose (ed.)
6. Handbook of Horticulture – KL Chadha (ed.)
7. Tropical Horticulture Vol-1 – TK Bose (ed.)

B.Sc Agric. Elective- I (Ag. Econ.).**Economic Problems of Indian Agriculture & Rural Sociology****Time: 3 Hours****Max. Marks : 100****Theory : 80****Int. Assess : 20****Periods per week (Th) : 04****Instructions for the paper setters**

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

- 1) Importance of Agriculture in Indian Economy, comparison with other countries.
- 2) Trends in Agricultural Production and productivity. Deceleration of Agricultural growth rates in India, causes and effective measures to check it.
- 3) Land reforms: Objectives, abolition of intermediaries, Tenancy Reforms, Ceilings on Agricultural holdings, Consolidation, Cooperative farming, Evaluation, Recent land legislation and Enforcement.
- 4) Rural Indebtness: Causes, Effects, Government measures to control it. Recommendations of Dr. Radha Krsihnan's and RBI's report on Rural Indebtness.
- 5) Rural Poverty: Measurement and Poverty alleviation programmes.
- 6) Agricultural Labour in India: Problems and remedies.
- 7) Agricultural Exports: Problems and prospects, past experiences and future strategies for export growth.
- 8) Agricultural Taxation: Case for Agricultural Taxation. Case for special treatment.

Suggested Readings:-

1. Leading Issues in Agricultural Economics – R.N. Soni.
2. Agricultural Economics – R.K. Lekhi and Joginder Singh.
3. Agricultural Problems of India- Dr. C.B. Memoria and B.B Tripathi.
4. Agricultural Problems of India -Bansil, P.C.
5. Land Reforms in India- Trends and Perspectives, P.C. Josh, Allied Publishers, Mumbai.
6. Indian Economy- S.K. Mishra & V.K. Puri.

Ag. Econ. Elective- I
(Practical)

Time: 3 Hours

Max. Marks: 50

Practical: 40

Int. Assess.: 10

Periods per week (Pract.): 06

Assign a visit to a village to team of five students to obtain.

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

B.Sc Agric. Elective- II (Ag. Econ.). Agricultural Marketing & Co-operation.

Time: 3 Hours

Max. Marks: 100

Theory : 80

Int. Assess : 20

Periods per week (Th) : 04

Instructions for the paper setters

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

What is co-operation, principles of cooperation. Co- operation in the National planning. Organisation, financial structure and general working of following co-operative societies.

1. Primary Agricultural Credit Societies.
2. Multi- Purpose Societies.
3. Large size primary credit societies.
4. Labour co- operative society.
5. Agricultural Service Co-operative society.

Success, failure of Co-operative sector in India. Role of Co- operatives under emerging economic policy.

Co-operative farming, meaning, objectives, types, merits and demerits.

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

Agricultural Marketing: Definition, importance, types and defects. Methods of study, functional, institutional and commodity approach.

Marketing functions and services: Assembling, Processing, Distribution, Packing, Standardization, Grading and Transportation.

Role of State Marketing Board, Public – Private partnership in Marketing, Contractual farming, Entry of Corporates in Agricultural Marketing.

Suggested Readings:-

1. Agricultural Economics – R.K. Lekhi and Joginder Singh.
2. Agricultural Marketing in India- Dr. S.S. Acharya and N.L Aggarwal.
3. Indian Foodgrain Marketing -Moore, J.R, Johl S.S, Khusro A.M.
4. Foodgrain Marketing Systems in Inidia, Structure and conduct- Kainth G.S.
5. Theory, history and practice of Co- operation – R.D. Bedi.
6. Agriculture Co- operation in India- C.B. Memoria.

Ag. Econ. Elective- II (Practical)

Time: 3 Hours

Max. Marks: 50

Practical: 40

Int. Assess.: 10

Periods per week (Pract): 06

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 farmer, various market charges paid by farmers and buyers.
3. Visit to Co-operative societies to get first hand knowledge of their methods of working, preparation of a report.

B.Sc Agric. Elective-III (Ag. Econ.). Micro & Macro Economics

Time: 3 Hours

Max. Marks: 100

Theory : 80

Int. Assess : 20

Periods per week (Th): 04

Instructions for the paper setters

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

Micro Economics

Nature and scope of Economics, Micro & Macro Analysis. Theory of consumer behaviour: Marginal Utility Analysis, Indifference Curve Analysis. Elasticity of demand and supply. Cost Curves, Revenue Curves. Forms of Market Structure and Price determination under perfect competition, monopoly and monopolistic competition.

Macro Economics

National Income Accounting: Keynesian and Post Keynesian concepts. Simple Keynesian model of Income determination. Theories of consumption, Investment and Interest rate. Multiplier, Wages and employment policies. Inflation: Causes, Remedies and theories.

Suggested Readings:

Macro Economic Theory by M.C.Vaish.

Advanced Economic Theory by H.L. Ahuja.

Modern Micro Economics- by A. Koutsoyiannis.