PANJAB UNIVERSITY CHANDIGARH- 160 014 (INDIA)

(Estted. under the Panjab University Act VII of 1947-enacted by the Govt. of India)

FACULTY OF DAIRYING,

ANIMAL HUSBANDRY AND AGRICULTURE

SYLLABI

FOR

B.Sc. (4 Years Course) AGRICULTURE

1st to 8th SEMESTER

EXAMINATIONS 2020-21

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B.Sc.(Four Years) Agriculture 1st & 2nd Semester

FIRST SEMESTER

S.No	Course No.	Name of Paper/Course	Max. Marks	Theory Periods/ Week	Practical Period/ Week	Int. Ass.
1.	111	Punjabi/History & Culture of Punjab *	50	3	-	10
2.	112	English	75	3	-	15
3.	113	Basic Mathematics-I (Elementary Algebra & Trigonometry)	100	3	-	20
4.	114	Computer Applications	70+30	3	1	15+5
5.	115	General Botany	70+30	3	1	15+5
6.	116	Basic Economics	75	3	-	15
7.	117	Introductory Agro Climatology	70+30	3	1	15+5
8.	118	Elements of Agronomy	70+30	3	1	15+5
		Total	600	24	4	140

SECOND SEMESTER

S.No	Course No.	Name of Paper/Course	Max. Marks	Theory Periods/ Week	Practical Period/ Week	Int. Ass.
1.	121	Agricultural Journalism and language Culture	100	3	-	20
2.	122	Landscaping and Floriculture	50+25	3	1	10+5
3.	123	Introduction to Soil Sciences	70+30	3	1	15+5
4.	124	Basic Biochemistry	70+30	3	1	15+5
5.	125	Fundamentals of Microbiology	50+25	3	1	10+5
6.	126	General Zoology	70+30	3	1	15+5
7.	127	Basic Mathematics -2 (Analytical Geometry and Calculus)	100	3	-	20
8.	128	Environment, Road Safety Education, Violence against Women & Children and Drug Abuse*	-	-	-	-
9.	129	Punjabi/History & Culture of Punjab	50	3	-	10
		Total	600	24	5	140

***Qualifying Paper**

THIRD SEMESTER

S.No	Course No.	Name of Paper/Course	Max. Marks	Theory Periods/ Week	Practical Period/ Week	Int. Ass.
1.	231	Agronomy –I (Kharif Crops)	70+30	3	1	15+5
2.	232	Elements of Genetics	70+30	3	1	15+5
3.	233	Manures and Fertilizers	50+25	3	1	10+5
4.	234	Fundamental of Agricultural	70+30	3	1	15+5

		Economics (Farm Management)				
5.	235	Agricultural Microbiology	50+25	3	1	10+5
6.	236	Horticulture (Vegetable Growing)	50+25	3	1	10+5
7.	237	Animal Husbandry	50+25	3	1	10+5
		Total	600	21	7	120

FOURTH SEMESTER

S.No	Course No.	Name of Paper/Course	Max. Marks	Theory Periods/ Week	Practical Period/ Week	Int. Ass.
1.	241	Agronomy –II(Rabi Crops)	70+30	3	1	15+5
2.	242	Horticulture (Fruit Growing)	50+25	3	1	10+5
3.	243	Agricultural Botany and Crop Physiology	70+30	3	1	15+5
4.	244	Statistical Techniques in Agriculture	50+25	3	1	10+5
5.	245	Introductory Entomology	50+25	3	1	10+5
6.	246	Soil Physics & Conservation	50+25	3	1	10+5
7.	247	Introductory Plant Breeding	70+30	3	1	15+5
		Total	600	21	7	120

FIFTH SEMESTER

S.No	Course No.	Name of Paper/Course	Max. Marks	Theory Periods/ Week	Practical Period/ Week	Int. Ass.
1.	351	Farm Forestry	70+30	3	1	15+5
2.	352	Applied Plant Breeding & Biotechnology	70+30	3	1	15+5
3.	353	Rural Sociology and Rural Psychology	70+30	3	1	15+5
4.	354	Dairy and Poultry	70+30	3	1	15+5
5.	355	Agricultural Engineering	70+30	3	1	15+5
6.	356	Introductory Seed Technology	70+30	3	1	15+5
		Total	600	18	6	120

SIXTH SEMESTER

S.No	Course No.	Name of Paper/Course	Max. Marks	Theory Periods/ Week	Practical Period/ Week	Int. Ass.
1.	361	Plant Pathology	70+30	3	1	15+5
2.	362	Crop Experimentation & Applied Statistics	70+30	3	1	15+5
3.	363	Applied Entomology	70+30	3	1	15+5
4.	364	Introductory Food Technology	70+30	3	1	15+5
5.	365	Economic Zoology	70+30	3	1	15+5

6.	366	Agricultural Extension	70+30	3	1	10+5
		Total	600	18	6	120

SEVENTH SEMESTER

S.No	Course No.	Name of Paper/Course	Max. Marks	Theory Periods/ Week	Practical Period/ Week	Int. Ass.
1.	471	Project Planning, Evaluation and Implementation	100	3	1	20
2.	472	Sericulture and Apiculture	70+30	3	1	15+5
3.	473	Medicinal and Aromatic Plants	70+30	3	1	15+5
Specialization		**Agronomy**				
47EAG1		Crop Ecology and Farm Crop System	70+30	3	1	15+5
47EAG2/ 47EPB3		Insect Pests of Field Crops	70+30	3	1	15+5
47EAG3		Recent Trends in Agronomy or Plant Breeding	70+30	3	1	15+5
47EPB1		Fundamentals of Plant Breeding	70+30	3	1	15+5
47EPB2		Biometrical Genetics	70+30	3	1	15+5
47EPB3/ 47EAG2		Insect Pests of Field Crops	70+30	3	1	15+5
47EH01		Pomology-I	70+30	3	1	15+5
47EH02		Nursery Production	70+30	3	1	15+5
47EH03		Insect Pests of Horticulture and Vegetables	70+30	3	1	15+5
		Total	600			

EIGHTH SEMESTER

S.No	Course No.	Name of Paper/Course	Max. Marks	Theory Periods/ Week	Practical Period/ Week	Int. Ass.
1.	481	Recent Trends in Agriculture	70+30	3	1	15+5
2.	482	Irrigation & Water Management	70+30	3	1	15+5
3.	483	Internship in Agricultural Related Ind./Vet. Hop./Village/Govt. Nurseries	100	Practical Training of one month in duration		
Specialization		**Agronomy**				
48EAG1		Weed Control	70+30	3	1	15+5
48EAG2		Bio fertilizers	70+30	3	1	15+5
48EAG3/ 48EPB3		Applied Plant Pathology or Plant Breeding	70+30	3	1	15+5
48EPB1		Breeding Field Crops	70+30	3	1	15+5
48EPB2		General Genetics	70+30	3	1	15+5
48EPB3/ 48EAG3		Applied Plant Pathology or Horticulture	70+30	3	1	15+5
48EH01		Pomology-II	70+30	3	1	15+5
48EH02		Culturing Vegetable	70+30	3	1	15+5
47EH03		Diseases of Fruits and Vegetables	70+30	3	1	15+5
		Total	600			

B.Sc. AGRICULTURE

ਸਮੈਸਟਰ ਪਹਿਲਾ

Course Title : PUNJABI Course Number : 111

ਕੁੱਲ ਅੰਕ : 50
ਲਿਖਤੀ : 45
ਇੰਟਰਨਲ ਅਸੈਸਮੈਂਟ: 5
ਸਮਾਂ: 3 ਘੰਟੇ

ਪਾਠਕ੍ਰਮ

1.	ਪੰਜਾਬੀ ਕਵਿਤਾ ਦਾ ਅਧਿਐਨ	28 ਅੰਕ
2.	ਪੱਤਰ-ਵਿਹਾਰ	7 ਅੰਕ
3.	ਵਿਆਕਰਣ	10 ਅੰਕ

ਕੋਰਸ

ਆਤਮ-ਅਨਾਤਮ (ਕਵਿਤਾ ਤੇ ਕਥਾ ਸੰਗ੍ਰਹਿ),
ਸੰਪਾਦਕ ਡਾ. ਸੁਹਿੰਦਰਬੀਰ ਸਿੰਘ ਤੇ ਡਾ. ਵਰਿਆਮ ਸਿੰਘ ਸੰਧੂ ਪ੍ਰਕਾਸ਼ਕ: ਗੁਰੂ ਨਾਨਕ ਦੇਵ ਯੂਨੀਵਰਸਿਟੀ, ਅੰਮ੍ਰਿਤਸਰ, 2006

1.	ਆਤਮ-ਅਨਾਤਮ ਪੁਸਤਕ ਦੇ ਕਵਿਤਾ ਭਾਗ ਵਿਚੋਂ ਪ੍ਰਸੰਗ ਸਹਿਤ ਵਿਆਖਿਆ (2 ਵਿਚੋਂ 1)	5 ਅੰਕ
2.	ਆਤਮ-ਅਨਾਤਮ ਪੁਸਤਕ ਵਿਚਲੀਆਂ ਕਵਿਤਾਵਾਂ ਦਾ ਵਿਸ਼ਾ ਦੱਸ ਕੇ ਸਾਰ ਲਿਖਣਾ (2 ਵਿਚੋਂ 1)	8 ਅੰਕ
3.	ਕੋਰਸ ਵਿਚਲੀ ਪਾਠ-ਪੁਸਤਕ (ਆਤਮ-ਅਨਾਤਮ) ਦੀਆਂ ਕਵਿਤਾਵਾਂ ਨਾਲ ਸੰਬੰਧਤ ਪੁਸਤਕ ਵਿੱਚੋਂ ਦਿੱਤੇ ਪ੍ਰਸ਼ਨਾਂ ਦੇ ਉੱਤਰ (7 ਚੋਂ 5)	5 ਅੰਕ
4.	ਸਰਕਾਰੀ ਅਤੇ ਅਖਬਾਰ ਦੇ ਸੰਪਾਦਕ ਨੂੰ ਚਲੰਤ ਮਸਲਿਆਂ ਬਾਰੇ ਪੱਤਰ ਲਿਖਣਾ (ਦੋ ਚੋਂ ਇਕ)	7 ਅੰਕ
5.	ਵਿਆਕਰਣ: ੳ) ਵਿਸ਼ਰਾਮ ਚਿੰਨ੍ਹ ਅ) ਵਾਕਾਂ ਨੂੰ ਹਰ ਪੱਖੋਂ ਸੋਧ ਕੇ ਲਿਖਣਾ ੲ) ਮੁਹਾਵਰਿਆਂ ਦੀ ਵਾਕਾਂ ਵਿਚ ਵਰਤੋਂ	(3+3+4=10 ਅੰਕ)
6.	ਪੁਸਤਕ ਵਿਚ ਸ਼ਾਮਿਲ ਕਵੀਆਂ ਦਾ ਜੀਵਨ, ਰਚਨਾ ਤੇ ਯੋਗਦਾਨ	10 ਅੰਕ

ਵਿਸ਼ੇਸ਼ ਨੋਟ : ਸਮੁੱਚੇ ਪਾਠ ਕ੍ਰਮ ਲਈ ਹਫ਼ਤੇ ਵਿਚ 6 ਪੀਰੀਅਡ

OR

HISTORY AND CULTURE OF PUNJAB – I

Instructions for the paper-setter and candidates: (for paper in Semester I & II)

1. The syllabus has been divided into four Units.
   There shall be 9 questions in all. The first question is compulsory and shall be short answer type containing 10 short questions spread over the whole syllabus to be answered in about 25 to 30 words each. The candidates are required to attempt any 5 short answer type questions. Each question will carry 1 mark. Rest of the paper shall contain 4 units. Each Unit shall have two essay type questions and the candidate shall be given internal choice of attempting one question from each Unit-IV in all. Each question will carry 10 marks.
2. For private candidates, who have not been assessed earlier for internal assessment, the marks secured by them in theory paper will proportionately be increased to maximum marks of the paper in lieu of internal assessment.
   The paper-setter must put note (2) in the question paper.
3. One question from Unit-IV shall be set on the map.

Explanation:

1. Each essay type question would cover about one-third or one-half of a topic detailed in the syllabus.
2. The distribution of marks for the map question would be as under:
   Map : 06 Marks
   Explanatory Note : 04 Marks
   In case a paper setter chooses to set a question of map on important historical places, the paper setter will be required to ask the students to mark 6 places on map of 1 mark each and write explanatory note on any two of 2 marks each.
3. The paper-setter would avoid repetition between different types of question within one question paper.

PAPER : HISTORY AND CULTURE OF PUNJAB FROM THE EARLIEST TIMES TO 1849

Max. Marks	:	50
Theory	:	45
Internal Assessment	:	05
Time	:	3 Hours

Objectives: To introduce the students to the history of the Punjab region.
Pedagogy: Lectures, library work and discussions.

UNIT I

1. Harappan Civilization: extent and town planning and socio-economic life.
2. Life in Vedic Age: socio-economic and religious.
3. Growth of Jainism and Buddhism in Punjab on the region.

UNIT II

4. Society and Culture under Maurayas
5. Society and Culture under Gupta
6. Cultural Reorientation: main features of Bhakti; origin and development of Sufism

UNIT III

7. Evolution of Sikhism: teaching of Guru Nanak; Institutional Development -Manji, Masand, Sangat and pangat.
8. Transformation of Sikhism: martyrdom of Guru Arjan; martyrdom of Guru Tegh Bahadur; impact.
9. Institution of Khalsa: new baptism; significance

UNIT IV

10. Changes in Society in 18th century: social unrest; emergence of misls and institutions-rakhi, gurmata, dal khalsa.
11. Society and Culture of the people under Maharaja Ranjit Singh
12. MAP (of undivided physical geographical map of Punjab): Major Historical Places: Harappa, Mohenjodaro, Sanghol, Ropar, Lahore, Amritsar, Kiratpur, Anandpur Sahib, Tarn Taran, Machhiwara, Goindwal, Khadur Sahib.

Suggested Readings:

1. Joshi, L.M (ed.) : History and Culture of the Punjab, Part-I, Publication Bureau, Punjabi University, Patiala, 1989 (3rd edn.)
2. Joshi, L.M and Singh, Fauja (ed.) : History and Culture of the Punjab, Vol. I, Punjabi University, Patiala, 1977
3. Prakash, Buddha : Glimpses of Ancient Punjab, P.U., Patiala, 1983
4. Thapar, Romila : A History of India, Vol. I, Penguin Books, 1966
5. Basham, A.L : The Wonder That was India, Rupa Books, Calcutta (18th rep.),1992
6. Sharma, B.N : Life in Northern India, Munshi Ram Manohar Lal, Delhi, 1966
7. Singh,Kirpal : History and Culture of the Punjab, Part II(Medieval Period), Publication Bureau, Punjabi University, Patiala 1990(3rd edn.).
8. Singh, Fauja(ed.) : History of the Punjab, Vol.III, Punjabi University, Patiala 1972
9. Grewal, J.S. : The Sikhs of the Punjab, the New Cambridge History of India, Orient Orient Longman, Hyderabad,1990.
10. Singh, Khuwant : A History of the Sikhs, vol I: 1469-1839, Oxford University Press Delhi, 1991.
11. Chopra, P.N.,Puri, B.N. :A Social, Cultural and Economic History of India, Vol. II, and Das, M.N. Macmillan, Delhi, 1974.
12. Hussain ,Yusuf : Glimpse of Medieval Indian Culture, Asia Publishing House, Bombay, 1973(rep.).

Note: The following categories of the students shall be entitled to take option of History & Culture of Punjab in lieu of Punjabi as compulsory subject:

A. That the students who have not studied Punjabi upto class 10th.
B. Ward of / and Defence Personnel and Central Govt. Employee/Employees who are transferrable on all India basis.
C. Foreigners

Course Title : **ENGLISH** **Course Number** : 112

Objectives : To improve vocabulary and grammatical knowledge of English in student with particular reference to agriculture article presentations.

MAX. MARKS :75

THEORY:75 WRITTEN EXAM:60 INTERNAL ASSESMENT:15

PERIOD PER WEEK –THEORY-THREE OF 45 MINUTE DURATION

Objective: To improve vocabulary and grammatical knowledge of English in student with particular reference to agriculture article presentations.

Instructions for Paper Setter:

Question paper should be as per standard, strictly according to the syllabus, covering whole syllabus. Language of the question should be simple and straight.

1.	Translation from Punjabi/Hindi to English	10 marks
2.	Applied Grammar:	20 marks
	A. Idioms	
	B Corrections of Incorrect sentences	
	C Active-passage	
	D Narration	
3.	Vocabulary pertaining to agricultural terms	10 marks
4.	Two questions from prescribed text book	20 marks

(Only story section of *Ten Mighty Pens* is to be taught in first Semester, essay section of the same is to be taught in second semester)

Suggested Readings:

1. Collin P.H., *Dictionary of Agriculture*, Universal Book Stall, 2008.
2. Kalie K.A (ed), *Ten Mighty Pens- An Anthology,* Oxford University Press, London 2008.
3. Black C, *Dictionary of Agriculture*, Black Publishers, New York , 2008.

Course Title : BASIC MATHEMATICS - I (Elementary Algebra & Trigonometry) (FOR MEDICAL STUDENTS ONLY) **Course Number : 113**

Objectives : To teach basic mathematical skills in trigonometry, matrices and coordinate geometry.

MAX. MARKS :100

THEORY :100 WRITTEN EXAM:80 INTERNAL ASSESSMENT: 20

PERIOD PER WEEK – THEORY-THREE OF 45 MINUTES DURATION

INSTRUCTIONS FOR PAPER SETTER:

Question paper will have five sections. First Question will contain 10 short answer type parts of two marks each and will cover whole of the syllabus. All parts of this question will be compulsory. Section 'I', 'II','III' and 'IV' will have two question each from respective section, out of which one from each section is to be attempted. Total five questions are to be attempted. Question paper should be as per standard, strictly according to the syllabus. Language of the questions should be simple and straight.

Teaching Aids: Teachers can use lecture, lecture cum demonstration , project, assignments, problem solving, inductive and deductive methods, and can use L.C. Display, L.E.Display, Multimedia projector in addition to black/white board.

SECTION-I

Review of trigonometric functions, sum and product formulae for trigonometric functions, trigonometric equations and inverse trigonometric functions (chapter 3 of text book of class XI-NCERT).

SECTION-II

Complex numbers, quadric equations, permutations and combinations, mathematical induction, binomial theorem, sequences and series (scope as in chapters 5, 7, 8, and 9 of text book-mathematics for class XI –NCERT –latest edition.

SECTION-III

Matrices, operation of matrices, determinants, singular and non singular matrices. Ad joint and inverse of matrix (scope as in chapter 3, 4 of text book –mathematics for class XII- NCERT)

SECTION-IV

Co-ordinate Geometry: Rectangular co-ordinate system, straight lines. Circles, parabola, ellipse and hyperbola-their equations in standard form, Condition for tangency (scope as in chapter 10, 11, of text book mathematics class XI-NCERT).
Three dimensional space (scope as in chapter 12 of text book mathematics class XI-NCERT)

BOOKS

Mathematics for XI and XII-2011 NCERT, New Delhi.

Course Title : COMPUTER APPLICATIONS Course Number : 114
Objectives : To make students familiar with computer software and hardware.

MAX. MARKS :100

1.	**THEORY :70**	**WRITTEN EXAM:55**	**INTERNAL ASSESSMENT:15**
2.	**PRACTICAL:30**	**WRITTEN EXAM:25**	**INTERNAL ASSESSMENT:5**

PERIOD PER WEEK – 1. THEORY-THREE OF 45 MINUTES DURATION
2. PRACTICAL- ONE OF THREE HOURS DURATION

INSTRUCTIONS FOR PAPER SETTER:
Question paper will have five sections. First Question will contain 10 short answer type parts of one and half marks each and will cover whole of the syllabus. All parts of this question will be compulsory. Section 'I', 'II','III' and 'IV' will have two question each from respective section ,out of which one from each section is to be attempted. Total five questions are to be attempted. Question paper should be as per standard, strictly according to the syllabus. Language of the question should be simple and straight

Teaching Aids : Teachers can use lecture, lecture cum demonstration , project, assignments, problem solving, inductive and deductive methods, and can use L.C. Display, L.E.Display, Multimedia projector in addition to black/white board.

SECTION -I

- Introduction to computers, anatomy of computers, block diagram of computers, hard-ware, software-application software, system software. Input –Output devices.

SECTION-II

- Introduction to Operating System
- Definition, functions, types of Operating System,

SECTION-III

- DOS, fundamental dos commands
- Windows- features, desktop and its elements, creating folder, recycle bin, starting, shutting, control panel, window explorer etc.

SECTION-IV

- Ms office- MS WORD, Excel, Power-Point
- Introduction to internet- Search Engine, Web browsing, e-mail

Practical

Max Marks :30
Practical exam :25 + Internal Assessments:05

Creating MS WORD document, POWER-POINT presentation, SPREAD SHEET, Web Browsing etc.
Parts and Structure of P.C. Machine

Suggested Readings :

1. Singh, G. and Singh, R. , *PC software and programming*, Kalyani Publishers, Ludhiana, 2002
2. Basandra , G., *Computer Today*, Galgotia Publications New Delhi, 2009.

3. Sinha P.K. ,*Computer Fundamentals*, BPB Publications Bombay, 2009.

Course Title : **GENERAL BOTANY** **Course Number : 115**

(FOR NON-MEDICAL STUDENTS ONLY)

Objectives : To teach basic Botanical terms related to plant kingdom and to give basic knowledge related to plant parts.

MAX. MARKS :100

1. THEORY : 70 **WRITTEN EXAM:55** **INTERNAL ASSESSMENT: 15**

2. PRACTICAL: 30 **WRITTEN EXAM:25** **INTERNAL ASSESSMENT:5**

PERIOD PER WEEK – 1. THEORY–THREE OF 45 MINUTE DURATION
2. PRACTICAL- ONE OF THREE HOURS DURATION

INSTRUCTIONS FOR PAPER SETTER:

Question paper will have five sections. First Question will contain 10 short answer type parts of one and half marks each and will cover whole of the syllabus. All parts of this question will be compulsory. Section 'I', 'II','III' and 'IV' will have two question each from respective section, out of which one from each section is to be attempted. Total five questions are to be attempted. Question paper should be as per standard, strictly according to the syllabus. Language of the questions should be simple and straight.

Teaching Aids: Teachers can use lecture, lecture cum demonstration , project, assignments, problem solving, inductive and deductive methods, and can use L.C. Display, L.E.Display, Multimedia projector in addition to black/white board.

SECTION –I

- Basic features of algae, fungi, bryophytes, pteridophytes, gymnosperms and angiosperms.
- General outlines of life history of angiosperms (Main events of life history).

SECTION-II

- Modifications of Root, Stem and Leaf.
- Seed structure of Gram and Maize.
- Physiology of seed germination and types of germination.

SECTION –III

- Structure of Flower and terminologies.
- Inflorescence- Definition and different types
- Pollination- Types and Agencies
- Fruit – Definition and various fruit Types.

SECTION –IV

- Anatomy - Tissue types – Only the Outline of Classification.
- Difference between Monocot and Dicot Root, Stem and Leaf.
- General characters of families Solanaceae and Poaceae (floral formula and floral diagrams of (*Solanum nigrum* and *Oryza sativa*).

Practical

Max. Marks : 30

Practical exam: 25 Internal Assessment:05

1. Form and function of Root, Stem & Leaf and modifications
2. Different types of inflorescence
3. Representative of families studied in theory
4. Herbarium collections (above ground parts only).

Suggested Readings:

Dutta, C., *Text book of Botany*, Oxford University Press- India, 2000.

Bhatia K.N. and Widge, R., *Introduction of Botany*, Truman Publishers, Jalandhar, 2010.
Vidyarthi, S., *Text book of Botany,* S. Chand and Company, New Delhi, 2002.

Course Title : BASIC ECONOMICS Course Number : 116

Objectives : To teach basic economic principles and strategies related to agricultural industry.

MAX. MARKS :75
THEORY :75 WRITTEN EXAM:60 INTERNAL ASSESSMENT:15

PERIOD PER WEEK – THEORY-THREE OF 45 MINUTES DURATION

INSTRUCTIONS FOR PAPER SETTER:

Question paper will have five sections. First question will contain 10 short answer type parts of two marks each and will cover whole of the syllabus. All parts of this question will be compulsory. Section 'I', 'II','III' and 'IV' will have two questions each from respective section, out of which one from each section is to be attempted. Total five questions are to be attempted. Question paper should be as per standard, strictly according to the syllabus. Language of the questions should be simple and straight.

Teaching Aids: Teachers can use lecture, lecture cum demonstration , project, assignments, problem solving, inductive and deductive methods, and can use L.C. Display, L.E. Display, Multimedia projector in addition to black/white board.

SECTION- I

- Agricultural Economic - Meaning, scope and its relationship with other Social and Agricultural Sciences.
- Land use and Cropping Pattern- Land Utilization Pattern in Punjab and India.
- Importance of Agriculture - Contribution to national income and its comparison with other countries.

SECTION –II

- Size of Holding - Size, distribution, subdivision and fragmentation of holding in Punjab and India, consolidation of holding, economic and family holding.
- Dynamics of Population- Population growth and its effect on Agricultural growth rate.

SECTION- III

- Farming System - Dominant type of farming in the state. Concept of co-operative farming, its growth and role in Punjab.
- Agricultural Finance and Marketing- Credit needs, rural indebtness, credit agencies and their role in Punjab.
- Fundamentals of Agricultural marketing- Mode of marketing of major agricultural products.
- Marketing centres and agencies, organisation, merits and shortcomings.

SECTION- IV

- Poverty and rural Unemployment- Concept of poverty, measurement of income. Income of farm and non farm families.
- Geographical distribution of low income areas in State.

- Causes and role of rural and cottage industries. Role of state government in stabilization of rural and cottage industry.

Suggested Readings:

Lekhi, R.K. and Singh, J., Agricultural Economics-, Kalyani publishers, Ludhiana, 2007.
Black. J.D., *Introduction of Economics for Agriculture,* Fromount Pierre National Press, 1955.
Nanavati, M.B. and J. J. Anjaria, *The Indian Rural Problem*. The Indian Society of Agricultural Economics, Bombay, 1944.
Memoria, C.B. and B.B. , *Agricultural Problems in India,* Kitab Mahal, Allahabad, 2007.

Course Title : INTRODUCTORY AGROCLIMATOLOGY Course Number : 117

Objectives : To study weather parameters and their influence on agriculture.

MAX. MARKS -100

1. THEORY : 70	**; WRITTEN EXAM:55**	**INTERNAL ASSESMENT: 15**
2. PRACTICAL: 30	**; WRITTEN EXAM:25**	**INTERNAL ASSESMENT: 5**

PERIOD PER WEEK – 1. THEORY — THREE OF 45 MINUTE DURATION
2. PRACTICAL— ONE OF THREE HOURS DURATION

INSTRUCTIONS FOR PAPER SETTER:

Question paper will have five sections. First Question will contain 10 short answer type parts of one and half marks each and will cover whole of the syllabus. All parts of this question will be compulsory. Section 'I', 'II','III' and 'IV' will have two question each from respective section, out of which one from each section is to be attempted. Total five questions are to be attempted. Question paper should be as per standard, strictly according to the syllabus. Language of the questions should be simple and straight

Teaching Aids : Teachers can use lecture, lecture cum demonstration , project, assignments, problem solving, inductive and deductive methods, and can use L.C. Display, L.E.Display, Multimedia projector in addition to black/white board.

SECTION-I

- Importance of weather & climate, Different branches concerning atmospheric phenomenon. Division of climatology.
- Agro climatology:-definition, scope and agroclimtology as an interdisciplinary science.
- The earth and its atmosphere:-structure & composition of earth. Motion of earth and their importance. Atmospheric characteristics, physical properties and composition of atmosphere.
- Role of atmospheric air in agriculture. Vertical layers of atmosphere & their important characteristics, Vertical distribution of temperature and pressure.

SECTION -II

- Elements of Climate and weather (solar radiation, air temperature, pressure, moisture & wind). Latitudinal and Seasonal distribution of temperature and precipitation.

- Factors of climate. Effect of temperature, pressure, wind, moisture, solar radiation on crops. Climate and crop growth.
- Role of weather in sowing, growth, maturity and harvesting of crops. Climatic requirement of wheat, rice, barley, bajra, maize, cotton, gram sugarcane, sunflower, millets, tomato and potato.

SECTION-III

- Weather hazards (frost and high temperature, drought, floods, storms, tornadoes & water spouts, lighting, blizzard and earth-quakes).
- Effect of weather in agriculture industry.
- Modification of weather hazards. Field climate modifications. Role of shelter belts and mulches in microclimate modifications.

SECTION-IV

- Climatic classification based on temperature, rain fall, vegetation.
- Climates of world with special reference to India. Agroclimatic regions of Punjab and India.
- Role of weather and climate in sustainable agriculture- role of temperature, solar radiation, precipitation on sustainable agriculture. Combined effects of different climatic parameters on crop production.

Practical

Max. Marks:30

Practical exam:25 Internal Assessment:05

1. Installation and use of various meteorological instruments for measurement of different weather parameters.
2. Study the principle and working of various meteorological instruments.
3. Study of wind direction and climatic water balance.
4. Measurement & significance of atmospheric humidity, rain fall and evaporation over an area. Interpretation of climatic data in relation to crop weather relationship.
5. Study of climatic requirement of important different crops & their distribution and yield in India.
6. Study the important crops yield sensitivity to weather fluctuation.
7. Recording, processing and presentation of climatic data on Climatographs, Charts and Maps. Study of different factors in soil formation.
8. Meteorological satellite technology in weather forecasting.
9. Climatic maps of India and Punjab.

Suggested Readings:

Mavi, H.S., *Introduction to Agrometerology*, Oxford and IBH Publishing Co Pvt Ltd, New Delhi, 1994.
Ahrens, C.D., *Meterology Today*, Thomson Teaching Inc. USA, 2003.
Critchfield, H. J., *General Climatology,* Prentice Hall of India Pvt Ltd., New Delhi. 2002.

Objectives: To give student elementary information on basic agronomic principles and practices.

MAX. MARKS :100

1. **THEORY : 70** **WRITTEN EXAM:55** **INTERNAL ASSESSMENT: 15**
2. **PRACTICAL:30** **WRITTEN EXAM:25** **INTERNAL ASSESSMENT: 5**

PERIOD PER WEEK: 1. THEORY- THREE OF 45 MINUTES DURATION
2. PRACTICAL- ONE OF THREE HOURS DURATION

INSTRUCTIONS FOR PAPER SETTER:

Question paper will have five sections. First Question will contain 10 short answer type parts of one and half marks each and will cover whole of the syllabus. All parts of this question will be compulsory. Section 'I', 'II','III' and 'IV' will have two question each from respective section, out of which one from each section is to be attempted. Total five questions are to be attempted. Question paper should be as per standard, strictly according to the syllabus. Language of the questions should be simple and straight.

Teaching Aids : Teachers can use lecture, lecture cum demonstration, project, assignments, problem solving, inductive and deductive methods, and can use L.C. Display, L.E.Display, Multimedia projector in addition to black/white board.

SECTION-I

- Meaning and scope of agriculture, development of agriculture in India in general and Punjab in particular.
- Agriculture Education and Research in India. Classification of crops
- Crop rotation – principles, limitation, advantages. Rotational intensity, cropping scheme, cropping intensity.
- Cropping system: Types of cropping (mono, inter, multiple, mixed and relay)
- Introductory knowledge of major cropping system of India.
- Difference between cropping pattern and cropping system.

SECTION-II

- Agronomy as a science and its scope.
- Germination, Maturity, Harvesting and Storage of crop plants.
- Tillage : Concept, objective and types of tillage. Influence of tillage on physical properties of soil.
- Different types of tillage implements used in Indian Agriculture and modern concept of tillage.

SECTION-III

- Tillage – practices for different soil types and crops.
- Seed bed preparation.
- Characteristics of good seed beds.
- Methods of sowing and their suitability under different conditions.
- Seedling practices in relation to types of seeds, time of sowing and soil moisture.

SECTION-IV

- Weed characteristics, dissemination and competition for growth factors and problems caused by them.
- Common methods of weed control : mechanical, cultural, chemical and biological.
- Green manuring – advantages , limitations and examples of green manure crops.
- Agronomic methods of pest management.

Practical

Max Marks:30

Practical exam:25 Internal Assessment:05

1. Land measurement
2. Identification and practices in the use of farm hand tools, bullock and tractor driven implements.
3. Identification of crop seeds, crop plant and important weeds.
4. Knowledge of various fertilizers – Collection, weeding, hoeing in various crops.
5. Local seed banks
6. Collection of weeds
7. Use of spray pumps.
8. Calculation of herbicide doses for different crops.

Suggested Readings:-

Reddy S.R., *Principles of Crop Husbandry,* Kalyani Publishers, Ludhiana, 2009.
Handbook of Agriculture, I.C.A.R. Publications, New Delhi, 2008.
Weeds of North India I.C.A.R. Publications, New Delhi, 2008.
Package of Practices for Rabi and kharif crops, P.A.U. Publications Ludhiana, Corresponding year.

SEMESTER II

Course Title : AGRICULTURAL JOURNALISM AND LANGUAGE CULTURE **Course Number : 121**

Objectives : To teach impressive letters, reports and advertisement making related to agriculture journalism.

MAX. MARKS :100
THEORY :100 WRITTEN EXAM: 80 INTERNAL ASSESSMENT: 20

PERIOD PER WEEK – THEORY - THREE OF 45 MINUTES DURATION

INSTRUCTIONS FOR PAPER SETTER:

Question paper should be as per standard, strictly according to the syllabus, covering whole syllabus.

Language of the question should be simple and straight.

1. Paragraph- Related to problems of agriculture and environment in India 20 Marks
2. Business letters /application 10 Marks
3. Precis 10 Marks
4. Reporting 10 Marks
5. Advertisement making –Related to Agriculture 10 Marks
6. Translation 10 Marks
7. Vocabulary test from Essay section of the prescribed book 10 Marks

Suggested Readings:

Kalie K.A. (ed), *Ten Mighty pens – An Anthology*, Oxford University Press, London, 2008.
Deol, N. S., *Hand book of Effective Communication Skills,* New Academic Publications, 2008.

Course Title : LANDSCAPING AND FLORICULTURE Course Number : 122

Objectives : To get basic principles in landscaping and knowledge for cultivation of ornamental plants, shrubs and other floriculture plants.

MAX. MARKS :75
1. **THEORY :50 WRITTEN EXAM:40 INTERNAL ASSESSMENT: 10**
2. **PRACTICAL:25 WRITTEN EXAM:20 INTERNAL ASSESSMENT:5**

PERIOD PER WEEK : 1. THEORY-THREE OF 45 MINUTES DURATION
2. PRACTICAL- ONE OF THREE HOURS DURATION

INSTRUCTIONS FOR PAPER SETTER:

Question paper will have five sections. First Question will contain 8 short answer type parts of one mark each and will cover whole of the syllabus. All parts of this question will be compulsory. Section 'I', 'II','III' and 'IV' will have two questions each from respective section ,out of which one from each section is to be attempted. Total five questions are to be attempted. Question paper should be as per standard, strictly according to the syllabus. Language of the questions should be simple and straight. All questions carry equal marks.

Teaching Aids : Teachers can use lecture, lecture cum demonstration, project, assignments, problem solving, inductive and deductive methods, and can use L.C. Display, L.E.Display, Multimedia projector in addition to black/white board.

SECTION-I

- History and Principles of landscaping.
- Landscape and gardening: Natural elements of Landscape, Factors affecting Landscape. Designs, styles of Gardening, some important terms used in landscape gardening.
- Layout of different styles of formal and informal gardens.

SECTION-II

- Utilisation of important Trees, Shrubs, Climbers, Ground covers, Potted and Shade loving plants for gardening and landscaping.
- Lawn management, selection of grass, soil preparation, planting of grass, diseases and other problems.

SECTION-III

- Cultivation practices of common Annuals, Pot culture, common propagation methods of ornamental plants (Chrysanthemum, Carnation and Marigold).

SECTION- IV

- Commercial floriculture cultivation practices of Gladiolus, Rose and Dahlia each including detailed study of climate, soil, timing of production, land preparation and fertilization and diseases of each crop.

Practical

Max. Marks: 25

Practical Exam : 20 Internal Assessment : 05

1. Identification and Growth behaviour of important Trees, Climbers and Shrubs.
2. Maintenance and Propagation of Lawns, Trees, Bulbous Plants, and Roses.
3. Maintenance and practice of pots.
4. Raising of seedlings.
5. Tools and implements used in landscaping.

Suggested Readings:

Arora, J.S., *Introductory Ornamental Horticulture*, Kalyani Publishers, Ludhiana, 1998.
Gopalaswami, I. *Complete Gardening in India* - ICAR New Delhi, 2009.
Randhawa, M.S., *Flowers and trees,* National book trust-New Delhi, 2008.
Randhawa, M.S., *Beautiful trees and gardens*, National book trust-New Delhi, 2008.

Course Title : INTRODUCTION TO SOIL SCIENCES Course Number : 123

Objectives : To teach introductory knowledge of weathering and study of properties of soil.

MAX. MARKS :100

1. THEORY :70 WRITTEN EXAM:55 INTERNAL ASSESSMENT: 15
2. PRACTICAL:30 WRITTEN EXAM:25 INTERNAL ASSESSMENT: 5

PERIOD PER WEEK –
1. THEORY-THREE OF 45 MINUTES DURATION
2. PRACTICAL- ONE OF THREE HOURS DURATION

INSTRUCTIONS FOR PAPER SETTER:

Question paper will have five sections. First Question will contain 10 short answer type parts of one and half marks each and will cover whole of the syllabus. All parts of this question will be compulsory. Section 'I', 'II', 'III' and 'IV' will have two question each from respective section, out of which one from each section is to be attempted. Total five questions are to be attempted. Question paper should be as per standard, strictly according to the syllabus. Language of the questions should be simple and straight.
Teaching Aids : Teachers can use lecture, lecture cum demonstration , project, assignments, problem solving, inductive and deductive methods, and can use L.C. Display, L.E. Display, Multimedia projector in addition to black/white board.

SECTION-I

- Introductory knowledge of soil: definition of soil, component of soil
- Definition, occurrence and classification of soil forming rocks & minerals.
- Weathering of rocks and minerals.
- Soil Profile, Horizons. Classification of soil based on soil taxonomy.

SECTION-II

- Important physical properties of soil: Soil separates/particles, their mechanical analysis and characteristics.
- Soil texture, soil densities and porosity of soil.
- Classification of Soil structure, factors effecting soil structure and its importance.
- Soil Organic Matter origin, its nature and composition.

SECTION-III

- Decomposition of various organic compounds: Factors affecting decomposition, decompositions of water soluble and water insoluble organic matters.
- Advantages and disadvantages of organic matter.
- Concept of humus formation.
- Soil reactions:- Methods of expressing and factors affecting Soil reactions, its influence on nutrient availability & plant growth.
- Buffer action & buffering capacity of soils. Factors affecting buffering capacity of soils.

SECTION-IV

- Formation & problems of Salt effected soils: Different types of Salt effected soils, nature & sources of soluble salt in saline soil, appraisal of saline & sodic soil. Calcareous soil.
- Reclamations of saline and alkali or sodic soils: Chemical reactions involving reclamations of salt affected soil. Gypsum requirement.
- Plant growth concept and factors affecting plant growth.
- Plant nutrition: Essential elements, classification & general function of plant nutrients, forms of nutrient elements absorbed by plants. Process of nutrient uptake.
- Important groups and distribution of soils, soils of India, soils of Punjab (both properties and their distribution).

Practical

Max. Marks: 30

Practical Exam: 25 Internal Assessments: 05

1. Identification of Important rocks and minerals.

2. Examination of soil profile in the field.
3. Soil sampling and use of augers.
4. Determination of water and soil texture.
5. Study of soil colour using Munsell soil colour charts.
6. Study of soil texture and soil structure of a given sample.
7. Calculations of soil densities and porosity of soil.
8. Calculation of gypsum requirement for given sample
9. Soil survey of a farm.
10. Determination of soil pH and EC.

Suggested Readings:

Brady, N.C. and Weil, R.R., *The Nature and Properties of Soil: 13th edn.,* Pearson education Pte. Ltd. New Delhi, 2002.
Oswal, M.C., *Soil Physics,* Oxford & IBH publishing Co.Pvt. Ltd. New Delhi, 1994.
Biswas, T.D., and Mukherjee, S.K., *Text book of soil science,* Tata McGraw Hill Publishing Co. Ltd., New Delhi, 1997.

Course Title : BASIC BIOCHEMISTRY Course Number : 124

Objectives : To get basic knowledge of biochemical and agrochemicals pathways.

MAX. MARKS :100

1.	**THEORY :70**	**WRITTEN EXAM:55**	**INTERNAL ASSESSMENT: 15**
2.	**PRACTICAL:30**	**WRITTEN EXAM:25**	**INTERNAL ASSESSMENT: 5**

PERIOD PER WEEK – 1. THEORY-THREE OF 45 MINUTES DURATION
2. PRACTICAL- ONE OF THREE HOURS DURATION

INSTRUCTIONS FOR PAPER SETTER:

Question paper will have five sections. First Question will contain 10 short answer type parts of one and half marks each and will cover whole of the syllabus. All parts of this question will be compulsory. Section 'I', 'II', 'III' and 'IV' will have two questions each from respective section, out of which one from each section is to be attempted. Total five questions are to be attempted. Question paper should be as per standard, strictly according to the syllabus. Language of the questions should be simple and straight.

Teaching Aids : Teachers can use lecture, lecture cum demonstration, project, assignments, problem solving, inductive and deductive methods, and can use L.C. Display, L.E. Display, Multimedia projector in addition to black/white board.

SECTION-I

- Biochemistry: history and its scope. Composition of living matter, Chemical constituents of Plants.
- Role of Vitamins, Hormones and Mineral.
- Carbohydrates their occurrence and importance. Detailed classification of carbohydrates
- Structure of monosaccharides, disaccharides & polysaccharides.
- Composition, sources and properties of common disaccharides.
- Chemical properties of carbohydrates.

SECTION-II

- Lipids – introduction, occurrence, importance and classification.

- Proteins: occurrence, classification of protein based on solubility & composition, function, shape and size.
- Introductory knowledge of apoenzymes, coenzymes and cofactors, isozymes.
- Nucleic acids: structure and function.

SECTION-III

- Introductions to plant fatty acids.
- Agrochemicals - Elementary idea about Insecticides, Fungicides, Rodenticides, Nematicides, Molluscicides.
- Insecticides and their classifications, factors affecting their effectiveness, lethal dose.
- Mode of Action of Pesticides, Hazards of Pesticides. Behaviour of Pesticides in Soil.

SECTION IV

- Herbicides and their classifications, herbicides formulations and applications.
- Absorption and translocation of herbicides. Mode of action of various herbicides.
- Herbicide persistence in soil and effect of herbicide on environment. Herbicide resistance.
- Environmental problems related to agrochemicals.

Practical

Max. Marks : 30
Practical Exam: 25 Internal Assessment: 05

1. Quantitative test of Carbohydrates, Amino acids and Proteins.
2. Protein estimation by Lowery method.
3. Carbohydrate estimation by anthrone method.
4. Protein denaturation – Heat, pH.
5. Protein precipitation by heavy metals.
6. Extraction of oils from seeds and characterization of lipids by TLC
7. Paper chromatography of sugars.
8. Determination of phenolics.

Suggested Readings:

Nelson, D.L. and Cox, M.M., *Principles of biochemistry*, Macmillan Publishers, New York, 1993.
Goodwin, T.W., and Mercer, E.I., *Introduction to plant biochemistry*, Pergamon Press, Oxford, 1983.
Buchanan B. B., Gruissen ,W. and Jones R.L., *Biochemistry and Molecular Biology of Plants*, American Society of Plant Physiologists, USA, 2000.

Course Title : FUNDAMENTALS OF MICROBIOLOGY Course Number : 125

Objectives : To teach fundamental knowledge of virus, bacteria, algae and fungi.

MAX. MARKS :75

1. **THEORY :50 WRITTEN EXAM:40 INTERNAL ASSESSMENT: 10**
2. **PRACTICAL:25 WRITTEN EXAM:20 INTERNAL ASSESSMENT:5**

PERIOD PER WEEK – 1. THEORY-THREE OF 45 MINUTES DURATION
2. PRACTICAL- ONE OF THREE HOURS DURATION

INSTRUCTIONS FOR PAPER SETTER:

Question paper will have five sections. First Question will contain 8 short answer type parts of one mark each and will cover whole of the syllabus. All parts of this question will be compulsory. Section 'I', 'II','III' and 'IV' will have two questions each from respective section ,out of which one from each section is to be attempted. Total five questions are to be attempted. Question paper should be as per standard, strictly according to the syllabus. Language of the questions should be simple and straight. All questions carry equal marks.

Teaching Aids : Teachers can use lecture, lecture cum demonstration, project, assignments, problem solving, inductive and deductive methods, and can use L.C. Display, L.E. Display, Multimedia projector in addition to black/white board.

SECTION-I

- Introduction: History of microbiology, microbiology in India. Branches of Microbiology, importance of microbiology in human welfare i.e. human health, food, agriculture and management of environmental pollution.
- Scope and future prospects of microbiology.
- General classification of microorganisms: Classification of major groups of micro organisms like Bacteria, Viruses, Fungi, and Algae.

SECTION-II

- Viruses: General concept and occurrence, morphology, symptom, structure and reproduction of TMV.
- Transmission of plant viruses – mechanical, vegetative, graft, pollen, seed, nematode, insect , Dodder and insect vector transmission.
- Effect of viruses on plants – external and internal symptoms.
- Viroids: Host range, genome and origin of Viroids
- Virusoids, Prions – spread of prions and artificial Prions.
- Bactriophages: Morphology and Multiplication of T4 phage
- Cyanophages: Morphology and growth cycle
- Mycoviruses: types, replication and example of mycovirus, the killer phenomenon
- Rhizobiophages.

SECTION-III

- General characteristics of Bacteria: Salient features, size, flagellation, behavioural response and sporolation.
- Reproduction in bacteria. Important bacterial genera along with examples.
- Different subcellular structures of bacterial cell and their functions.

SECTION – IV

- Detailed account of cyanobacteria.
- Detailed account of archaebacteria.
- Algae: general characteristics, classification. Algal division containing micro algae and important micro algae examples.
- Fungi : General characteristics and reproduction. Salient features and significance of phycomycotina (Chytridiomycetes, Oomycetes, zygomycetes) , ascomycotina, basidiomycotina, deuteromycotina.

Practical

Max. Marks: 25

Practical Exam: 20 Internal Assessment: 05

1. General instructions (laboratory rules, basic requirements and disposal of lab waste & culture).

2. Familiarization with different types of microscopes and other laboratory equipments.
3. Preparation of temporary cotton plugs.
4. Sampling and staining of Microorganisms.
5. Method of sterilizations.
6. Preparation of culture media.
7. Demonstration of spore germination of fungi.
8. Method of detection of specific bacteria.
9. Detection of calcium in milk.

Suggested Readings :

Dubey, R.C., and Maheshwari, D.K., *A text book of Microbiology,* S. Chand & Company Ltd, New Delhi, 2010.

Darralyn M., David S.and Phillip A., *Introduction to microbiology.* Black Well Publication Ltd. USA, 2001.

Salle, A.J., *Fundamentals Principles of bacteriology.* MacGraw Hill, Inc., 1974.

Course Title : GENERAL ZOOLOGY (FOR NON-MEDICAL STUDENTS ONLY) **Course Number : 126**

Objectives: To get basic knowledge of zoology and study of economic significance of animals and their economic importance to agriculture.

MAX. MARKS :100

1.	**THEORY :70**	**WRITTEN EXAM:55**	**INTERNAL ASSESSMENT:15**
2.	**PRACTICAL:30**	**WRITTEN EXAM:25**	**INTERNAL ASSESSMENT: 5**

PERIOD PER WEEK – 1. THEORY–THREE OF 45 MINUTES DURATION
2. PRACTICAL– ONE OF THREE HOURS DURATION

INSTRUCTIONS FOR PAPER SETTER:

Question paper will have five sections. First Question will contain 10 short answer type parts of one and half marks each and will cover whole of the syllabus. All parts of this question will be compulsory. Section 'I', 'II', 'III' and 'IV' will have two questions each from respective section, out of which one from each section is to be attempted. Total five questions are to be attempted. Question paper should be as per standard, strictly according to the syllabus. Language of the questions should be simple and straight.

Teaching Aids : Teachers can use lecture, lecture cum demonstration , project, assignments, problem solving, inductive and deductive methods, and can use L.C. Display, L.E.Display, Multimedia projector in addition to black/white board.

SECTION-I

- Introduction to Zoology, description of typical animal cell, difference between plant and animal cell.
- Zoological nomenclature and principles of classification.
- General survey of animal kingdom up to phylum in case of in–vertebrates and up to class in vertebrates.

SECTION-II

- Economic significance and importance of Amoeba, Entamoeba, Sycon, Plasmodium, Fasciola (liver fluke) , Tapeworm, Ascaris (round worm), Hirudinaria (Leech), Pheritema (Earthworm),

Grasshopper, Locust, Silkworm, Dohra, Red cotton bug, Honey bee, Mosquito (Anopheles), Rohu (fish), Frog, Snake, Owl, Woodpecker, Hoope, Parrot, Horse , Sheep, Rat, Mongoose and Monkey.

SECTION-III

- Animals of economic importance in Agriculture- specify name
- Comparison of Digestive and Reproductive system of ruminants and non-ruminants

SECTION-IV

- Physiology of Respiration
- Composition of Blood and its function
- Reproduction, Locomotion in Animals
- Structure of skin and its role in Heat Regulation

Practical

Max. Marks: 30 **Practical Exam : 25** **Internal Assessment: 05**

1. Animal cell, cell division, tissue
2. General survey and collection of fauna of local area
3. Smear of human blood
4. Skelton parts of ox, goat and horse

Suggested Readings:

Dhami P.S., *Agricultural Zoology,* S. Chand and Company Ltd., New Delhi., 1992.
Linville, H.R. and Kelley, H.A., *A text book of general zoology,* DPH Publications, New Delhi, 2006.
Frederick V.T., *A Text book of Agricultural Zoology,* General Books Publications, London, 2010.

Course Title : BASIC MATHEMATICS - 2 (Analytical Geometry and Calculus) (FOR MEDICAL STUDENTS ONLY) **Course Number : 127**

Objectives: To teach techniques in Analytical Geometry, mathematical calculus and differential equations.

MAX. MARKS :100
THEORY :100 **WRITTEN EXAM:80** **INTERNAL ASSESSMENT: 20**

PERIOD PER WEEK – THEORY– THREE OF 45 MINUTES DURATION

INSTRUCTIONS FOR PAPER SETTER:

Question paper will have five sections. First Question will contain 10 short answer type parts of two marks each and will cover whole of the syllabus. All parts of this question will be compulsory. Section 'I', 'II', 'III' and 'IV' will have two questions each from respective section ,out of which one from each section is to be attempted. Total five questions are to be attempted. Question paper should be as per standard, strictly according to the syllabus. Language of the questions should be simple and straight.

Teaching Aids : Teachers can use lecture, lecture cum demonstration, project, assignments, problem solving, inductive and deductive methods, and can use L.C. Display, L.E.Display, Multimedia projector in addition to black/white board.

SECTION-I

- Differential calculus: real functions and their graphs, limits and continuity. Derivative of function, product and quotient rule. Chain rule implicit and logarithmic differentiation. The 2^{nd} and 3^{rd} derivative, parametric, increasing and decreasing functions. Maxima and minima.

SECTION-II

- Mean value theorem, tangents and normals [scope as in chapter 13 (of class xi) and 5,6 of class xii both text books of mathematics, NCERT latest edition].

SECTION-III

- Integral calculus: Integral as anti derivatives integration as substitution , by partial fractions and by parts.
- Definite integral: the definition of integral of real valued function of real variable as limit of sum motivated by the determination of area. Functional theorem of integral calculus, properties of definite integral. Areas of boundary regions.

SECTION-IV

- Differential equations: Formation and methods of solving first order first degree diff. equations (scope as in chapter 7,8 and 9 of text book mathematics for class xii, NCERT, latest edition.

BOOKS:
MATHEMATICS FOR XI CLASS – NCERT

ENVIRONMENT, ROAD SAFETY EDUCATION, VIOLENCE AGAINST WOMEN & CHILDREN and Drug Abuse (SEMESTER – II)

*** Total duration of the whole paper(Consisting of four parts) shall be of 2 hours, carrying 100 marks in whole, divided into the rations of 40:20:20:20**

Note: The syllabus has 15 topics to be covered in 20 hour lectures in total, with 2 lectures in each topic from 2 to 11 and one each for the topics 1 and 12 to 15.

1. Environment Concept:

Introduction, concept of biosphere – lithosphere, hydrosphere, atmosphere; Natural resources – their need and types; Principles and scope of Ecology; concepts of ecosystem, population, community, biotic interactions, biomes, ecological succession.

2. Atmosphere:

Parts of atmosphere, components of air; pollution, pollutants, their sources, permissible limits, risks and possible control measures.

3. Hydrosphere:

Types of aquatic systems; Major sources (including ground water) and uses of water, problems of the hydrosphere, fresh water shortage; pollution and pollutants of water, permissible limits, risks and possible control measures.

4. Lithosphere:

Earth crust, soil – a life support system, its texture, types, components, pollution and pollutants, reasons of soil erosion and possible control measures.

5. Forests:

Concept of forests and plantations, types of vegetation and forests, factors governing vegetation, role of trees and forests in environment, various forestry programmes of the Govt. of India, Urban Forests, Chipko Andolan.

6. Conservation of Environment:

The concepts of conservation and sustainable development, why to conserve, aims and objectives of conservation, policies of conservation; conservation of life support systems – soil, water , air, wildlife, forests.

7. Management of Solid Waste:

Merits and demerits of different ways of solid waste management– open dumping, landfill, incineration, resource reduction, recycling and reuse, vermicomposting and vermiculture, organic farming.

8. Indoor Environment:

Pollutants and contaminants of the in-house environment; problems of the environment linked to urban and rural lifestyles; possible adulterants of the food; uses and harms of plastics and polythene; hazardous chemicals, solvents and cosmetics.

9. Global Environmental Issues:

Global concern, creation of UNEP; Conventions on climate change, Convention on biodiversity; Stratospheric ozone depletion, dangers associated and possible solutions.

10. Indian Laws on Environment:

Indian laws pertaining to Environmental protection: Environment (Protection) Act, 1986; General information about laws relating to control of air, water and noise pollution. What to do to seek redressal.

11. Biodiversity:

What is biodiversity, levels and types of biodiversity, importance of biodiversity, causes of its loss, how to check its loss; Hotspot zones of the world and India, Biodiversity Act, 2002.

12. Noise and Microbial Pollution:

Pollution due to noise and microbes and their effects.

13. Human Population and Environment:

Population growth and family welfare programme, Human Health. HIV-AIDS. Human Rights.

14. Social Issues:

Environmental Ethics: Issues and possible solutions, problems related to lifestyle, sustainable development; Consumerisms and waste generation.

15. Local Environmental Issues:

Environmental problems in rural and urban areas. Problem of Congress Grass & other weeds, problems arising from the use of pesticides and weedicides, smoking etc.

Practical

Depending on the available facility in the college, a visit to vermicomposting units or any other such non-polluting eco-friendly site or planting/caring of vegetation/trees could be taken.

Examination Pattern:

A qualifying paper of 40 marks comprising of forty multiple choice questions (with one correct and three incorrect alternatives and no deduction for wrong answer or un-attempted question), and of 1 hour duration.

The students have to obtain 33% marks to qualify the paper. The marks are not added / included in the final mark sheet.

UNIT II (ROAD SAFETY)

Concept and Significance of Road Safety.

Role of Traffic Police in Road Safety.

Traffic Engineering – Concept & Significance.

Traffic Rules & Traffic Signs.

How to obtain Driving License.

Traffic Offences, Penalties and Procedures.

Common Driving mistakes.

Significance of First-aid in Road Safety.

Role of Civil Society in Road Safety.

Traffic Police-Public Relationship.

Note : Examination Pattern :

Road Safety paper is 20 marks.

Unit II shall comprise of 20 questions with minimum of 1 question from each topics 1 to 10. The entire syllabus of Unit II is to be covered in 10 hours.

All the questions are to be attempted.

Qualifying Marks 33 per cent

The paper setter is requested to set the questions strictly according to the syllabus.

Suggested Readings

The Motor Vehicle Act, 1988 (2010), Universal Law Publishing Co. Pvt. Ltd., New Delhi.

Road Safety Signage and Signs (2011), Ministry of Road Transport and Highways, Government of India.

Websites:

www.chandigarhpolice.nic.in

www.punjabpolice.gov.in

www.haryanapolice.gov.in

www.hppolice.nic.in

Unit – III

SYLLABUS ON "VIOLENCE AGAINST WOMEN & CHILDREN" AT UNDER-GRADUATE LEVEL

VIOLENCE AGAINST WOMEN & CHILDREN

Concept and Types of Violence: Meaning and Definition of violence; Types of Violence against women – domestic violence, sexual violence (including rape), sexual harassment, emotional/psychological violence; Types of Violence against children – physical violence, sexual violence, verbal and emotional abuse, neglect & abandonment.

Protective Provisions of IPC on Domestic Violence & Sexual Violence against Women: Dowry Death – Section 304B;

Rape – Sections 375, 376(1), 376A, 376B, 376C, 376D and 376E; Cruelty – Section 498A;

Insult to Modesty – The Indian Penal Code does not define the word eve-teasing; there are three sections which deal with crime of eve-teasing. These are Sections, 294, 354 and 509of Indian Penal Code. Section 509 of the Indian penal code defines (Word, gesture or act intended to insult the modesty of a woman), Section 294 – (Obscene acts and songs) and Section 354 (Assault or criminal force to woman with intent to outrage her modesty);

Hurt & Grievous Hurt Provisions – Sections 319 to 326; Acid Attacks – Sections 326A and 326B;

Female Infanticide – Section 312, Section 313 of Indian Penal Code (Causing miscarriage without women's consent) and section 314;

Sexual Harassment – For providing protection to working women against sexual harassment, a new section 354 A is added; 354 B (Assault or use of criminal force to women with intent to disrobe); 354 C Voyeurism; 354 D (Stalking). All these provisions are added in IPC to protect women against acts of violence through Criminal Law (Amendment) Act, 2013; Human Trafficking and Forced Prostitution- Sections 370 and 370A

Protective Laws for Women:

3.1 Provisions of Protection of Women Against Domestic Violence Act 2005 – Definition, Powers of the Magistrate and Protection Officers, Protection order, Residence order, Monetary relief, Custody order and Compensatory order.

3.2 The Sexual Harassment of Women at Workplace (Prevention, Prohibition and Redressal) Act, 2013 – Definition, Internal Complaint Committee, Local Complaint Committee, Procedure adopted by Committee for punishing accused.

4. Protective Provisions of IPC regarding Sexual Violence against Children:

Section 293(sale etc. of obscene objects to young persons); 294 (obscene acts & songs); 305 (abetment of suicide of child); 315 to 317 (act causing death after birth of a child etc.); 361 (kidnapping from lawful guardianship); 362 (abduction); 363 (punishment for kidnapping); 363A (kidnapping or maiming a minor for purposing of begging); 364A (kidnapping for ransom etc.); 366 (kidnapping etc. to compel woman for marriage etc.); 366A (procuration of minor girl for illicit forced intercourse); 366B (importation of girl from foreign country); 367 (kidnapping/abduction in order to subject person to grievous hurt, slavery etc.); 369 (kidnapping adductive child under 10 year with intent to steal from its person); 372 & 373 (selling & buying minor for purposes of prostitution etc.).

4.1 The Protection of Children from Sexual Offences Act, 2012: An overview of the POCSO, relevant legal provisions and guidelines for the protection of children against sexual offences along with punishments; role of doctors, psychologists & mental experts as per rules of POCSO.

Note: Instructions for Examination:

Unit III of the paper dealing with Violence against Women and Children is of 20 Marks. It shall have 20 multiple-choice questions (with one correct and three incorrect choice
options and no deduction of marks for wrong or un-attempted questions). Minimum two
questions from each topic must be covered.

All the questions are to be attempted Qualifying
Marks 33 percent

Duration of Examination 30 Minutes

The Paper Setter is requested to set the questions strictly according to the syllabus.

Pedagogy:

The entire syllabus of Unit III is to be covered in ten hours in total, with each lecture of one-hour duration.

The purpose behind imparting teaching-learning instructions is to create basic understanding of the contents of the Unit III among the students.

RELEVANT READING MATERIAL

Ahuja, Ram (1998), Violence against Women, New Delhi: Rawat Publication

NRHM, Child Abuse, A Guidebook for the Media on Sexual Violence against Children The Indian Penal Code (Universal Law Publishing Co. Pvt. New Delhi).

The Protection of Children from Sexual Offences Act, 2012 The
Protection of Women from Domestic Violence Act 2005
The Sexual Harassment of Women at Workplace (Prevention, Prohibition and Redressal) Act, 2013

UNO, United Nations Secretary-General's Study on Violence against Children, adapted for Children and Young People

Unit –IV
Drug Abuse

UNIT IV (Drug abuse: problem, prevention and management)

1. **Problem of drug abuse**
   Meaning and concept; types of drugs often misused;antibiotics, steroids and their misuse with suitable examples;habit forming drugs and their effects; drug addiction; drug tolerance and withdrawal symptoms;various signs and symptoms of drug abuse;vulnerable groups (age, gender and socio-economic status)
2. **Prevention and management of drug abuse**
   Medical treatment through deaddiction center, support of family, media and school education; Government policies, programs and laws to prevent drug abuse.

Instructions to the examiners

1. Unit IV of the paper dealing with Drug abuse would be of 20 marks comprising of twenty multiple choice questions carrying one mark each having four options a, b, c, d with one correct and three incorrect alternatives.
2. The question paper shall be set strictly according to the syllabus uniformly
3. All the questions are to be attempted

Note: The teaching hours for the Unit IV will be 10 hours

Suggested readings

1. Kapoor T (1985) Drug epidemic among Indian Youth. New Delhi: Mittal Pub

2. Modi, Ishwar and Modi, Shalini (1997) Drugs: addiction and prevention, Jaipur: Rawat publications

3. World drug Report 2019, Booklet 1, Executive summary, United Nations Office of drug and crime

4. Bansal R and Kumar A (2020) Drug abuse, addiction and recovery

B.Sc. AGRICULTURE

ਸਮੈਸਟਰ ਦੂਜਾ

ਕੁੱਲ ਅੰਕ : 50
ਲਿਖਤੀ : 45
ਇੰਟਰਨਲ ਅਸੈਸਮੈਂਟ: 5
ਸਮਾਂ: 3 ਘੰਟੇ

ਪਾਠਕ੍ਰਮ

1. ਪੰਜਾਬੀ ਕਹਾਣੀ ਦਾ ਅਧਿਐਨ
2. ਪੱਤਰ-ਵਿਹਾਰ
3. ਵਿਆਕਰਣ

ਕੋਰਸ

ਆਤਮ-ਅਨਾਤਮ (ਕਵਿਤਾ ਤੇ ਕਥਾ ਸੰਗ੍ਰਹਿ)
ਸੰਪਾਦਕ : ਡਾ. ਸੁਹਿੰਦਰਬੀਰ ਸਿੰਘ ਤੇ ਡਾ. ਵਰਿਆਮ ਸਿੰਘ ਸੰਧੂ ਪ੍ਰਕਾਸ਼ਕ: ਗੁਰੂ ਨਾਨਕ ਦੇਵ ਯੂਨੀਵਰਸਿਟੀ, ਅੰਮ੍ਰਿਤਸਰ, 2006

1.	ਆਤਮ-ਅਨਾਤਮ ਪੁਸਤਕ ਦੇ ਕਹਾਣੀ ਭਾਗ ਵਿਚੋਂ ਪ੍ਰਸੰਗ ਸਹਿਤ ਵਿਆਖਿਆ (2 ਵਿਚੋਂ 1)	5 ਅੰਕ
2.	ਆਤਮ-ਅਨਾਤਮ ਪੁਸਤਕ ਵਿਚਲੀਆਂ ਕਹਾਣੀਆਂ ਦਾ ਵਿਸ਼ਾ ਦੱਸ ਕੇ ਸਾਰ ਲਿਖਣਾ (2 ਵਿਚੋਂ 1)	3+5 = 8 ਅੰਕ
3.	ਕੋਰਸ ਵਿਚਲੀ ਪਾਠ-ਪੁਸਤਕ (ਆਤਮ-ਅਨਾਤਮ) ਦੀਆਂ ਕਹਾਣੀਆਂ ਨਾਲ ਸੰਬੰਧਤ ਪੁਸਤਕ ਵਿੱਚੋਂ ਦਿੱਤੇ ਪ੍ਰਸ਼ਨਾਂ ਦੇ ਉੱਤਰ (7 ਚੋਂ 5)	5 ਅੰਕ
4.	ਸਰਕਾਰੀ ਅਤੇ ਅਖਬਾਰ ਦੇ ਸੰਪਾਦਕ ਨੂੰ ਚਲੰਤ ਮਸਲਿਆਂ ਬਾਰੇ ਪੱਤਰ ਲਿਖਣਾ (2 ਵਿਚੋਂ 1)	7 ਅੰਕ
5.	ਵਿਆਕਰਣ: ੳ) ਵਿਸ਼ਰਾਮ ਚਿੰਨ੍ਹ ਅ) ਵਾਕਾਂ ਨੂੰ ਹਰ ਪੱਖੋਂ ਸੋਧ ਕੇ ਲਿਖਣਾ ੲ) ਮੁਹਾਵਰਿਆਂ ਦੀ ਵਾਕਾਂ ਵਿਚ ਵਰਤੋਂ	(3+3+4=10 ਅੰਕ)
6.	ਪੁਸਤਕ ਵਿਚ ਸ਼ਾਮਿਲ ਕਹਾਣੀਕਾਰਾਂ ਦਾ ਜੀਵਨ, ਰਚਨਾ ਤੇ ਯੋਗਦਾਨ	10 ਅੰਕ

ਵਿਸ਼ੇਸ਼ ਨੋਟ : ਸਮੁੱਚੇ ਪਾਠ ਕ੍ਰਮ ਲਈ ਹਫ਼ਤੇ ਵਿਚ 6 ਪੀਰੀਅਡ

OR

HISTORY AND CULTURE OF PUNJAB IN THE COLONIAL AND POST INDEPENDENCE TIMES

INSTRUCTIONS FOR THE PAPER –SETTER AND CANDIDATES: (FOR PAPER in semester 1 AND 2)

1. The syllabus has been divided into four Units.
   There shall be 9 questions in all. The first question is compulsory and shall be short answer type containing 10 short questions spread over the whole syllabus to be answered in about 25 to 30 words each. The candidates are required to attempt any 5 short answer type questions carrying 5 marks i.e. 1 mark each. Rest of the paper shall contain 4 units. Each Unit shall have two essay type questions and the candidate shall be given internal choice of attempting one question from each Unit-IV in all. Each question will carry 10 marks.
2. For private candidates, who have not been assessed earlier for internal assessment, the marks secured by them in theory paper will proportionately be increased to maximum marks of the paper in lieu of internal assessment.
   The paper-setter must put note (2) in the question paper.
3. One question from Unit-IV shall be set on the map.

Explanation:

1. Each essay type question would cover about one-third or one-half of a topic detailed in the syllabus.
2. The distribution of marks for the map question would be as under:
   Map : 6 Marks
   Explanatory Note : 4 Marks
   In case a paper setter chooses to set a question of map on important historical places, the paper setter will be required to ask the students to mark 6 places on map of 1 mark each and write explanatory note on any two of 2 marks each.
3. The paper-setter would avoid repetition between different types of question within one question paper.

PAPER: HISTORY AND CULTURE OF PUNJAB IN THE COLONIAL AND POST INDEPENDENCE TIMES

Max. Marks	:	50
Theory	:	45
Internal Assessment	:	05
Time	:	3 Hours

Objectives: To introduce the students to the history of Punjab region in modern times.

Pedagogy: Lectures, library work and discussions.

UNIT I

1. Introduction of Colonial Rule: administrative changes; means of communication; western education.
2. Agrarian Development: Commercialization of agriculture; canalization and colonization.
3. Social Classes: agrarian groups; new middle classes

UNIT II

4. Early Socio Religious Reform: Christian Missionaries; Namdharis; Nirankaris.
5. Socio Religious Reform Movements: activities of Arya Samaj; Singh sabhas; Ahmadiyas.
6. Development of Press & literature: growth of press; development in literature

UNIT III

7. Emergence Of Political Consciousness: Agrarian uprising 1907; Ghadar.
8. Gurudwara Reform Movement: Jallianwala Bagh; foundation of SGPC and Akali Dal; Morchas.
9. Struggle for Freedom: activities of revolutionaries - Babbar Akalis, Naujawan Bharat Sabha; participation in mass movements – non co-operation, civil disobedience, Quit India.

UNIT IV

10. Partition and its Aftermath: resettlement; rehabilitation
11. Social Concerns In Post Independence Punjab: language; immigration; socio-economic issues.
12. MAP: Major Historical places: Delhi, Kurukshetra, Jaito, Ferozepur, Ambala, Amritsar, Lahore, Ludhiana, Qadian, Jalandhar, Lyallpur, Montgomery.

Suggested Readings:

1. Singh,Kirpal :History and Culture os the Punjab, Part II(Medieval Period), Publication Bureau, Punjabi University, Patiala 1990(3rd edn.).
2. Singh, Fauja(ed.) :History of the Punjab, Vol.III, Punjabi University, Patiala 1972.
3. Grewal, J.S. :The Sikhs of the Punjab, the New Cambridge History of India, Orient Longman, Hyderabad,1990.
4. Singh, Khushwant :A History of the Sikhs, vol I: 1469-1839, oxford University Press,. Delhi, 1991.
5. Chopra, P.N.,Puri, B.N.:A Social, Cu.ltural and Economic History of India, Vol.II, And Das,M.N. Macmillan, delhi, 1974.

SEMESTER III

Course Title : AGRONOMY I (*KHARIF* CROP) **Course Number** : 231

Objectives : To learn cultivations and other practices for *kharif* crops cultivations.

MAX. MARKS :100

1.	THEORY :70	WRITTEN EXAM: 55	INTERNAL ASSESSMENT:15
2.	PRACTICAL:30	WRITTEN EXAM:25	INTERNAL ASSESSMENT: 5

PERIOD PER WEEK – 1. THEORY--THREE OF 45 MINUTES DURATION
2. PRACTICAL— ONE OF THREE HOURS DURATION

INSTRUCTIONS FOR PAPER SETTER:

Question paper will have five sections. First Question will contain 10 short answer type parts of one and half marks each and will cover whole of the syllabus. All parts of this question will be compulsory. Section 'I', 'II', 'III' and 'IV' will have two question each from respective section, out of which one from each section is to be attempted. Total five questions are to be attempted. Question paper should be as per standard, strictly according to the syllabus. Language of the questions should be simple and straight.

Teaching Aids : Teachers can use lecture, lecture cum demonstration, project, assignments, problem solving, inductive and deductive methods, and can use L.C. Display, L.E.Display, Multimedia projector in addition to black/white board.

SECTION-I

Distribution, Climatic requirement, Soil requirements, Rotations, Improved varieties, Agronomic practices (land preparation, seed rate & seed treatment, weed control, fertilizer application, irrigation) and harvesting of :-

Cereals – Rice, Basmati Rice, Maize.

SECTION-II

Distribution, Climatic requirement, Soil requirements, Rotations, Improved varieties, Agronomic practices (land preparation, seed rate & seed treatment, weed control, fertilizer application, irrigation) and harvesting of :-

Oilseeds- Groundnut, Sesame.
Cotton (American and Desi), Sugarcane

SECTION-III

Distribution, Climatic requirement, Soil requirements, Rotations, Improved varieties, Agronomic practices (land preparation, seed rate & seed treatment, weed control, fertilizer application, irrigation) and harvesting of :-

Pulses –Moong, Mash, Arhar, Soyabean.

SECTION-IV

Distribution, Climatic requirement, Soil requirements, Rotations, Improved varieties, Agronomic practices (land preparation, seed rate & seed treatment, weed control, fertilizer application, irrigation) and harvesting of :-

Green manuring Crop: Dhaincha, cowpea and sunhemp.

Fodders : Maize, Sorghum, Bajra, Guara.

Practical

Max. Marks : 30

Practical Exam. : 25 Internal Assessment : 05

Crop identification based on seed and morphological characteristics.

Different inorganic fertilizers, fertilizers recommendation for *Kharif* crops and calculating the fertilizer requirement of various crops as per the recommendation using different combinations.

Practice in different methods of fertilizer application.

Sowing of important *kharif* crops.

Identification of *kharif* weeds and chemical method of weed control.

Visit to different farms.

Study of morphological characterstics of rice, maize, bajra, groundnut and cotton.

Suggested Readings:-

Reddy S.R., *Principles of Crop Husbandry,* Kalyani Publishers, Ludhiana, 2009.
Handbook of Agriculture, I.C.A.R. Publications, New Delhi, 2008.
Weeds of North India I.C.A.R. Publications, New Delhi, 2008.
Package of Practices for kharif crops, P.A.U. Publications Ludhiana, Corresponding year.

Course Title : ELEMENTS OF GENETICS **Course Number** : 232

Objectives: To learn basic genetic principles and mechanisms.

MAX. MARKS : 100

1.	THEORY : 70	WRITTEN EXAM : 55	INTERNAL ASSESSMENT: 15
2.	PRACTICAL: 30	WRITTEN EXAM : 25	INTERNAL ASSESSMENT: 5

PERIOD PER WEEK – 1. THEORY- THREE OF 45 MINUTES DURATION
2. PRACTICAL- ONE OF THREE HOURS DURATION

INSTRUCTIONS FOR PAPER SETTER:

Question paper will have five sections. First Question will contain 10 short answer type parts of one and half marks each and will cover whole of the syllabus. All parts of this question will be compulsory. Section 'I', 'II','III' and 'IV' will have two questions each from respective section, out of which one from each section is to be attempted. Total five questions are to be attempted. Question paper should be as per standard, strictly according to the syllabus. Language of the questions should be simple and straight.

Teaching Aids : Teachers can use lecture, lecture cum demonstration, project, assignments, problem solving, inductive and deductive methods, and can use L.C. Display, L.E.Display, Multimedia projector in addition to black/white board.

SECTION-I

Introduction to Genetics: definitions & role of other sciences in advancement of genetics. Application of genetics in agriculture.
Mitosis: cell cycle and various stages of mitosis.

Meiosis: An overview, first & second meiotic division. Variation in development of gametes during spermatogensis and Oogenesis. Meiosis in relation to successful sexual reproduction of diploid organism.
Mendel's discoveries: conclusion of scientist before Mendel and their reasons for failure. Selection of pea as an experimental material and reasons for Mendel's success, law of segregation and law of independent assortment.

SECTION-II

Chromosomal theory of inheritance. Sex determination and sex chromosome.
Sex Linked traits: Inheritance of white eye in Drosophila, non disjunction of X-chromosome, cause and characteristic of sex Linked inheritance. Sex linkage in man & other organism.
Gene Linkage and crossing over: Phases of linkage, types of linkage, significance of linkage in plant breeding, types of crossing over and factor affecting crossing over, cytological base of crossing over. Linkage map.
Chromosome Mutations: Variation in chromosome number and arrangement: terminology describing chromosome number, general discussion regarding origin of aneuploidy and euploidy with examples.

SECTION-III

Chromosome morphology & Chromosome Structure, Folded fibre model & Nucleosome solenoid Model.
Inheritance of qualitative and quantitative traits, pleotropism, penetrance and expressivity, threshold character.
Multiple traits Hypothesis.
DNA as genetic material: Griffith's experiment, Harshey and Chase experiment.

SECTION -IV

Evidence for RNA as genetic material.
Watson and Crick model of DNA, structure of RNA, types of RNA. Clover leaf model of t- RNA.
DNA replications, Experimental evidence for semi conservative DNA replication, Mechanism of DNA replications.
Recombinant DNA Technology.

Practical

Max. Marks :30

Practical Exam : 25 Internal Assessment : 05

Study of monohybrid and dihybrid crosses.
Study of stages of mitosis from Root Tips of Onion.
Use of chi square analysis.
Study of multiple alleles taking human blood group example.
Study and estimation of linkage.
Study of simple human trait variations in class.
Construction of linkage map among three linked genes.
Pedigree analysis.
Study of quantitave inheritance.

Suggested Readings:

Gupta, P.K. *Genetics*, Rastogi Publication Meerut, 2008.

Singh, B.D., *Fundamentals of Genetics* ,Kalyani Publishers, Ludhiana, 2006.

Gardner, E.J., *Principles of Genetics*, John Wiley and Sons, New York, 1991.

Singh, P., *Genetics*, Kalyani Publishers Ludhiana, 2000.

Course Title : MANURES AND FERTILIZERS **Course Number** : 233

Objectives : To learn plant nutritients & their general function. To make student familiar with behaviour of fertilizers in soil and nutrient uptake.

MAX. MARKS :75

1. THEORY :50 WRITTEN EXAM=40 INTERNAL ASSESSMENT- 10
2. PRACTICAL:25 WRITTEN EXAM=20 INTERNAL ASSESSMENT- 5

PERIOD PER WEEK – 1. THEORY-THREE OF 45 MINUTES DURATION
2. PRACTICAL- ONE OF THREE HOURS DURATION

INSTRUCTIONS FOR PAPER SETTER:

Question paper will have five sections. First Question will contain 8 short answer type parts of one mark each and will cover whole of the syllabus. All parts of this question will be compulsory. Section 'I', 'II','III' and 'IV' will have two question each from respective section, out of which one from each section is to be attempted. Total five questions are to be attempted. Question paper should be as per standard, strictly according to the syllabus. Language of the questions should be simple and straight.
Teaching Aids : Teachers can use lecture, lecture cum demonstration, project, assignments, problem solving, inductive and deductive methods, and can use L.C. Display, L.E.Display, Multimedia projector in addition to black/white board.

SECTION-I

Plant nutrition: essential elements in plant nutrition. Factors influencing growth of plants.

Classification of plant nutrients: Different forms of nutrient elements absorbed by plants.

General function of plant nutrients (Nitrogen, phosphorus, potassium, calcium, magnesium, sulphur, iron, manganese, copper, zinc, boron, molybdenum, silicon, sodium).

SECTION- II

Mechanism of nutrient uptake. Mechanism of ion translocation in root tissue.

Transformation of nitrogen in soil, immobilization. Gain & losses of Nitrogen by soil.

Chelates and plant nutrition Deficiency symptoms of Nitrogen, phosphorus, potassium, sulphur, Zinc and iron.

SECTION- III

Classification of manures. Characteristics of organic manures, FYM, advantage and disadvantages of green manuring, reaction of organic manures in soil.

Nitrogenous fertilizers & their classification, chemical reaction of Ammonium sulphate and Urea in soil.

Potassic fertilizers and their behaviour in soil.

SECTION IV

Phosphate fertilizers and their classification. Chemical reaction of superphosphate in soil.

Fertilizers mixture: advantages, disadvantages, incompatibilities in fertilizers mixture, granulated fertilizers, biofertilizers.

Some important Complex fertilizers.

Practical

Max. Marks: 25

Practical Exam :20 Internal Assessment : 05

Collection of manures and fertilizers

Physical characters of manures and fertilizers.

Diagnostic technique for soil & crops.

Chemical tests for fertilizers of local utilization.

Study side or ill effects of fertilizers at village level.

Suggested Readings:

Basak, R.K., *Fertilizers,* Kalyani Publishers, Ludhiana, 2007.
Brady, N.C. and Weil, R.R., *The nature and Properties of Soil: 13th edn.,* Pearson education Pte. Ltd. New Delhi, 2002.
Russal, E.W., *Soil conditions and plant growth*, Longman publishers, London, 1961.
Ruth and Turk, J., *Fundamentals of soil sciences*, J. Wiley & Sons, Inc., London, 1943.

Course Title : FUNDAMENTALS OF AGRICULTURAL ECONOMICS (FARM MANAGEMENT) **Course Number** : 234

Objectives : To learn economic principles and their applications in farm management

MAX. MARKS :100

1.	THEORY :70	WRITTEN EXAM:55	INTERNAL ASSESSMENT: 15
2.	PRACTICAL:30	WRITTEN EXAM:25	INTERNAL ASSESSMENT:5

PERIOD PER WEEK – 1. THEORY–THREE OF 45 MINUTES DURATION
2. PRACTICAL–ONE OF THREE HOURS DURATION

INSTRUCTIONS FOR PAPER SETTER:

Question paper will have five sections. First Question will contain 10 short answer type parts of one and half marks each and will cover whole of the syllabus. All parts of this question will be compulsory. Section 'I', 'II', 'III' and 'IV' will have two questions each from respective section, out of which one from each section is to be attempted. Total five questions are to be attempted. Question paper should be as per standard, strictly according to the syllabus. Language of the questions should be simple and straight.

Teaching Aids : Teachers can use lecture, lecture cum demonstration, project, assignments, problem solving, inductive and deductive methods, and can use L.C. Display, L.E.Display, Multimedia projector in addition to black/white board.

SECTION-I

Definition and scope of farm management. Typical farm management decision on a farm.
Economic principles applied in farm management, concept of variable cost, proportion factor substitution, equi–marginal returns ,combining enterprises, time.
Factor product relationship: Meaning and Objectives and choosing of minimum cost input for the analysis given level of input.
Factor-factor relationship, product-product relationship, determination of optimum product combination.

SECTION-II

Selection of farm, farm size.
Valuation appraisal and acquisition of a farm.
Farming systems and types of Farming Areas, factors effecting the choice of farming.
Farm finance, its Classification, Capital and Credit Requirements.
The 3Rs of Credit.

SECTION-III

Farm labour, types of labour, factors effecting efficiency, wages their evaluation and mode of payment
Farm business analysis, efficiency measures for land use, capital, income and farm fit ability.

SECTION- IV

Farm book keeping and accounting: objectives, types of book and accounts, physical and financial records. Double entry system and its application in agriculture.
Farm planning and budgeting, budgeting, enterprise budgeting and complete budgeting.
Steps in planning and organisation of farm business.

Practical

Max. Marks: 30

Practical Exam : 25 Internal Assessment:05

Management of 5 acre farm of college. Make its parts for cropping plan.
Farm profit and loss account, balance sheet and other final statements of financial importance.
Handling of farm machinery, selection of good seeds, judging and valuing crop grading of farm produce, study market rates and marketing of product.

Preparation of dropping scheme and work out manure, labour and capital requirement for different conditions in state.

Study tours of Marketing Centres and Research Stations of the area.

Suggested Readings:

Tandon, P.K. and Dhandyal, S.P., *Principles and methods of farm management* Kalyani publishers, Ludhiana, 2007.
Joshi.S.S. and Kapur,T.R., *Fundamentals of farm business management,* Kalyani publishers, Ludhiana, 2005.
Economics of farm management in india, Govt. of India, 2007
Bond H. and Cunnighum, Farm Management, John Wiley and Sons Inc, New York, 1921.
Lekhi, R.K. and Singh, J., Agricultural Economics-, Kalyani publishers, Ludhiana, 2007.

Course Title : AGRICULTURAL MICROBIOLOGY **Course Number** : 235
Objectives : To learn various applications of micro organism in agriculture, industry and environment.

MAX. MARKS :75

1.	THEORY : 50	WRITTEN EXAM : 40	INTERNAL ASSESSMENT : 10
2.	PRACTICAL : 25	WRITTEN EXAM : 20	INTERNAL ASSESSMENT : 5

PERIOD PER WEEK – 1. THEORY-THREE OF 45 MINUTES DURATION
2. PRACTICAL-ONE OF THREE HOURS DURATION

INSTRUCTIONS FOR PAPER SETTER:

Question paper will have five sections. First Question will contain 8 short answer type parts of one mark each and will cover whole of the syllabus. All parts of this question will be compulsory. Section 'I', 'II', 'III' and 'IV' will have two questions each from respective section, out of which one from each section is to be attempted. Total five questions are to be attempted. Question paper should be as per standard, strictly according to the syllabus. Language of the questions should be simple and straight.

Teaching Aids : Teachers can use lecture, lecture cum demonstration, project, assignments, problem solving, inductive and deductive methods, and can use L.C. Display, L.E.Display, Multimedia projector in addition to black/white board.

SECTION-I

Fermentation and fermentable microbes: History and design of Fermenters (Bioreactors), basic functions and type of fermenters, construction of fermenters, design & operation, batch, fed batch & continuous fermentation. Methods of culture preservation. Criteria used for selection of microorganism for fermentation, method of culture maintenance. Maintenance of culture by storage with limited metabolic activity.

1) Alcohol production
2) Malt beverages (production of beer, other malt product, production of wine)
3) Vinegar production

Microbiology of milk, Microbiology of milk products: yogurt, butter milk
Microbiology of cheese, Microbial contamination of meats, spoilage of different kind of meat. Growth of microorganism in meat
Control of spoiling microorganism by heat, freezing, irradiation, drying.

SECTION- II

Food preservation methods: Physical and chemical preservation methods
Oriental foods: Mycoproteins (Soya sauce, Idli, Natto, Minchin, Poi)
Oriental foods: Food feed source (baker's yeast , mushroom nutriceuticals)
Aflatoxins- Structure and function, aflatoxin producing potential of fungi.

SECTION- III

Environmental Microbiology :Microbiology of organic compost, Biogas, sewage (waste water) treatment: small scale and large scale sewage treatment.
Bio-filtration.
Purification of water :sedimentation, filtration and disinfection
Microbiological analysis of water purity.
Types of soil microbes, Organic matter decomposition: composition of litter, carbon assimilation and immobilization, microorganism associated with organic matter decomposition.

SECTION IV

Organic matter dynamics in soil, factor affecting organic matter decomposition.
Biogeochemical cycle of carbon, nitrogen, phosphorus and sulphur.
Crop protection using microorganism : Microbial herbicides, bacterial insecticides
Virus insecticides, entomopathogenic fungi
Microbiology of ligocellulose degradation in rumen.

Practical

Max Marks :25 Practical exam: 20 Internal Assessment : 05

Methods in Microbiology – cultivation and isolation of microorganisms
Demonstration of techniques for pure culture of microorganism by streek plate, pour plate and spread plate technique
Methods of culture preservation and maintenance.
Measurement of microbial activity in soil by respiration method.
Identification of symbiotic bacteroids of rhizobia.
Observation of root colonization by V.A.M. fungi.
Enzymatic test of milk by methylene blue reductase test
Demonstration of micro organism in soil, water, air and food.

Suggested Readings:

Dubey, R.C., and Maheshwari, D.K., *A text book of Microbiology,* S. Chand & Company Ltd, New Delhi, 2010.
Peleczar. M.J., Chain, E. and Kreis, N.R., *Microbiology* , Tata-Mcgraw-Hill Company, 2008.
Alcamo I.E., *Fundamentals of Microbiology*, Benjamin Cummings Publishing Company, 2007.
Rangaswami, G., Bagyaraj, D. J. and Bagyaraj , D.G., *Agricultural Microbiology*, Prentice Hall of India Ltd. New Delhi, 2005.

Course Title : HORTICULTURE (VEGETABLE GROWING) **Course Number** : 236

Objectives : To get cultivations and other agronomic practices for raising vegetable crops.

MAX. MARKS :75

1.	THEORY : 50	WRITTEN EXAM : 40	INTERNAL ASSESSMENT : 10
2.	PRACTICAL: 25	WRITTEN EXAM : 20	INTERNAL ASSESSMENT : 5

PERIOD PER WEEK – 1. THEORY–THREE OF 45 MINUTES DURATION
2. PRACTICAL—ONE OF THREE HOURS DURATION

INSTRUCTIONS FOR PAPER SETTER:

Question paper will have five sections. First Question will contain 8 short answer type parts of one mark each and will cover whole of the syllabus. All parts of this question will be compulsory. Section 'I', 'II', 'III' and 'IV' will have two questions each from respective section, out of which one from each section is to be attempted. Total five questions are to be attempted. Question paper should be as per standard, strictly according to the syllabus. Language of the questions should be simple and straight.

Teaching Aids : Teachers can use lecture, lecture cum demonstration, project, assignments, problem solving, inductive and deductive methods, and can use L.C. Display, L.E.Display, Multimedia projector in addition to black/white board.

SECTION-I

Scope, Importance and Types of vegetable growing, importance of kitchen garden.
Classification of vegetable crops.
Cultivation practices including Soil and Climatic Requirements.

SECTION-II

Varieties, seed rate, time of sowing, spacing, plant population, fertilizers and manures, irrigation, hoeing, weed control pests and diseases (brief) and yield potential of Potato, Cole Crops, Root Crops, Bulb Crops and their harvesting.

SECTION-III

Varieties, seed rate, time of sowing, spacing, plant population, fertilizers and manures, irrigation, hoeing, weed control pests and diseases (brief) and yield potential of Peas, Beans, Solanaeceous fruits, Cucurbits, Okra and Colocasia.

SECTION-IV

Storage and seed production of the Potato, Cole Crops, Root Crops, Bulb Crops, Peas, Beans, Solanaeceous fruits, Cucurbits, Okra vegetables crops.

Practical

Max. Marks :25 **Practical Exam : 20** **Internal Assessment: 05**

Identification of various vegetable crops, varieties and seeds. Preparation of the field for sowing/ transplanting of various crops.
Application of manure and fertilizers, watering, hoeing, other cultural operations.
Prepare calendar of operation for various vegetable growing in Punjab.

Suggested Readings:

Dhaliwal M.S., *Handbook of vegetable crops*, Kalyani Publishers, Ludhiana, 2008.
Das , P.C., *Vegetable crops of India*, Kalyani Publishers, Ludhiana, 1993.
Chauhan, D.V., *Vegetable production in India*, S. Ram Prasad and Sons, Agra, 1993
Package of Practices for Vegetable crops, P.A.U. Publications Ludhiana, Corresponding year.

Course Title : ANIMAL HUSBANDRY **Course Number : 237**

Objectives : To get knowledge raising various breeds of milking cattle and their feeding.

MAX. MARKS :75

1.	THEORY : 50	WRITTEN EXAM:40	INTERNAL ASSESSMENT: 10
2.	PRACTICAL: 25	WRITTEN EXAM:20	INTERNAL ASSESSMENT: 5

PERIOD PER WEEK – 1. THEORY—THREE OF 45 MINUTES DURATION
2. PRACTICAL— ONE OF THREE HOURS DURATION

INSTRUCTIONS FOR PAPER SETTER:

Question paper will have five sections. First Question will contain 8 short answer type parts of one mark each and will cover whole of the syllabus. All parts of this question will be compulsory. Section 'I', 'II','III' and 'IV' will have two questions each from respective section ,out of which one from each section is to be attempted. Total five questions are to be attempted. Question paper should be as per standard, strictly according to the syllabus. Language of the questions should be simple and straight.

Teaching Aids : Teachers can use lecture, lecture cum demonstration, project, assignments, problem solving, inductive and deductive methods, and can use L.C. Display, L.E.Display, Multimedia projector in addition to black/white board.

SECTION-I

Importance of live stock to the agriculture and its relation to National Economy.
Milk production in India, per capita consumption of milk in various states.

SECTION-II

Study of Breeds of :
Buffaloes: Murrah, Nili, Surti and Mehsana
Cow: Sahiwal, Haryana Red Sindhi, Holsterin, Fresion, Jersey, Red Dane and Brown Swiss.

SECTION-III

General account for selection of livestock, score-card performance, pedigree & history sheet.

SECTION-IV

Feed stuff and their classification, study of roughage, silage making, hay making and concentrates.
General principle for feeding cattle and buffaloes. Preparation of rations , DCP and TIN.

Feeding standards, their merits and demerits.

Food requirements for work, milk production cattle.

Practical

Max. Marks:25 **Practical Exam : 20** **Internal Assessment : 05**

External body part of cow, buffaloes.

Handling and methods of restrain for cow and buffaloes for milking. #Selection and judging cow and buffaloes.

Finding out weight of animal for body measurements by formula.

Determination of age By

A. Dentation B. Horns

Numbering of animals-tattooing, notching, barding, ear tags.

Suggested Readings:

Singh, H., *Handbook of Animal Husbandry*, I.C.A.R. Publications, New Delhi, 2005.
Eigan, W.M., and Paul, R., *Dairy cattle feed,* Johan Willey & Sons, New York, 2005.

Kumar, A., *Animal Husbandry*, Discovery Publishing House, New Delhi, 2006.

SEMESTER IV

Course Title : AGRONOMY II (*RABI* CROP) **Course Number** : 241

Objectives : To learn cultivation practices for raising good crop in *Rabi* seasons.

MAX. MARKS : 100

1. THEORY :70 WRITTEN EXAM : 55 INTERNAL ASSESSMENT: 15
2. PRACTICAL: 30 WRITTEN EXAM : 25 INTERNAL ASSESSMENT: 5

PERIOD PER WEEK – 1. THEORY—THREE OF 45 MINUTES DURATION
2. PRACTICAL— ONE OF THREE HOURS DURATION

INSTRUCTIONS FOR PAPER SETTER:

Question paper will have five sections. First Question will contain 10 short answer type parts of one and half marks each and will cover whole of the syllabus. All parts of this question will be compulsory. Section 'I', 'II', 'III' and 'IV' will have two questions each from respective section ,out of which one from each section is to be attempted. Total five questions are to be attempted. Question paper should be as per standard, strictly according to the syllabus. Language of the questions should be simple and straight.

Teaching Aids : Teachers can use lecture, lecture cum demonstration, project, assignments, problem solving, inductive and deductive methods, and can use L.C. Display, L.E. Display, Multimedia projector in addition to black/white board.

SECTION-I

Origin, Climatic requirement, Soil requirements, Rotations, Improved varieties, Agronomic practices (land preparation, seed rate & seed treatment, weed control, fertilizer application, irrigation) and harvesting of : Cereals-Wheat, Barley, Winter Maize.

SECTION-II

Distribution, Climatic requirement, Soil requirements, Rotations, Improved varieties, Agronomic practices (land preparation, seed rate & seed treatment, weed control, fertilizer application, irrigation) and harvesting of : Oilseeds — Rapeseed and Mustard (Toria, Gobhi Sarson, Raya, Taramira, Linseed, and Sunflower.

SECTION-III

Distribution, Climatic requirement, Soil requirements, Rotations, Improved varieties, Agronomic practices (land preparation, seed rate & seed treatment, weed control, fertilizer application, irrigation) and harvesting of : Pulses — Gram, Field Pea and Lentil.

Minor Crop: Safflower.

SECTION-IV

Distribution, Climatic requirement, Soil requirements, Rotations, Improved varieties, Agronomic practices (land preparation, seed rate & seed treatment, weed control, fertilizer application, irrigation) and harvesting of :

Minor Crop : Celery, Coriander
Fodders : Barseem, Shaftal, Lucerne, Oat and Senji.

Practical

Max. Marks : 30

Practical Exam : 25 Internal Assessment: 05

Crop identification based on seed and morphological characteristics

Different inorganic fertilizers, fertilizers recommendation for *Rabi* crops and calculating the fertilizer requirement of various crops as per the recommendation using different combinations.
Different methods of fertilizer application used in *Rabi* crop.
Sowing of important *Rabi* crops

Identification of *Rabi* weeds and chemical method of weed control
Study of morphological characteristics of important *Rabi* crops.
Visit to different farms

Suggested Readings:

Reddy S.R., *Principles of Crop Husbandry,* Kalyani Publishers, Ludhiana, 2009.
Handbook of Agriculture, I.C.A.R. Publications, New Delhi, 2008.
Weeds of North India I.C.A.R. Publications, New Delhi, 2008.
Package of Practices for Rabi crops, P.A.U. Publications Ludhiana, Corresponding year.

Course Title : HORTICULTURE (FRUIT GROWING) **Course Number** : 242

Objectives: To learn agronomic and other management practices in fruit growing. Student will also learn fruit preservation method & their scope.

MAX. MARKS : 75

1.	THEORY : 50	WRITTEN EXAM:40	INTERNAL ASSESSMENT:10
2.	PRACTICAL:25	WRITTEN EXAM:20	INTERNAL ASSESSMENT: 5

PERIOD PER WEEK – 1. THEORY– THREE OF 45 MINUTES DURATION
2. PRACTICAL— ONE OF THREE HOURS DURATION

INSTRUCTIONS FOR PAPER SETTER:

Question paper will have five sections. First Question will contain 8 short answer type parts of one mark each and will cover whole of the syllabus. All parts of this question will be compulsory. Section 'I', 'II','III' and 'IV' will have two questions each from respective section ,out of which one from each section is to be attempted. Total five questions are to be attempted. Question paper should be as per standard, strictly according to the syllabus. Language of the questions should be simple and straight.

Teaching Aids : Teachers can use lecture, lecture cum demonstration, project, assignments, problem solving, inductive and deductive methods, and can use L.C. Display, L.E.Display, Multimedia projector in addition to black/white board.

SECTION-I

Fruits and their importance, average production and distribution of fruits in Punjab. Selection of site and soils for planting an orchard. Orchard soil managements, growing of inter crops as green manure and cover crops, mulching effect of soil moisture.

SECTION-II

Importance and scope of fruit growing in Punjab. Role of plant growth regulators in fruit production, planting system and distribution.

Layout of orchards, Nursery management practices.
Planting system.

SECTION-III

History and development of fruit preservation and its scope. Canning and bottling of fruit. Cold storage of fruits and transportation method. Agronomic and cultivation practices of Kinoo and Guava.

SECTION-IV

Different methods of preservation and preparing jams, jellies and marmalades.
Post harvest handling and methods of important fruit crops. Agronomic and cultivation practices of Mango and Grapes.

Practical

Max. Marks : 25

Practical Exam : 20 Internal Assessment : 05

Practice in propagation, methods, layout of orchard, transplanting, manuring, training and pruning of fruit plants.

Studies of cold storage and quick freezing practices and refrigerated transport methods.

BOOKS

Singh, R., *Fruits,* National Book Trust of India, New Delhi, 1969.
Hayes, W.B., Fruit growing in India, Kitabistan, Allahabad, 1945.
Lal, G., Siddappa, S. And Tandon, G.L., *Preservation of fruits and vegetables,* Indian Council of Agricultural Research, New Delhi, 2009.

Course Title : AGRICULTURAL BOTANY AND CROP PHYSIOLOGY **Course Number** : 243

Objectives : To learn ecological concepts and theories of evolutions. Student will also learn plant physiological mechanisms.

MAX. MARKS :100

1. THEORY :70 WRITTEN EXAM:55 INTERNAL ASSESSMENT:15

2. PRACTICAL: 30 WRITTEN EXAM:25 INTERNAL ASSESSMENT: 5

PERIOD PER WEEK – 1. THEORY– THREE OF 45 MINUTES DURATION
2. PRACTICAL– ONE OF THREE HOURS DURATION

INSTRUCTIONS FOR PAPER SETTER:

Question paper will have five sections. First Question will contain 10 short answer type parts of one and half marks each and will cover whole of the syllabus. All parts of this question will be compulsory. Section 'I', 'II', 'III' and 'IV' will have two questions each from respective section, out of which one from each section is to be attempted. Total five questions are to be attempted. Question paper should be as per standard, strictly according to the syllabus. Language of the questions should be simple and straight.

Teaching Aids : Teachers can use lecture, lecture cum demonstration, project, assignments, problem solving, inductive and deductive methods, and can use L.C. Display, L.E.Display, Multimedia projector in addition to black/white board.

SECTION- I

Plant ecology, Nature and scope of ecology, concept of environment. Ecological factors and their influence on distribution of vegetation. Main ecological plant communities and their adaptations.
Ecosystem and biosphere.

SECTION-II

Sources of pollution. Environmental conservation and health. Ecological divisions of Punjab.
Introduction of plant in to new localities. Plant succession. Ecology of farm crops and weeds.

SECTION-III

Introductory concept of theories of organic evolution. Evolution of important group of plants.
Variation, their types and causes. Adaptations.

SECTION-IV

Transpiration. Absorption of food material by plants. Water absorption and translocation. Plant respiration. Plant photosynthesis. Hormones and weed killers. C/N ratio. Photoperiodism and Vernalisation.

Practical

Max. Marks 30

Practical Exam : 25 Internal Assessment: 05

Morphological and anatomical studies of Xerophytes, Mesophytes and Hydrophytes.
Experiments to demonstrate various aspects of respiration, photosynthesis, ascent of sap.
Water culture techniques/ deficiency and toxicity of major and minor elements.

Suggested Readings:

Devlin, R.M., *Plant Physiology*, Prindle Weber & Svhmidt Publisher, New York, 1983.
Kochhar, P.L., *Plant Physiology*, Trumen Publishers Jalandhar, 2010.
Bhatia K.N., and Widge, R., Foundation *of Botany* , Truman Publishers, Jalandhar, 2010.

Course Title : STATISTICAL TECHNIQUES IN AGRICULTURE **Course Number** : 244

Objectives : To learn basic statistical techniques for analysis of agricultural data.

MAX. MARKS -75

1.	THEORY :50	WRITTEN EXAM:40	INTERNAL ASSESSMENT:10
2.	PRACTICAL:25	WRITTEN EXAM:20	INTERNAL ASSESSMENT: 5

PERIOD PER WEEK – 1. THEORY –THREE OF 45 MINUTES DURATION
2. PRACTICAL– ONE OF THREE HOURS DURATION

INSTRUCTIONS FOR PAPER SETTER:

Question paper will have five sections. Section 'A' will contain 08 short answer type questions of one mark each and will cover whole of the syllabus. All parts of this question will be compulsory. Section 'B', 'C', 'D' and 'E' will have two questions each from respective section ,out of which one from each section is to be attempted. Total five questions are to be attempted.

Question paper will have five sections. First Question will contain 8 short answer type parts of one mark each and will cover whole of the syllabus. All parts of this question will be compulsory. Section 'I', 'II', 'III' and 'IV' will have two questions each from respective section, out of which one from each section is to be attempted. Total five questions are to be attempted. Question paper should be as per standard, strictly according to the syllabus. Language of the questions should be simple and straight.

Teaching Aids : Teachers can use lecture, lecture cum demonstration, project, assignments, problem solving, inductive and deductive methods, and can use L.C. Display, L.E. Display, Multimedia projector in addition to black/white board.

SECTION-I

Definition of statistics, scope and limitation. Measure of central tendency– AM, Mode, medium, GM. Measure of dispersion-Quadrille deviation, SD, CV. Skewness and Kurtosis.

SECTION-II

Correlation and regression- Simple, multiple. Partial Correlation coefficient, multiple Correlation, interclass Correlation.

SECTION-III

Test of significance – Small sample test (t, paired t test, difference between two mean). Large sample test- Z test for single mean, Z test for difference between two mean, Z test for proportion. F test- To test equity of variance, to test difference between variance.

SECTION-IV

Design of experiments: Preliminaries, Principle of experiment design. ANOVA- One way Classification (CRD), two way Classification (RBD).

Practical

Max. Marks :25

Practical Exam : 20 Internal Assessment : 05

Calculation of Mean, Median, Mode, SD, CV
Correlation and regression analysis
Analysis of CRD, RBD

Suggested Readings:

Panse, V.G., Shaw, F.J., and Sukhatme, P.V., *Statistical methods for agricultural workers*, Indian Council of Agricultural Research, 1967.
Fisher, R.A., *Statistical methods for research workers(14th Edition),* Hafner Press, UK, 1975.
Singh, S., Singh, T.P., Babsal, M.L., and Kumar R., *Statistical Method for Research workers* Kalyani Publishers, Ludhiana, 2004.

Course Title : INTRODUCTORY ENTOMOLOGY **Course Number** : 245

Objectives : To learn body parts and life cycle of insects and taxonomical classification.

MAX. MARKS :75

1.	THEORY :50	WRITTEN EXAM:40	INTERNAL ASSESSMENT: 10
2.	PRACTICAL:25	WRITTEN EXAM:20	INTERNAL ASSESSMENT: 5

PERIOD PER WEEK – 1. THEORY–THREE OF 45 MINUTES DURATION
2. PRACTICAL— ONE OF THREE HOURS DURATION

INSTRUCTIONS FOR PAPER SETTER:

Question paper will have five sections. First Question will contain 8 short answer type parts of one mark each and will cover whole of the syllabus. All parts of this question will be compulsory. Section 'I', 'II', 'III' and 'IV' will have two questions each from respective section, out of which one from each section is to be attempted. Total five questions are to be attempted. Question paper should be as per standard, strictly according to the syllabus. Language of the questions should be simple and straight.

Teaching Aids : Teachers can use lecture, lecture cum demonstration, project, assignments, problem solving, inductive and deductive methods, and can use L.C. Display, L.E. Display, Multimedia projector in addition to black/white board.

SECTION-I

Insects/pests- their close relatives. Importance of insects to man.
Insect - Integument, Moulting and Metamorphosis.

Types of Eggs, Larvae and Pupae.

SECTION-II

Insect body regions, Structure and Segmentation of Head, Thorax, Abdomen and their appendages.
Modification of Antennae, Mouth parts, Wings, and Legs.

Hypothetical wing venation and wing coupling mechanism.

SECTION-III

Study of internal anatomy of Grass hopper with respect to digestive, reproductive, respiration, excretory and circulatory system.
Elementary Insect Ecology – biotic and abiotic factors influencing insect life.

SECTION-IV

Major insect orders (Coleoptera, Lepidoptera, Hymenoptera, Diptera, Orthoptera, Isoptera, Hemiptera) with reference to their salient features and economically important insects *viz.,* sugarcane leaf hopper, white fly, pink ball worm, rice gundhy bug, pumpkin fruit fly and gram dohra (Pulse beetle).
Economic importance of insects of Punjab with special reference to apiculture, sericulture and lac culture.

Practical

Max. Marks: 25 Practical Exam: 20 Internal Assessment: 05

Study of metamorphosis.
Types of Eggs, Larvae, Pupae.
Internal and External Anatomy of Grass hopper.
Collection and Identification of insects.

Suggested Readings:

Mani, M.S., *General Entomology, Oxford* & I.B.H. Pub. New Delhi, 1973.
David, B.V. and Ananthakrishnan, T.N., *General and applied Entomology Second Edition*,Tata Mcgraw Hill, New Delhi, 2006.
Atwal, A.S. and Dhaliwal G.S., *Agricultural pests of India and South-East Asia*, Kalyani Publishers, Ludhiana, 2007.
Nayar, K.K., Ananthakrishanan, T.N., and David, V.B. *General and applied entomology,* Tata McGraw-Hill, 1976.

Course Title : SOIL PHYSICS & CONSERVATION **Course Number** : 246

Objectives : To learn physical properties of soil, concept of soil water, air and soil conservation.

MAX. MARKS :75

1.	THEORY :50	WRITTEN EXAM:40	INTERNAL ASSESSMENT: 10
2.	PRACTICAL: 25	WRITTEN EXAM:20	INTERNAL ASSESSMENT:5

PERIOD PER WEEK – 1. THEORY–THREE OF 45 MINUTES DURATION
2. PRACTICAL— ONE OF THREE HOURS DURATION

INSTRUCTIONS FOR PAPER SETTER:

Question paper will have five sections. First Question will contain 8 short answer type parts of one mark each and will cover whole of the syllabus. All parts of this question will be compulsory. Section 'I', 'II', 'III' and 'IV' will have two questions each from respective section, out of which one from each section is to be attempted. Total five questions are to be attempted. Question paper should be as per standard, strictly according to the syllabus. Language of the questions should be simple and straight.

Teaching Aids : Teachers can use lecture, lecture cum demonstration, project, assignments, problem solving, inductive and deductive methods, and can use L.C. Display, L.E. Display, Multimedia projector in addition to black/white board.

SECTION-I

Soil as a three phase system, component and uses of soil.

Particle size distribution, Stoke's law:assumption & limitation of Stoke's law.

Soil compaction, factor affecting soil compaction, significance and control of soil compaction, difference between soil compaction and soil consolidation.

Soil water: structure of water & ice, properties of water, importance of water in agriculture, retention of soil water in the field, factors affecting field capacity & wilting coefficient.

SECTION-II

Concept of hygroscopicity and factors affecting hygroscopicity.
Physical & biological classification of soil water and factors affecting these types of water.
Concept of soil water availability to plants and factors affecting available water.
Movement of water in soils, laminar flow and turbulent water flow.
Darcy's law and its limitations, permeability, fluidity and hydraulic conductivity, factors affecting permeability or hydraulic conductivity of a saturated soil.

SECTION-III

Flow of water in unsaturated soil : comparison of water flow in saturated and that in unsaturated soils. Hydraulic conductivity in unsaturated soil. Factors affecting hydraulic conductivity of unsaturated soil.

Water filtration into soil and factor affecting infiltration rate.

Soil temperature: difference between heat & temperature, latent heat, mode of heat transfer.

Soil temperature and its diurnal variation, factors affecting soil temperature, thermal conductivity. Importance and management of soil temperature.

SECTION-IV

Soil air: expansion of gases (Boyle's, Charles's law and Avogadro's law), composition of soil air and factors affecting soil air compositions.

Mechanism of gaseous exchange between soil and atmosphere. Influence of aeration on plant growth.

Air capacity & oxygen diffusion rate and factors affecting these

Soil crusting: formation and types of soil crust. Control of soil crusting & Influence of soil crusting on soil productivity. Measurement of crust strength.

Soil erosion:Types & causes of erosion. Problem caused by erosion. Soil conservation and erosion problem in India. Approaches to soil conservation. Soil & water conservation measures.

Practical

Max. Marks :25

Practical Exam : 20 Internal Assessment :05

Procedure for determination of particle size distribution in soil.
Compaction test of soil.
Determination of dispersion ratio of soil.
Measurement of soil water content.
Study of saturation percentage and maximum water retaining capacity of soil.
Measurement of soil water potential.
Measurement of capillary rise of water in soil.
Measurement of consistency limit of soil.
Saturated hydraulic conductivity and specific heat of soil.

Suggested Readings:

Brady, N.C. and Weil, R.R., *The nature and Properties of Soil: 13th edn.,* Pearson education Pte. Ltd. New Delhi, 2002.

Oswal, M.C., *Soil Physics,* Oxford & IBH publishing Co.Pvt Ltd. New Delhi, 1994.
Biswas, T.D., and Mukherjee, S.K., *Text book of soil science,* Tata McGraw Hill Publishing Co. Ltd., New Delhi, 1997.
Saha, A.K., *Text book of soil Physics*, Kalyani Publishers. Ludhiana, 2008.

Course Title : INTRODUCTORY PLANT BREEDING **Course Number** : 247

Objectives : To learn basic plant breeding and genetic principles for crop improvement.

MAX. MARKS :100

1.	THEORY :70	WRITTEN EXAM:55	INTERNAL ASSESSMENT: 15
2.	PRACTICAL:30	WRITTEN EXAM:25	INTERNAL ASSESSMENT: 5

PERIOD PER WEEK – 1. THEORY–THREE OF 45 MINUTES DURATION
2. PRACTICAL– ONE OF THREE HOURS DURATION

INSTRUCTIONS FOR PAPER SETTER:

Question paper will have five sections. First Question will contain 10 short answer type parts of one and half marks each and will cover whole of the syllabus. All parts of this question will be compulsory. Section 'I', 'II', 'III' and 'IV' will have two questions each from respective section, out of which one from each section is to be

attempted. Total five questions are to be attempted. Question paper should be as per standard, strictly according to the syllabus. Language of the questions should be simple and straight.

Teaching Aids : Teachers can use lecture, lecture cum demonstration, project, assignments, problem solving, inductive and deductive methods, and can use L.C. Display, L.E.Display, Multimedia projector in addition to black/white board.

SECTION-I

Introduction, Definition and Objectives of Plant breeding. Relationship with other sciences and Achievement of Plant Breeding.
Historical event related to plant breeding, objective and achievement of Plant Breeding. Center of Origin of crop plants,
Exploration and collection of plant genetic resources, evaluation of germplasm.
Collection, documentation, conservation and utilization of plant genetic resources. Domestication of field crops and role of genetics.
Mode of reproduction and their significance. Mode of pollination and their genetic consequence.

SECTION-II

Relevance of Mode of reproductions in Plant Breeding.
Mechanism of pollination Control in crop plants- self Incompatibility, male sterility.
Inheritance of qualitative characters, Pleiotrophy, threshold characters, modifying genes, gene interaction.
Quantitative characters, Multiple factor hypothesis, polygenic inheritance and continuous variation. Role of environment in quantitative inheritance. Heritability.

SECTION-III

Self pollinated Crops: History of selection , Progeny testing, Pure line theory, effect of self pollination on genotype, Origin of variation in pure line.

Genetic advance under selection . History and objectives of Hybridization, types of hybridization, hybridization programme, procedure of hybridization. Raising F_1 generation, selfing, difficulties in hybridization.

Cross pollinated Crops: The Hardy Weinberg Law, factor effecting equilibrium in populations, Rapid gain followed by slow response in selection. Slow response for long and short period. Lack of response to selection.

Inbreeding depression, effect of inbreeding, degree of inbreeding depression. Homozygous & heterozygous balance.

SECTION-IV

Heterosis history, Heterosis in cross & self pollinated species, manifestation of heterosis, genetic basis of heterosis & inbreeding depression.

History of agricultural research in India, establishment of agriculture department and agriculture colleges Establishment of ICAR, the commodity committees, project for intensification of regional research on cotton, oilseed and millets (PIRRCOM), initiation of all India coordinated research projects.

Reorganisation of ICAR, development of Agricultural Universities. Organization for crop improvement, organization and function of ICAR. Central institutes for crop improvement, Agricultural Universities. All India coordinated crop improvement projects.

International institutes, Function and contribution of International institutes

Practical

Max. Marks: 30
Practical exam :25 **Internal Assessment: 05**

To study the breeding objectives in *Rabi* crop plants.
Study of morphology and pattern of variation in *Rabi* crop plants.
Study of procedure of hybridization and Selfing in *Rabi* crops.

Suggested Readings :

Allard, R.W., *Principles of Plant Breeding*, John Wiley & Sons, New York, 1999.
Singh, B.D., *Plant Breeding*, Kalyani Publishers, New Delhi, 2009.
Poehlman, J.N. and Borthakur, D.N, *Breeding Asian Field Crops*, Oxford and IBH Pub. Co., New Delhi, 2000.
Singh, P., *Essentials of plant breeding*, Kalyani Publishers, New Delhi, 2009.

SEMESTER V

Course Title : FARM FORESTRY **Course Number** : 351

Objectives : To learn general silvicultural principles and other aspects of agro forestry

MAX. MARKS :100

1.	THEORY :70	WRITTEN EXAM:55	INTERNAL ASSESSMENT:15
2.	PRACTICAL:30	WRITTEN EXAM:25	INTERNAL ASSESSMENT: 5

PERIOD PER WEEK – 1. THEORY–THREE OF 45 MINUTES DURATION
2. PRACTICAL— ONE OF THREE HOURS DURATION

INSTRUCTIONS FOR PAPER SETTER:

Question paper will have five sections. First Question will contain 10 short answer type parts of one and half marks each and will cover whole of the syllabus. All parts of this question will be compulsory. Section 'I', 'II', 'III' and 'IV' will have two questions each from respective section, out of which one from each section is to be attempted. Total five questions are to be attempted. Question paper should be as per standard, strictly according to the syllabus. Language of the questions should be simple and straight.

Teaching Aids : Teachers can use lecture, lecture cum demonstration, project, assignments, problem solving, inductive and deductive methods, and can use L.C. Display, L.E. Display, Multimedia projector in addition to black/white board.

SECTION-I

General Silvicultural Principles : Ecological and physiological factors influencing vegetation, natural and artificial regeneration of forests.

Nursery and planting techniques-nursery beds, polybags and maintenance.

Water budgeting, grading and hardening of seedlings; special approaches; establishment and tending.

Clear felling, uniform shelter wood selection, coppice and conversion systems. Management of silviculture systems of temperate, subtropical, humid tropical, dry tropical and coastal tropical forests with special reference to plantation silviculture, choice of species, establishment and management of standards, enrichment methods, technical constraints, intensive mechanized methods, aerial seeding thinning.

SECTION-II

Traditional and recent advances in tropical silvicultural research and practices.

Silviculture of some of the economically important species in India such as Acacia catechu, Acacia nilotica, *Albizzia lebbeck, Azadirachta indicaButea monosperma, Cassia siamea, Cedrus deodara, Dalbergia sisoo, Emblica officinlalis, Eucalyptus spp, Pinus roxburghi, Populus spp, Prosopis juliflora, Santalum album, Shorea robusta, Salmalia malabaricum, Tectona grandis, Terminalis tomemtosa, Tamarindus indica*.

SECTION-III

Agroforestry - scope and necessity; role in the life of people and domestic animals and in integrated land use.
Agro forestry systems under different agro-ecological zones; selection of species and role of multipurpose trees and NTFPs, techniques, food, fodder and fuel security.
Social/Urban Forestry : objectives, scope and necessity; people's participation.
Joint Forest Management (JFM) - principles, objectives, methodology, scope, benefits and role of NGOs

SECTION-IV

Normal Forest Growing stock: Objective and principles; techniques; stand structure and dynamics, sustained yield relation; rotation.

Regulation of yield; management of forest plantations, commercial forests, forest cover monitoring.

Need and importance of wood seasoning and preservation; general principles of seasoning, air and kiln seasoning, solar dehumidification, steam heated and electrical kilns.

Plywood manufacture-properties, uses, fibre board-manufacture: properties, uses; particle board manufacture; properties uses. Present status of composite wood industry in India and future expansion plans

Practical

Max. Marks: 30
Practical Exam : 25 Internal Assessment:05
Raising Forest Nurseries
Visit to wood seasoning units, plywood manufacturing units, board manufacturing units, forest nurseries, and various institutes at national and state level.

Suggested Readings :

Kothari, A.S., *A Celebration of Indian Trees*, Marg Pub, New York, 2007.
Bore, N.L., *A Manual of Indian Forest Botany*, International Book Dist. New Delhi, 2008.
Diwivedi, A.P., A *Text Book of Silviculture*, International Book Distributor., New Delhi, 1993.

Course Title : APPLIED PLANT BREEDING AND BIOTECHNOLOGY **Course Number** : 352

Objectives : To learn plant breeding, genetic & biotechnology techniques for improvement of crop plants.

MAX. MARKS:100

1.	THEORY :70	WRITTEN EXAM:55	INTERNAL ASSESSMENT: 15
2.	PRACTICAL:30	WRITTEN EXAM:25	INTERNAL ASSESSMENT: 5

PERIOD PER WEEK – 1. THEORY–-THREE OF 45 MINUTES DURATION
2. PRACTICAL– ONE OF THREE HOURS DURATION

INSTRUCTIONS FOR PAPER SETTER:
Question paper will have five sections. First Question will contain 10 short answer type parts of one and half marks each and will cover whole of the syllabus. All parts of this question will be compulsory. Section 'I', 'II', 'III' and 'IV' will have two questions each from respective section, out of which one from each section is to be attempted. Total five questions are to be attempted. Question paper should be as per standard, strictly according to the syllabus. Language of the questions should be simple and straight.

Teaching Aids : Teachers can use lecture, lecture cum demonstration, project, assignments, problem solving, inductive and deductive methods, and can use L.C. Display, L.E.Display, Multimedia projector in addition to black/white board.

SECTION-I

Breeding methods in self pollinated crop: Introduction, selection and hybridization.

Mass Selection – application, procedure, advantages, disadvantages and achievements.

Pureline selection: Characteristics, history, uses, application, procedure, advantages, disadvantages and achievements. Difference between mass selection and pure line.

Pedigree method: maintenance of pedigree record, application and procedure of pedigree method, selection basis, early generation test, advantages, disadvantages and achievements.

Bulk method: Application, procedure, duration of bulking and artificial selection during bulk period. Modification of bulk method, advantages, disadvantages and achievements. Comparison between bulk and pedigree method.

SECTION-II

Back cross method: requirements of back cross programme. Applications of back cross. Genetic basis of repeated back crossing. Selection of parents.

Procedure of back cross method. – Transfer of single dominant and recessive gene.

Transfer of two or more traits into a single recurrent parents. Modification, advantages, disadvantages and achievements. Comparison between pedigree method and back cross method.

Multiline variety concept, its advantages, disadvantages and achievements.

Breeding methods in cross pollinated crop : Population improvement (interapopulation improvement) mass selection and its advantages, disadvantages. Modifications of mass selection. Family Selection : Half sib (ear to row, modified ear to row selection), full sib selection, s^1/s^2 family selection, modified s1, family selection based on test cross.

SECTION-III

Interpopulation improvement: recurrent selection (simple recurrent selection, recurrent selection for general combining ability, recurrent selection for specific combining ability, reciprocal recurrent selection. Comparison between different recurrent selection schemes.

Heterosis breeding: introduction & history, production of hybrids (development of inbred lines, evaluation of inbred lines, production of hybrid seed). Improvement of available inbred lines, advantages, disadvantages and achievements of hybrid varieties.

Breeding methods in asexual pollinated crop: characteristics of asexual pollinated crop, breeding approaches asexual pollinated crop. Breeding of apomictic crops. Advantages and disadvantages of asexual reproduction.

Polyploidy in plant breeding : types of polyploids, induction of polyploidy, phenotypic effects of polyploidy. Significance of polyploids.

Mutation breeding : induction of mutations, mutation treatment and selection of mutants, induction of mutations through tissue culture. Significance of induced mutations in plant breeding.

SECTION- IV

Wide hybridization and biotechnology in crop improvement: applications, techniques & barriers to production of distant hybrids in crop improvement. Limitations of distant hybridization.

Plant Biotechnology: tissue culture in crop improvement- micropropagation, somaclonal variations, protoplast culture and somatic hybridization.

Molecular biology in crop improvement- basic tenents of molecular biology, Gene cloning, molecular markers. Applications of DNA markers in plant breeding .

Gene transfer method. Genetic markers in transformation and confirmation of transformation.

Engineering crops for useful traits for increasing agricultural potential.

Practical

Max. Marks :30

Practical Exam :25 Internal Assessment :05

To study the breeding objectives in *Kharif* crop plants.
Study of morphology and pattern of variation in *Kharif* crop plants.
Study of procedure of hybridization and Selfing in *Kharif* crops.

Suggested Readings :

Allard, R.W ., *Principles of Plant Breeding*, John Wiley & Sons, New York, 1999.
Poehlman, J.N. and Borthakur, D.N., *Breeding Asian Field Crops*, Oxford and IBH Pub. Co., New Delhi, 2000.
Singh, B.D., *Plant Breeding*, Kalyani Publishers. New Delhi, 2009.
Singh, P., *Essentials of plant breeding*, Kalyani Publishers. New Delhi, 2009.

Course Title : RURAL SOCIOLOGY AND RURAL PSYCHOLOGY **Course Number** : 353

Objectives : To learn basic principles in Rural Sociology, Social Stratification and Social Institutions.

MAX. MARKS :100

1.	THEORY :70	WRITTEN EXAM:55	INTERNAL ASSESSMENT:15
2.	PRACTICAL-30	WRITTEN EXAM:25	INTERNAL ASSESSMENT:5

PERIOD PER WEEK – 1. THEORY–THREE OF 45 MINUTES DURATION
2. PRACTICAL– ONE OF THREE HOURS DURATION

INSTRUCTIONS FOR PAPER SETTER:

Question paper will have five sections. First Question will contain 10 short answer type parts of one and half marks each and will cover whole of the syllabus. All parts of this question will be compulsory. Section 'I', 'II', 'III' and 'IV' will have two questions each from respective section ,out of which one from each section is to be attempted. Total five questions are to be attempted. Question paper should be as per standard, strictly according to the syllabus. Language of the questions should be simple and straight.

Teaching Aids : Teachers can use lecture, lecture cum demonstration, project, assignments, problem solving, inductive and deductive methods, and can use L.C. Display, L.E.Display, Multimedia projector in addition to black/white board.

SECTION-I

Sociology and Rural Sociology - Meaning, definition, scope, importance of Rural Sociology.
Interrelationship between rural sociology and agricultural extension.
Indian Rural Society - Important characteristics, differences and relationship between rural and urban societies.
Social Groups - Meaning, definition, classification, factors considered in formation and organization of groups. Motivation in group formation and role of social groups in Agricultural Extension.

SECTION-II

Social Stratification - Meaning, definition, functions, basis for stratification, forms of social Stratification. Characteristics and differences between class & caste System.
Culture, customs, folkways, mores, taboos, rituals and traditions – Meaning, Definition and their role in Agricultural Extension
Social Values and Attitudes - Meaning, definition, types and role of social values and attitudes.

SECTION-III

Social Institutions - Meaning, definition, major institutions in Rural society: marriage, family and religion, Functions and their Role in Agricultural Extension.
Social Organizations - Meaning, definition, types of organizations and role of social organizations in Agricultural Extension.
Social control – Meaning, definition, Need of social control and means of social control.
Social change - Meaning, definition, nature of social change. Dimensions of social change and factors of social change.

SECTION-IV

Leader - Meaning, definition, types and their role in Agricultural Extension.

Psychology and educational Psychology - Meaning, definition, scope, and importance of Educational Psychology in Agricultural Extension.

Intelligence - Meaning, definition, types, factors affecting intelligence
Personality - Meaning, definition, types, Factors influencing the personality. Role of personality in Agricultural Extension.
Perception and motivation.

Practical

Max. Marks :30

Practical Exam : 25 Internal Assessment : 05

Exploring social processes.
Exploring group dynamics and leadership pattern in villages.
Leadership styles in village situation.
Rural social institutions (Panchayats, Cooperatives).
Social sanctions, values and deviance - cases Assignments and term papers.

Suggested Readings:

Dubey, S.C., *Tradition and Development*. Vikas Publishing Home Pvt. Ltd. Jangpura, New Delhi.,2008
Gupta, D., Social *Stratification*. Oxford University Press, Delhi, 2004.

Course Title : DAIRY AND POULTRY **Course Number** : 354

Objectives : To learn Farming aspects in livestock, management of Dairy and Poultry. Sanitary and hygienic conditions in Animal farm, Establishment of Dairy and poultry farm.

MAX. MARKS :100

1. THEORY :70 WRITTEN EXAM:55 INTERNAL ASSESSMENT:15
2. PRACTICAL:30 WRITTEN EXAM:25 INTERNAL ASSESSMENT:5

PERIOD PER WEEK – 1. THEORY–THREE OF 45 MINUTES DURATION
2. PRACTICAL– ONE OF THREE HOURS DURATION

INSTRUCTIONS FOR PAPER SETTER:

Question paper will have five sections. First Question will contain 10 short answer type parts of one and half marks each and will cover whole of the syllabus. All parts of this question will be compulsory. Section 'I', 'II', 'III' and 'IV' will have two questions each from respective section, out of which one from each section is to be attempted. Total five questions are to be attempted. Question paper should be as per standard, strictly according to the syllabus. Language of the questions should be simple and straight.

Teaching Aids : Teachers can use lecture, lecture cum demonstration, project, assignments, problem solving, inductive and deductive methods, and can use L.C. Display, L.E. Display, Multimedia projector in addition to black/white board.

SECTION-I

Indian status of dairy industry. Principles of production, processing and marketing of milk types.

Importance of livestock in agriculture and relationship between plant and animal husbandry. Important breed of buffaloes, cows and goats.

Housing requirement: objective and advantages of adequate housing. Factors related to selection of site and layout of dairy farm.

Methods of housing animals. Management of livestock, important diseases of animals, care of cows at and after calving, raising of calves.

SECTION-II

Care and management of heifers. Care of bulls, maintenance of livestock records.

Milking systems– methods and principles of clean milk productions. Control of external and internal parasites.

Nutrients and their functions in animal body. Feed stuff and their classification, Indian feeding standard and daily nutrient requirement of cattle.

Principles of rationing.

SECTION-III

Present status and future scope of poultry industry in India.

Formation of egg, classification of poultry feeds, composition of poultry feeds.

Method / system of feeding, anti nutritional factors, metabolic disorders.

SECTION-IV

Selection and storage of hatching eggs, factors effecting fertility, embryo development, sexing of chicks.
Origin of domestic fowls, classification of poultry, Interspecific crossing and parthenogenesis, mating plans for eggs, meat and selection. Population size and flock structure.
Control measure and prevention of poultry diseases. Vaccination programme
Egg structure and its nutrients, abnormal eggs, Evaluation of egg quality.

Practical

Max Marks :30

Practical Exam :25 Internal Assessment: 05

Lay out of dairy farms.
Hygiene, isolation and vaccination of animals and birds.
Handling animals and birds, transpensing, record keeping, economics of dairy and poultry, house design and litter management for dairy and poultry.
Grading of milk and eggs.
Identification of various dairy and poultry feeds.
Visit to dairy farms, poultry farms and veterinary hospitals.
Visit to feed plants for dairy and poultry.

Suggested Readings :

Singh, H., *Handbook of Animal Husbandry*, I.C.A.R. Publications, New Delhi, 2005.
Eigan, W.M., and Paul, R., *Dairy cattle feed,* Johan Willey & Sons, New York, 2005.
Singh, Advances of animal Husbandry, I.C.A.R. publication. New Delhi, 2009.
Kumar, A., *Animal Husbandry*, Discovery Publishing House, New Delhi, 2006.

Course Title : AGRICULTURAL ENGINEERING **Course Number** : 355

Objectives : To learn basic principles related to power generation and to learn operational procedures, maintenance of other farm power machinery used in agriculture.

MAX. MARKS -100

1. THEORY –70 ; WRITTEN EXAM=55 INTERNAL ASSESMENT- 15
2. PRACTICAL-30 ; WRITTEN EXAM=25 INTERNAL ASSESMENT- 5

PERIOD PER WEEK – 1. THEORY--THREE OF 45 MINUTES DURATION
2. PRACTICAL— ONE OF THREE HOURS DURATION

INSTRUCTIONS FOR PAPER SETTER:

Question paper will have five sections. First Question will contain 10 short answer type parts of one and half marks each and will cover whole of the syllabus. All parts of this question will be compulsory. Section 'I', 'II', 'III' and 'IV' will have two questions each from respective section, out of which one from each section is to be attempted. Total five questions are to be attempted. Question paper should be as per standard, strictly according to the syllabus. Language of the questions should be simple and straight.

Teaching Aids : Teachers can use lecture, lecture cum demonstration, project, assignments, problem solving, inductive and deductive methods, and can use L.C. Display, L.E Display, Multimedia projector in addition to black/white board.

SECTION-I

Sources of farm power , status of farm power in India, farm power from renewable energy resources.
Advantages and disadvantages of various forms of power.
Engine types, Internal Combustion (IC) engines: introductions, classification constructional features of IC engines.
Components' of IC Engine and their functions.
Principal of operation of IC engines:- two and four stroke cycle diesel engine; four stroke spark ignition engine, two stroke cycle petrol engine.
Advantages and disadvantages of two stroke over four stroke cycle. Comparison of CI and SI engines.

SECTION-II

Basic terminology of heat engines. Firing order and firing intervals. Power balance in single, two, three and four cylinders engines.

Air cleaners necessity and utility. Types of air cleaners and mufflers.

Types of tractors. Main assemblies/parts of the tractors. Selection of tractor:- operations of tractor operation.

Power tillers engine system: classification & features of power tillers, construction of power tillers.

Tillage implements -mould board plough & disc plough – constructional features, preparation for operation, ploughing with MB plough.

SECTION-III

Sub soilers:- constructional features and operation. Rotary tiller components and its principal of operation. Applications of rotatvators.
Harrow and their different types, constructional features. Operational techniques and procedure of Harrow.
Seed drills – types, constructional features. Calibration of seed cum fertilizer drill, Planters types, method of planting.
Constructional features of planters, drive mechanism, field operation and adjustment of planters. Special crop planters. Rice transplanters and their types.

SECTION-IV

Harvesting and threshing machines:- reapers windrower and their types. Threshers-their constructional features and working principle.
Plant protection equipments – types and size of sprayers types (Stirrup pump sprayer, hand compression sprayer, foot sprayer, rocking sprayer , knapsack sprayer and power sprayer), types of nozzles.
Dusters, moterized knapsack mistblower cum duster, spinning disc applicators and thermal foggers.

Practical

Max. Marks :30

Practical Exam : 25 Internal Assessment:05

Study parts of engine.
Study of Working principle of different engines.
Maintenance of tractor and power tiller.
Calibration of seed cum fertilizer drill.
Study of MB, their problems and causes .

Study of different types of sprayers.
Calibrations of sprayers.

Suggested Readings :

Nakra, C.P ., *Farm machines and equipment*, Dhanpat Rai Publishing Company, New Delhi, 2009.
Srivastava, A.C. and Primlari, R., *Elements of Farm Machinary*, Oxford & IBH Publishing Company, New Delhi, 2008.
Jain, S.C. and Rai, C.R., *Farm Tractor-maintenance and repair*, Standard Publishing Distributers, New Delhi, 2008.

Course Title : INTRODUCTORY SEED TECHNOLOGY **Course Number** : 356

Objectives : To learn basic principles in seed production industry and release of varieties, their multiplications.

MAX. MARKS:100

1.	THEORY :70	WRITTEN EXAM:55	INTERNAL ASSESSMENT:15
2.	PRACTICAL:30	WRITTEN EXAM:25	INTERNAL ASSESSMENT:5

PERIOD PER WEEK – 1. THEORY–THREE OF 45 MINUTES DURATION
2. PRACTICAL- ONE OF THREE HOURS DURATION

INSTRUCTIONS FOR PAPER SETTER:

Question paper will have five sections. First Question will contain 10 short answer type parts of one and half marks each and will cover whole of the syllabus. All parts of this question will be compulsory. Section 'I', 'II','III' and 'IV' will have two questions each from respective section ,out of which one from each section is to be attempted. Total five questions are to be attempted. Question paper should be as per standard, strictly according to the syllabus. Language of the questions should be simple and straight.

Teaching Aids : Teachers can use lecture, lecture cum demonstration , project, assignments, problem solving, inductive and deductive methods, and can use L.C. Display, L.E.Display, Multimedia projector in addition to black/white board.

SECTION-I

Definition, uses of seed. Seed morphology. Male and female gametogenesis, types of seed,
Morphology and anatomy of seed parts. Physiology of seed
Seed health, factors affecting seed health, production of healthy seed
Seed viability and germination of seed- factor affecting germination.
Seed vigour :- vigour and germination of seed, factor affecting seed vigour.
Seed dormancy:- classification and induction of dormancy, regulation and breaking seed dormancy.
Seed deterioration :- manifestation, causes and prevention of seed deterioration.

SECTION-II

Seed purity: standard & regulation, genuineness of variety, purity test components.
Stages of production of improved seeds. Maintenance of purity of nucleus & breeder seed of self & cross pollinated crops production of virus free nucleus stock in potato.
Seed production in different reproductive systems, seed production risks.
Self incompatibility, nuclear male sterility and cytplasmic male sterility in hybrid seed productions.

SECTION- III

Mode of maintenance of germplasm: in situ, ex situ. Plant material used for maintenance; Cryopreservation, germination standard for storage in gene banks in India
Seed production organizations in India. Seed processing and seed treatments.
Packaging of seeds. Seed storage: factors affecting seed longevity in storage, types of storage for different end use. Management of insect pests during storage.
Release of variety, multiplication of seed- (breeder seed, foundation seed, registered seed and certified seed) Protocol for identification, release and notification of variety for seed production.

SECTION- IV

Seed certification: Objective, organization and agencies, standards. Field inspection of seed crops. Field inspection and seed tests. Labelling and legislation.
Productions of foundation and certified seed. Certified seed production in hybrid maize, sunflower, paddy, potato.
Seed legislation in India- statuary bodies and regulations. Statuary regulations regarding seed law enforcement, procedure and problems in seed law enforcement.
Intellectual Property Rights in relation to plant breeding:- history and forms of Intellectual Property Protections for plants. Positive and negative aspects of PBR:- benefits promised and drawbacks.

Practical

Max. Marks : 30

Practical Exam: 25 Internal Assessment : 05

Study of general method of seed health tests:- inspection of dry seeds, washing test and Blotter method.
Seed sampling procedures;
Seed purity test.
Moisture testing.
Seed germination test
Seed viable test
Visit to Seed production plots of Maize,
Isolation distance and hybrid seed in maize crop.

Suggested Readings:

Vishunavat, K., *Seed health testing- principal and protocol*, Kalyani Publishers, New Delhi, 2009.

Sen Subir,and Ghosh N, *Seed science and technology-*, Kalyani Publishers, New Delhi, 2009.

Singh, B.D., *Plant Breeding*, Kalyani Publishers, New Delhi, 2009.

SEMESTER VI

Course Title : PLANT PATHOLOGY **Course Number** : 361

Objectives : To learn basic principle of plant disease and resistance mechanisms.

MAX. MARKS:100

1.	THEORY :70	WRITTEN EXAM:55	INTERNAL ASSESSMENT:15
2.	PRACTICAL:30	WRITTEN EXAM:25	INTERNAL ASSESSMENT: 5

PERIOD PER WEEK – 1. THEORY-THREE OF 45 MINUTES DURATION
2. PRACTICAL- ONE OF THREE HOURS DURATION

INSTRUCTIONS FOR PAPER SETTER:

Question paper will have five sections. First Question will contain 10 short answer type parts of one and half marks each and will cover whole of the syllabus. All parts of this question will be compulsory. Section 'I', 'II', 'III' and 'IV' will have two question each from respective section ,out of which one from each section is to be attempted. Total five questions are to be attempted. Question paper should be as per standard, strictly according to the syllabus. Language of the questions should be simple and straight

Teaching Aids : Teachers can use lecture, lecture cum demonstration, project, assignments, problem solving, inductive and deductive methods, and can use L.C. Display, L.E.Display, Multimedia projector in addition to black/white board.

SECTION- I

Introduction to plant pathology- what is plant disease, importance of plant disease, terminology.
History of plant pathology.
Causes of plant disease–inanimate causes, animate causes, plant viruses, classification of plant diseases.
Symptoms and identification of plant diseases.

SECTION-II

Epidemiology – simple interest and compound interest diseases, slow and rapid epiphytotics, essential conditions for epiphytotics, disease svearity, analysis of epidemics.

Role of toxins in plant pathogenesis-pathotoxins, vivotoxins, and phytotoxins, effect of toxins on plant tissue, selective and non-selective toxins.

Defence mechanism of plants-pre existing structural defence, pre existing biochemical defence, post infectional structural and biochemical defence, phytoalexins.

Forecasting of plant diseases-practical advantages of forecasting, conditions for practical gains for forcasting, computerised system of disease forcasting, management of disease- through host resistance and chemicals

SECTION-III

Effect of infection on physiology of host – permeability changes, photosynthesis, paths of carbon fixation, respiration under pathogenesis, changes in nitrogen metabolism, phenols, growth regulators in plant diseases.

Dissemination of plant pathogens.

Nutrition of plant pathogens – growth, methods of measurement, factors influencing growth, culture media, classification of media.

Control of plant diseases: cultural methods, chemical methods, use of fungicides , insecticides, nematicides etc. for treatment of soil, seeds, plants. Spraying and dusting instruments.

SECTION- IV

Study of symptoms, disease cycle, control measures for wheat (rust and smut), rice (rice blast, false smut of rice), maize (Maydis leaf blight), vegetables (white rust of crucifers, powdery mildews of pea) and fruits (citrus canker, mango malformation).

Practical

Max Marks :30

Practical Exam: 25 Internal Assessment : 05

Study of diseases mentioned in section IV of the theory paper.

Collection of different types of symptoms as mentioned in unit iv of theory paper.
Basic study of structure of spraying and dusting instruments.
How to prepare various formulations of fungicides, insecticides, nematicides.
Precautions to be taken during chemicals.
Preparation of bourdeoux mixture and burgundy paste.
Visit to plant pathology department of near by agricultural University and to write a project on field visit for local crops atleast five crops to be studied.

Suggested Readings:

Mehrotra. R.S., *plant pathology*. TMH Publishing Limited, New Delhi, 2009.

Singh. R.S., *Introduction to principles of plant pathology*, Oxford and IBH Publishing Company, New Delhi, 2006

Singh. R.S., P*lant Diseases*, Oxford and IBH publishing company, New Delhi, 2009.

Course Title : CROP EXPERIMENTATION & APPLIED STATISTICS **Course Number** : 362

Objectives : To learn various applied statistical procedures used in research work

MAX. MARKS :100

1.	THEORY :70	WRITTEN EXAM:55	INTERNAL ASSESSMENT:15
2.	PRACTICAL: 30	WRITTEN EXAM:25	INTERNAL ASSESSMENT: 5

PERIOD PER WEEK –
1. THEORY-THREE OF 45 MINUTES DURATION
2. PRACTICAL- ONE OF THREE HOURS DURATION

INSTRUCTIONS FOR PAPER SETTER:

Question paper will have five sections. First Question will contain 10 short answer type parts of one and half marks each and will cover whole of the syllabus. All parts of this question will be compulsory. Section 'I', 'II', 'III' and 'IV' will have two questions each from respective section ,out of which one from each section is to be attempted. Total five questions are to be attempted. Question paper should be as per standard, strictly according to the syllabus. Language of the questions should be simple and straight.

Teaching Aids : Teachers can use lecture, lecture cum demonstration, project, assignments, problem solving, inductive and deductive methods, and can use L.C. Display, L.E.Display, Multimedia projector in addition to black/white board.

SECTION- I

Concept of Crop Experiment (introduction, types, salient points of good expt, purpose & step in experimentation).

Basic statistical terms in relation to crop experimentation (variate, frequency, probability, mean, variance and level of uncertainty).

Basic Concept related to experiment design and their applications (experiment error & its reduction, principles of experiment design).

SECTION- II

Test of significance (large sample and small sample), steps in test of significance.
Analysis of variance (assumption and techniques).

SECTION- III

Analysis of Completely randomized design (CRD), Randomized complete block design (RBD) and Latin square design.
Analysis of RBD and LSD with one missing value
Data transformations.

SECTION-IV

Split plot designs, Test for goodness of fit, Sampling techniques and their application,
Path Coefficient analysis: Theoretical description, direct, indirect and residual effects.

Practical

Max Marks: 30

Practical Exam : 25 Internal Assessment : 05

Analysis of agricultural related data for CRD, RBD with one missing value
Study of various sampling techniques in field.
Study of various field plot techniques.
Chi square test.

Suggested Readings:

Banerjee, P.K., *Introduction to Biostatistics.* S. Chand & Company Ltd. New Delhi, 2009.
Sahu,P.K., and Das, A.K. *Agricultural and Applied Statistics II ,* Kalyani Publishers, Ludhiana, 2009.
Panse, V.G., Shaw, F.J., and Sukhatme, P.V., *Statistical methods for agricultural workers*, Indian Council of Agricultural Research, 1967.
Fisher, R.A., *Statistical methods for research workers(14th Edition),* Hafner Press, UK, 1975.

Course Title : APPLIED ENTOMOLOGY **Course Number** : 363

Objectives: To learn various methods of pest control.

MAX. MARKS :100

1.	THEORY :70	WRITTEN EXAM:55	INTERNAL ASSESSMENT: 15
2.	PRACTICAL:30	WRITTEN EXAM:25	INTERNAL ASSESSMENT: 5

PERIOD PER WEEK –
1. THEORY-THREE OF 45 MINUTES DURATION
2. PRACTICAL- ONE OF THREE HOURS DURATION

INSTRUCTIONS FOR PAPER SETTER:

Question paper will have five sections. First Question will contain 10 short answer type parts of one and half marks each and will cover whole of the syllabus. All parts of this question will be compulsory. Section 'I', 'II', 'III' and 'IV' will have two questions each from respective section ,out of which one from each section is to be attempted. Total five questions are to be attempted. Question paper should be as per standard, strictly according to the syllabus. Language of the questions should be simple and straight.

Teaching Aids : Teachers can use lecture, lecture cum demonstration, project, assignments, problem solving, inductive and deductive methods, and can use L.C. Display, L.E.Display, Multimedia projector in addition to black/white board.

SECTION-I

Evolution of plants and insect pests, Types of insect-pests, Crop losses due to insect pests.

Characteristics of insect population and factors influencing pest population.

Modern agriculture and insect-pest problems.

SECTION-II

Legislative control of insect-pests: pest and pesticide legislations *viz.,* Destructive Insect-pest Act, plant quarantine order and Insecticide Act.

Cultural control and mechanical control of insect-pests.

Host plant resistance concept.

Biological control of insect pests with reference to predators and parasitoids.

SECTION-III

Microbial control of insect-pests using fungi, bacteria and viruses.

Major group of Insecticides and status of pesticide use in agriculture.

Methods of application of insecticides and environmental impact of pesticides.

SECTION-IV

Major insect pests of maize (maize stem borer, maize aphid and maize shoot fly), rice (rice stem borer, rice leaf folder, hispa), sugarcane (sugarcane top borer, sugarcane leaf hopper, Gurdaspur borer) and their control measures.

Major insect pests of Cucurbits (red pumpkin beetle, melon fruit fly, hadda beetle), brinjal (fruit and shoot borer, stem borer, lacewing bug), bhindi (spotted boll worm, blister beetle, white fly) and cabbage (cabbage butterfly, semi-looper, and cabbage aphid) and their control measures.

Major pests of citrus (lemon butterfly, leaf miner and psylla) and mango (mango hoppers, mango mealy bug, stone weevil, fruit-fly).

Practical

Max Marks : 30

Practical Exam :25 Internal Assessment :05

Identifications of various insect-pests, their damaging stages and their control measures of important *Rabi* crops.

Suggested Readings:

Srivastva, K.P., *Text book of Applied Entomology.* Kalyani Publishers, Ludhiana, 2009.
Atwal, A.S., and Dhaliwal, G.S *Agriultural pest of south Asia and their management,* Kalyani Publishers, Ludhiana, 2005.
Dhaliwal, G.S., and Kukal, S.S., *Essentials of Environment Science,* Kalyani Publishers, Ludhiana, 2005.

Course Title : INTRODUCTORY FOOD TECHNOLOGY **Course Number** : 364

Objectives : To learn introductory knowledge of various foods, their nutritive value and their adulterations.

MAX. MARKS :100

1. THEORY :70 ; WRITTEN EXAM:55 INTERNAL ASSESSMENT:15
2. PRACTICAL:30 ; WRITTEN EXAM:25 INTERNAL ASSESSMENT: 5

PERIOD PER WEEK –

1. THEORY-THREE OF 45 MINUTES DURATION
2. PRACTICAL- ONE OF THREE HOURS DURATION

INSTRUCTIONS FOR PAPER SETTER:

Question paper will have five sections. First Question will contain 10 short answer type parts of one and half marks each and will cover whole of the syllabus. All parts of this question will be compulsory. Section 'I', 'II', 'III' and 'IV' will have two questions each from respective section, out of which one from each section is to be attempted. Total five questions are to be attempted. Question paper should be as per standard, strictly according to the syllabus. Language of the questions should be simple and straight.

Teaching Aids : Teachers can use lecture, lecture cum demonstration, project, assignments, problem solving, inductive and deductive methods, and can use L.C. Display, L.E.Display, Multimedia projector in addition to black/white board.

SECTION-I

Introduction to food – science food groups.

Cereal and cereal products – structure, composition and nutritive value, specific cereals.

SECTION-II

Pulses – composition and nutritive value, processing.

Nuts and oil seeds – nutritive value and toxins

Vegetables and fruits – classification, nutritive value, post harvest changes and storage enzymatic browning.

Meat, poultry, fish – composition and nutritive value.

Spices – common spices name and uses.

SECTION-III

Evaluation of food quality.

Sensory evaluation– characteristics, requirement for conducting sensory tests.

Types of tests, Difference test, Rating test, Sensory test, Descriptive test.

Objective test – basic guidelines, chemical methods, physiochemical methods, microscopic examination.

SECTION-IV

Food adulteration- types, law, standards and tests.

Food preservation.

Methods by low temp., high temp., preservative, high osmotic pressure, dehydration, radiation.

Practical

Max. Marks: 30

Practical Exam: 25 **Internal Assessment: 05**

Identification of various food adulterants.

Preparation of important fruit products – squashes, jams, jellies, pickles,
Familiarization with different grades of tea and coffee. Flavour profile analysis.

Visits to various food processing industries.

Suggested Readings

Potter, N.N., Food *Science*. AVI Publishing Company, Connecticut. 1998

Srilakshmi, B., *Food Science*. New Age International (P) Ltd, New Delhi, 1997

Ranganna, S., *Manual of analysis of fruits and vegetables products*. Tata Mc. Graw Hill Publishing Company, New Delhi. 1977.

Roger, C, Griffin, J.R and Stanley Sacharow, *Principles of package development*. The AVI Publishing Company INC, Westport, USA. 1972.

Course Title : ECONOMIC ZOOLOGY **Course Number** : 365

Objectives: To learn Basic knowledge related to economical important animals/amphibians related to agriculture.

MAX. MARKS :100

1.	THEORY :70	WRITTEN EXAM:55	INTERNAL ASSESSMENT:15
2.	PRACTICAL:30	WRITTEN EXAM:25	INTERNAL ASSESSMENT:5

PERIOD PER WEEK – 1. THEORY-THREE OF 45 MINUTES DURATION
2. PRACTICAL- ONE OF THREE HOURS DURATION

INSTRUCTIONS FOR PAPER SETTER:

Question paper will have five sections. First Question will contain 10 short answer type parts of one and half marks each and will cover whole of the syllabus. All parts of this question will be compulsory. Section 'I', 'II', 'III' and 'IV' will have two questions each from respective section, out of which one from each section is to be attempted. Total five questions are to be attempted. Question paper should be as per standard, strictly according to the syllabus. Language of the questions should be simple and straight.

Teaching Aids : Teachers can use lecture, lecture cum demonstration, project, assignments, problem solving, inductive and deductive methods, and can use L.C. Display, L.E.Display, Multimedia projector in addition to black/white board.

SECTION-I

Basic knowledge and fundamentals of Apiculture, Seri culture, Lac culture, Carp culture, Pearl culture, Prawn culture, Vermi culture. The scope of these fields at global level and in north India.

Transgenic animals- : Concept, definition, their importance in agriculture with special reference to north India.

SECTION-II

Principles of ornamental fisheries management in India. Fishing methods, management with special reference to fishes of north India and Punjab in particular.
Mammals of north India useful and harmful to agriculture.

Quarantine law : Meaning and it's implementation in India, insecticide Act.

SECTION III

Various breeds of domesticated dogs, importance of dogs in agriculture, their feeding behavior, important diseases, kennel management.

SECTION IV

Stud farming, role of horse in Indian agriculture and Punjab culture, important breeds of horse in north India, their feeding behavior, important diseases and cure. Stud management.

Practical

Max. Marks :30

Practical Exam : 25 Internal Assessment : 05

Visit to kennel, stud farms taking notes on management.
Visit to vermicompost centres, apiary, aviary, fish culture centres taking notes on various management tips.
Morphological and economic studies on any two transgenic animals of local area.
To Study feed preparation for dog , horse and fish .
Study of common diseases of dog, horse, bee, fish, lac insect and silk worm.
Study of life cycle of silk worm and lac insect.

Suggested Readings:

Jawaid Ahsan and Sinha, S. P. *A Handbook of Economic Zoology*. S. Chand and Group Publication. Delhi, 2008.

Nigam, H.C. *Modern Trends in Biology & Economic Zoology*. Vishal Publ. Co. 2006.

Shukla, G.S. & Upadhyay, V.B. *Economic Zoology*. Rastogi Publs. New Delhi, 2005.

Tomar, B.S. & Singh, Neera. *A textbook of Applied Zoology*. Emkay Publ., Delhi. 2004.

Course Title : AGRICULTURAL EXTENSION **Course Number** : 366
Objectives : To learn various techniques and principal in agricultural extension.

MAX. MARKS :100

1.	THEORY :70	WRITTEN EXAM:55	INTERNAL ASSESSMENT: 15
2.	PRACTICAL:30	WRITTEN EXAM:25	INTERNAL ASSESSMENT:5

PERIOD PER WEEK – 1. THEORY– THREE OF 45 MINUTES DURATION
2. PRACTICAL– ONE OF THREE HOURS DURATION

INSTRUCTIONS FOR PAPER SETTER:

Question paper will have five sections. First Question will contain 10 short answer type parts of one and half marks each and will cover whole of the syllabus. All parts of this question will be compulsory. Section 'I', 'II', 'III' and 'IV' will have two questions each from respective section, out of which one from each section is to be attempted. Total five questions are to be attempted. Question paper should be as per standard, strictly according to the syllabus. Language of the questions should be simple and straight.

Teaching Aids : Teachers can use lecture, lecture cum demonstration, project, assignments, problem solving, inductive and deductive methods, and can use L.C. Display, L.E.Display, Multimedia projector in addition to black/white board.

SECTION- I

Education – Meaning, Definition, Types – Formal, Informal and Non-formal education and their Characteristics. Extension Education and Agricultural Extension – Meaning, Definition, Concepts.

Objectives and Principles. Rural development – Meaning, Definition, Concepts, Objectives, Importance and Problems in rural development. Developmental programmes of pre-independence era – Sriniketan, Marthandam, Gurgaon experiment and Gandhian constructive proprogramme.

SECTION- II

Development programmes of Post independence era, Firka Development, Etawah – Pilot project and Nilokheri Experiment.
Community Development Programme – Meaning, Definition, Concepts.
Panchayat Raj system – Meaning of Democratic – Decentralization and Panchayat Raj, Three tiers of Panchayat Raj system, Powers, Functions and Organizational setup. Agricultural Development.

SECTION-III

Programmes with reference to year of start, objectives & salient features – Intensive Agricultural District Programme (IADP), High Yielding Varieties Programme (HYVP), Institution Village Linkage Programme (IVLP), Watershed Development Programme (WDP), National Agricultural Technology Project (NATP), ATMA, ATIC. Social Justice and Poverty alleviation programmes – Integrated Tribal Development Agency (ITDA), Integrated Rural Development Programme (IRDP), Swarna Jayanthi Gram Swarojgar Yojana (SGSY), Prime Minister Employment Yojana (CMEY).

SECTION-IV

New trends in extension, privatization. Women Development programmes – Development of Women and Children in Rural Areas (DWCRA), Rashtriya Mahila Kosh (RMK), Integrated Child Development Scheme (ICDS) and Mahila Samriddi Yojana (MSY). Reorganized extension system (T&V System) – Salient features, Fort night Meetings, Monthly workshops, Linkages, Merits and Demerits, Emergence of Broad Based Extension (BBE).

Practical

Max. Marks :30

Practical Exam :25 Internal Assessment:05

Visits to a village and kisan mandal to study the ongoing development programmes.
Visit to Panchayat Raj Institutions to study the functioning of Gram Panchayat (GP) & Zilla Praja Parishad (ZPP).
Visit and study the District Rural Development Agency (DRDA).
Participation in monthly workshops of Training and Visit (T & V) System.
Visit to Watershed Development Project area.

Suggested Readings:

Mondal, S. and Ray G.L., *A Text book of Rural Development*. Kalyani Publishers, Chennai, 2007.
Dharma, O.P. and Bhatnagar, O.P., *Education and Commnication for Development.* Oxford, IBH, New Delhi, 2003.
Desai, A.R., *Rural Sociology in India*. Popular Prakashan, Bombay, 2003.
Samanta, R.B., *Agricultural Extension in Changing World perspective*. UDH Publishing, New Delhi, 1991.
Ray G.L., *Extension Communication and Management*, Kalyani Publishers, Chennai, 2007.

SEMESTER VII

Course Title PROJECT PLANNING, EVALUATION , FORMULATION AND IMPLEMENTATION. **Course Number** 471

Objectives : To make the student familiar with writing of project proposal.

MAX. MARKS :100

Project will be assigned to student on agricultural problems/ industry.

Course Title SERICULTURE AND APICULTURE **Course Number** 472

Objectives: To familiarize the students with entrepreneurial opportunities in Entomology, provide information on productive insects, their management and commercialization of products.

MAX. MARKS :100

1. THEORY :70 ; WRITTEN EXAM:55 INTERNAL ASSESSMENT:15
2. PRACTICAL:30 ; WRITTEN EXAM:25 INTERNAL ASSESSMENT: 5

PERIOD PER WEEK –
1. THEORY– THREE OF 45 MINUTES DURATION
2. PRACTICAL– ONE OF THREE HOURS DURATION

INSTRUCTIONS FOR PAPER SETTER:

Question paper will have five sections. First Question will contain 10 short answer type parts of one and half marks each and will cover whole of the syllabus. All parts of this question will be compulsory. Section 'I', 'II','III' and 'IV' will have two questions each from respective section, out of which one from each section is to be attempted. Total five questions are to be attempted. Question paper should be as per standard, strictly according to the syllabus. Language of the questions should be simple and straight.

Teaching Aids : Teachers can use lecture, lecture cum demonstration , project, assignments, problem solving, inductive and deductive methods, and can use L.C. Display, L.E.Display, Multimedia projector in addition to black/white board.

SECTION-I

Scope and prospects of beekeeping. History & development of beekeeping in India. Bee keeping equipment, Species and races of bees, bee hive and its characterization. Bee castes, biology, ecology, behavior, communication, foraging strategies. Swarming and absconding. Apiary establishment- beekeeping equipment, bee pasturage.

SECTION-II

General colony management, seasonal management. Managing colonies for production of honey, other hive products such as Bee pollen, Royal jelly and Bee venom. Artificial queen rearing. Bee health management. Bee poisoning. Production, properties, uses and marketing of good quality honey, bee pollen, royal jelly, propolis, beewax, bee venom, and value added products of honey.

SECTION-III

Establishment and maintenance of apiaries. Beekeeping for pollination- role of honey bees in pollinating, agricultural, horticultural and tree crops. Beekeeping in integrated farming systems and organic farming. History, origin and development, study of different species of silkworms, characteristic features.

SECTION-IV

Host plants and their cultivation, comparative morphology, biology. Rearing and management of silk worms, appliances. Pests and diseases of silkworms, Silk worm seed technology, Cocoon production and post harvest operations. Reeling and testing of silk, marketing. Recent advances in sericulture.

Practical

Max. Marks: 30

Practical Exam: 25 **Internal Assessment: 05**

Identification of honeybee species, bee castes and special adaptations, identification and handling of beekeeping equipments. Familiarization of bee pasturage, Identification of bee and diseases. Honey extraction and processing, methods of extraction of other hive products. Visit to bee nursery and commercial apiaries. Silkworm- identification of different species, rearing and management, Identification of diseases and pests of silk worm, host range identification.

Suggested Readings

Atwal AS, 2006. The World of the Honey Bee, Kalyani Publ, New Delhi.
Mishra R.C 1995, Honey bees and their management in India. ICAR. New Delhi 168p.
Singh S.1975, Beekeeping in India. ICAR, New Delhi
Abrol, D.P 2003, Honey bees diseases and their management. Kalyani Publ, New Delhi.
FAO Mannual on sericulture (1981) VOL. I, II,& III on mulberry cultivation, silk worm rearing and silk reeling. Oxford and IBH Publishing Company. 351p.
Ganga, G. and Sulochana Chetty 1991. Introduction to Sericulture, Oxford and IBH Publishing Company, Pvt, Ltd, New Delhi.
Comprehensive Sericulture. Vol.II. Silkworm Rearing and Silk Reeling.
Aruga H.1994. Principals of Sericulture. Oxford & IBH, New Delhi.
Ganga G. 2003. Comprehensive Sericulture. Vol.II Silkworm Rearing and Silk Reeling. Oxford & IBH, New Delhi.

Course Title: MEDICINAL AND AROMATIC PLANTS **Course Number** : 473

Objectives : To acquaint students about different medicinal and aromatic crops, their package of practices.

MAX. MARKS :100

1.	THEORY :70	WRITTEN EXAM:55	INTERNAL ASSESSMENT:15
2.	PRACTICAL:30	WRITTEN EXAM:25	INTERNAL ASSESSMENT: 5

PERIOD PER WEEK –
1. THEORY– THREE OF 45 MINUTES DURATION
2. PRACTICAL– ONE OF THREE HOURS DURATION

INSTRUCTIONS FOR PAPER SETTER:

Question paper will have five sections. First Question will contain 10 short answer type parts of one and half marks each and will cover whole of the syllabus. All parts of this question will be compulsory. Section 'I', 'II','III' and 'IV' will have two questions each from respective section, out of which one from each section is to be attempted. Total five questions are to be attempted. Question paper should be as per standard, strictly according to the syllabus. Language of the questions should be simple and straight.

Teaching Aids : Teachers can use lecture, lecture cum demonstration , project, assignments, problem solving, inductive and deductive methods, and can use L.C. Display, L.E.Display, Multimedia projector in addition to black/white board.

SECTION- I

Importance of medicinal and aromatic plants in human health, national economy and related industries, classification of medicinal and aromatic plants according to botanical characteristics and uses, conservation of medicinal plants.

SECTION- II

Climate and soil requirements; cultural practices; yield and important chemical constituents and uses of medicinal plants (*Aloe vera*, *Terminalia bellerica*, *Stevia*, *Tinospora cordifolia*, Black Musali, Thippali, *Nux vomica,* etc).

SECTION-III

Climate and soil requirements; cultural practices; yield of varieties in rose, jasmine, crossandra, chrysanthemum, marigold, tuberose, cut rose, gladiolus, carnation.

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SECTION-IV

Climate and soil requirements; cultural practices; yield of important medicinal, spice and aromatic crops like Cellery, Coriander, Fennel, Dill Seed, Honey Plant, Funugreek and Mentha.

Practical

Max. Marks :30

Practical Exam: 25 Internal Assessment : 05

Identification, description, study of propagation techniques of above mentioned crops.

Suggested Readings

Chadha, K. L. and Gupta, R. 1995. *Advances in Horticulture*. Vol. II. *Medicinal and Aromatic Plants*. Malhotra Publ.

Das, N. R. 2007. *Introduction to Crops of India*. Scientific Publ.

Handa, S. S. 1984. *Cultivation and Utilization of Medicinal Plants*. RRL, CSIR, Jammu.

Hussain, A. 1984. *Essential Oil Plants and their Cultivation*. CIMAP, Lucknow.

Hussain A. 1993. *Medicinal Plants and their Cultivation.* CIMAP, Lucknow.

ICAR 2006. *Hand Book of Agriculture.* ICAR, New Delhi.

Kumar, N., Khader, Md. A., Rangaswami, J.B.M. Irulappan 1997. *Introduction to Spices, Plantation Crops, Medicinal and Aromatic Plants.* Oxford & IBH.

Prajapati, N.D., Purohit, S.S., Sharma, A.K. and Kumar, T. 2003. *A Hand Book of Medicinal Plants: A Complete Source Book*. Agrobios.

Sharma, R. 2004. *Agro-Techniques of Medicinal Plants*. Daya Publ. House.

Course Title CROP ECOLOGY AND FARM CROP SYSTEM **Course Number** 47EAG1

Objectives: To acquaint the students about the agricultural systems, agro-ecological regions and crop adaptation.

MAX. MARKS :100

1. THEORY : 70 WRITTEN EXAM :55 INTERNAL ASSESSMENT : 15
2. PRACTICAL : 30 WRITTEN EXAM :25 INTERNAL ASSESSMENT : 5

PERIOD PER WEEK – 1. THEORY– THREE OF 45 MINUTES DURATION
2. PRACTICAL– ONE OF THREE HOURS DURATION

INSTRUCTIONS FOR PAPER SETTER:

Question paper will have five sections. First Question will contain 10 short answer type parts of one and half marks each and will cover whole of the syllabus. All parts of this question will be compulsory. Section 'I', 'II', 'III' and 'IV' will have two questions each from respective section, out of which one from each section is to be attempted. Total five questions are to be attempted. Question paper should be as per standard, strictly according to the syllabus. Language of the questions should be simple and straight.

Teaching Aids : Teachers can use lecture, lecture cum demonstration, project, assignments, problem solving, inductive and deductive methods, and can use L.C. Display, L.E.Display, Multimedia projector in addition to black/white board.

SECTION-I

Concept of crop ecology, agricultural systems, ecology of cropping systems, principles of plant distribution and adaptation, crop and world food supply.

SECTION-II

Ecosystem characteristics, types and functions, terrestrial ecology, flow of energy in ecosystem, ecosystem productivity, biomass, succession and climax concept.

SECTION-III

System approach- cropping systems, definition and importance, physical resources and its management in cropping systems. Monocropping, multiple cropping, intercropping, sequential cropping, alley cropping and their advantages.

SECTION-IV

Interactions in cropping systems, complimentary interactions- competitions, allelopathic effect. Assessment yield advantage in intercropping system-assessment of land use- indiceseconomic evaluation of cropping systems- Important cropping systems of India and Punjab.

Practical

Max. Marks :30

Practical Exam : 25 **Internal Assessment : 05**

Study of various systems of Monocropping, multiple cropping, intercropping, sequential cropping, alley cropping
Preparation of charts and maps of India showing different types of pastures and agro-forestry systems
Visit to important agro-forestry research stations.

Suggested Readings

Ambasht R.S. 1986. *A Text Book of Plant Ecology*. 9th Ed. Students' Friends & Co.
Chadha K.L. & Swaminathan M.S. 2006. *Environment and Agriculture*. Malhotra Publ. House.
Dwivedi P, Dwivedi SK & Kalita MC. 2007. *Biodiversity and Environmental Biotechnology.* Scientific Publ.
Hemantarajan A. 2007. *Environmental Physiology*. Scientific Publ.

Kumar H.D. 1992. *Modern Concepts of Ecology*. 7th Ed. Vikas.Publ.
Lenka D. 1998. *Climate, Weather and Crops in India*. Kalyani.
Misra K.C. 1989. *Manual of Plant Ecology*. 3rd Ed. Oxford & IBH.
Pandey S.N & Sinha BK. 1995. *Plant Physiology*. Vikas Publ.
Sharma P.D. 1998. *Ecology and Environment*. Rastogi Publ.
Singh J & Dhillon SS. 1984. *Agricultural Geography.* Tata McGraw Hill.
Taiz L & Zeiger E. 1992. *Plant Physiology*. Benjamin/Cummings Publ.

Course Title: INSECTS -PESTS OF FIELD CROPS **Course Number:** 47EAG2/ 47EPB3

Objectives : To make the students familiar with various pests of field crops.

MAX. MARKS:100

1.	THEORY :70	WRITTEN EXAM:55	INTERNAL ASSESSMENT: 15
2.	PRACTICAL:30	WRITTEN EXAM:25	INTERNAL ASSESSMENT: 5

PERIOD PER WEEK – 1. THEORY-THREE OF 45 MINUTES DURATION
2. PRACTICAL- ONE OF THREE HOURS DURATION

INSTRUCTIONS FOR PAPER SETTER:

Question paper will have five sections. First Question will contain 10 short answer type parts of one and half marks each and will cover whole of the syllabus. All parts of this question will be compulsory. Section 'I', 'II', 'III' and 'IV' will have two questions each from respective section, out of which one from each section is to be attempted. Total five questions are to be attempted. Question paper should be as per standard, strictly according to the syllabus. Language of the questions should be simple and straight.

Teaching Aids : Teachers can use lecture, lecture cum demonstration, project, assignments, problem solving, inductive and deductive methods, and can use L.C. Display, L.E.Display, Multimedia projector in addition to black/white board.

SECTION I

Pest: definition and its categories, losses from pests to agricultural crops and their products.

Natural Control of insect-pests, factors causing pest outbreak in agriculture.

Concept of economic injury and economic thresh hold level. Principal and methods of pest control in reference to IPM- its components *viz.,* physical, legal, cultural, biological and chemical.

SECTION II

Distribution, host range, life cycle, damage and control of major insect-pests of cereals and millets : Pests of Rice (Rice hoppers , rice hispa, yellow stem borer), Pests of wheat (termites, wheat stem borer and wheat aphid), Pests of Sorghum (shoot fly, stem borer, inflorescence ear head bug), Pests of Bajra (shoot fly, grasshopper and stem borer).

Distribution, host range, life cycle, damage and management of major insect -pests of pulses (gram dohra, pod fly, gram pod borer).

SECTION III

Distribution, host range, life cycle, damage and control of major insect-pests of Oil seeds: Groundnut (red hairy caterpillars, leaf miner), Mustard (mustard aphid, painted bugs).

SECTION IV

Distribution, host range, life cycle, damage and control of major insect-pests of cotton (cotton boll worms, cotton jassid, whitefly), pest of sugarcane (internode borer, termites, woolly aphid, pyrilla), Stored grain Pests (rice weevil, khapra beetle, rice moth).

Practical

Max. Marks: 30
Practical Exam : 25 **Internal Assessment : 05**

Identifications of various above mentioned insect-pests, their behaviors and damaging stages and their control measures.

Suggested Readings:

Srivastva, K.P., *Text book of Applied Entomology.* Kalyani Publishers. Ludhiana, 2009.
Atwal, A.S., and Dhaliwal, G.S *Agriultural pests of south Asia and their management.* Kalyani Publishers. Ludhiana, 2005.
Dhaliwal, G.S., and Kukal, S.S., *Essentials of Environment Science,* Kalyani Publishers. Ludhiana, 2005.

Course Title: RECENT TRENDS IN AGRONOMY **Course Number:** 47EAG3

Objectives : To acquaint the students about recent advances in Agricultural production.

MAX. MARKS -100

1. THEORY –70 ; WRITTEN EXAM=55 INTERNAL ASSESSMENT- 15
2. PRACTICAL-30 ; WRITTEN EXAM=25 INTERNAL ASSESSMENT- 5

PERIOD PER WEEK – 1. THEORY--THREE OF 45 MINUTES DURATION
2. PRACTICAL— ONE OF THREE HOURS DURATION

INSTRUCTIONS FOR PAPER SETTER:

Question paper will have five sections. First Question will contain 10 short answer type parts of one and half marks each and will cover whole of the syllabus. All parts of this question will be compulsory. Section 'I', 'II', 'III' and 'IV' will have two questions each from respective section ,out of which one from each section is to be attempted. Total five questions are to be attempted. Question paper should be as per standard, strictly according to the syllabus. Language of the questions should be simple and straight.

Teaching Aids : Teachers can use lecture, lecture cum demonstration, project, assignments, problem solving, inductive and deductive methods, and can use L.C. Display, L.E.Display, Multimedia projector in addition to black/white board.

SECTION-I

Agro–physiological basis of variation in yield, Soil-plant- water relationship and recent trends. GM crops its advantages and possible risks.

SECTION-II

Globalization of agriculture and WTO, precision agriculture, contract farming, organic farming sustainable agriculture, marketing and export potential of organic products, agroforestry.

SECTION-III

Crop residue management in multiple cropping systems; latest developments in plant management, integrated weed management - economics of weed management – new trends in weed management, cropping systems, grassland management, Allelopathy history and examples.

SECTION-IV

GIS, GPS and remote sensing for crop management, global warming and its impact on agriculture, dryland farming, modern concepts in diversification.

Practical

Max. Marks :30

Practical Exam :25 **Internal Assessment : 05**

Identification of important weeds and preparation of herbarium, Weed survey in crops and cropping systems, Crop - weed competition studies.

Suggested Readings

Agarwal RL. 1995. *Seed Technology*. Oxford & IBH.

Dahiya BS & Rai KN. 1997. *Seed Technology*. Kalyani Ludhiana.

Govardhan V. 2000. *Remote Sensing and Water Management in Command Areas: Agroecological Prospectives*. IBDC.

ICAR. 2006. *Hand Book of Agriculture*. ICAR. New Delhi

Narasaiah ML. 2004. *World Trade Organization and Agriculture*. Sonali Publ.

Palaniappan SP & Annadurai K. 2006. *Organic Farming - Theory and Practice*. Scientific Publ.

Sen S & Ghosh N. 1999. *Seed Science and Technology*. Kalyani.

Tarafdar JC, Tripathi KP & Mahesh Kumar 2007. *Organic Agriculture*. Scientific Publ.

Course Title: FUNDAMENTALS OF PLANT BREEDING **Course Number:** 47EPB1

Objectives : To make the students familiar with various fundamentals techniques in plant breeding.

MAX. MARKS :100

1. THEORY : 70 WRITTEN EXAM:55 INTERNAL ASSESSMENT: 15
2. PRACTICAL: 30 WRITTEN EXAM:25 INTERNAL ASSESMENT: 5

PERIOD PER WEEK – 1. THEORY--THREE OF 45 MINUTES DURATION
2. PRACTICAL— ONE OF THREE HOURS DURATION

INSTRUCTIONS FOR PAPER SETTER:

Question paper will have five sections. First Question will contain 10 short answer type parts of one and half marks each and will cover whole of the syllabus. All parts of this question will be compulsory. Section 'I', 'II', 'III' and 'IV' will have two questions each from respective section, out of which one from each section is to be attempted. Total five questions are to be attempted. Question paper should be as per standard, strictly according to the syllabus. Language of the questions should be simple and straight.

Teaching Aids : Teachers can use lecture, lecture cum demonstration, project, assignments, problem solving, inductive and deductive methods, and can use L.C. Display, L.E.Display, Multimedia projector in addition to black/white board.

SECTION-I

Plant Genetic resources: center of origin of crop plant, exploration and collection of Plant Genetic resources, Evaluation of germplasm collection. Documentation, conservation and utilization of Plant Genetic resources. Genetic basis and application of selection in self pollinated crops : Pureline theory and its genetic basis, sources of genetic variation in pure line. Application of selection.

Mandelian consequences of planned hybridization in self pollinated crops : early experiment on hybridization in plants, Planned hybridization.

SECTION-II

Geneotype environment interaction: types of environment and classification of GE interaction and its measurement, multivariate approaches to analyse G X E interaction, allocation of resources for selection and testing choice of type of environment for selection and evaluation.

Effects of heterosis and inbreeding depression, conventional theory of heterosis, biometrical approach to heterosis.

Breeding for heterosis : historical development, production of hybrids and hybrid seed, achievement in heterosis breeding.

SECTION-III

Synthetic and composite varieties : genetic basis, procedure for development of synthetic varieties, assessment of GCA.

Breeding for resistance to diseases and insect pests

Tissue culture in crop improvement.

SECTION-IV

Molecular approaches to crop improvement.

Genetic transformation and production of transgenic plant.

Plant Breeder rights, release and multiplication of varieties.

Practical

Max. Marks :30

Practical Exam : 25 Internal Assessment :05

To study the analysis G X E interaction.

Study the effects of heterosis and inbreeding depression on crop plants.

Study of procedure for screening and breeding crops for resistance to diseases and insect pests.

Suggested Readings :

Allard, R.W ., *Principles of Plant Breeding*, John Wiley & Sons, New York, 1999.
Singh, B.D., *Plant Breeding*, Kalyani Publishers. New Delhi, 2009.
Poehlman, J.N. and Borthakur, D.N, *Breeding Asian Field Crops*, Oxford and IBH Pub. Co., New Delhi, 2000.
Singh, P., *Essentials of plant breeding*, Kalyani Publishers. New Delhi, 2009.

Course Title: BIOMETRICAL GENETICS **Course Number :** 47EPB2

Objectives : To make the students familiar with various biometrical techniques in area of Genetics.

MAX. MARKS :100

1.	THEORY : 70	WRITTEN EXAM:55	INTERNAL ASSESSMENT: 15
2.	PRACTICAL:30	WRITTEN EXAM:25	INTERNAL ASSESSMENT: 5

PERIOD PER WEEK – 1. THEORY– THREE OF 45 MINUTES DURATION
2. PRACTICAL– ONE OF THREE HOURS DURATION

INSTRUCTIONS FOR PAPER SETTER:

Question paper will have five sections. First Question will contain 10 short answer type parts of one and half marks each and will cover whole of the syllabus. All parts of this question will be compulsory. Section 'I', 'II', 'III' and 'IV' will have two questions each from respective section, out of which one from each section is to be attempted. Total five questions are to be attempted. Question paper should be as per standard, strictly according to the syllabus. Language of the questions should be simple and straight.

Teaching Aids : Teachers can use lecture, lecture cum demonstration, project, assignments, problem solving, inductive and deductive methods, and can use L.C. Display, L.E.Display, Multimedia projector in addition to black/white board.

SECTION-I

Important issues in plant breeding. Salient contribution of biometrical genetics in Plant Breeding.
Frequencies of genes and populations.
Hardy-Weinberg equilibrium.
Changes in gene frequency.

SECTION-II

Pedigreed populations and close inbreeding : inbreeding coefficient of an individual and kinship.
Regular system of inbreeding.

Simple, partial and multiple regression analysis.

SECTION-III

Value and means : population means, average effect and breeding value.
Dominance deviation and interaction deviation.
Variance: component of variance, genetic component of variance Heritability.

SECTION-IV

First degree statistics: Importance and utilization of first degree statistics in quantitative genetics.
Second degree statistics: Mating designs: BIPs, North Carolina design I and II, Line X tester and diallel analysis.
Genotype and environment interaction: type of environment, classification and measurement of Genotype and environment interaction.

Practical

Max. Marks : 30
Practical Exam: 25 **Internal Assessment: 05**

Estimations and calculation of Heritability, Generation mean analysis, First degree statistics, Second degree statistics and North Carolina design I and II, Line X tester and diallel analysis.

Suggested Readings:

Kempthorne, O., *An introduction to Genetic Statestics.* Wiley, New York. 1957.

Mather K and Jinks. J.L, *Biometrical Genetics,* Chapman and Hall. London, 1982.

Singh B. D., Plant Breeding –principal and methods. Kalyani publishers, Ludhiana.

Course Title: INSECTS-PESTS OF FIELD CROPS **Course Number** 47EAG2/ 47EPB3

Objectives : To make the students familiar with various pests of field crops.

MAX. MARKS :100

1.	THEORY : 70	WRITTEN EXAM:55	INTERNAL ASSESSMENT: 15
2.	PRACTICAL: 30	WRITTEN EXAM:25	INTERNAL ASSESSMENT:5

PERIOD PER WEEK – 1. THEORY– THREE OF 45 MINUTES DURATION
2. PRACTICAL– ONE OF THREE HOURS DURATION

INSTRUCTIONS FOR PAPER SETTER:

Question paper will have five sections. First Question will contain 10 short answer type parts of one and half marks each and will cover whole of the syllabus. All parts of this question will be compulsory. Section 'I', 'II', 'III' and 'IV' will have two questions each from respective section, out of which one from each section is to be attempted. Total five questions are to be attempted. Question paper should be as per standard, strictly according to the syllabus. Language of the questions should be simple and straight.

Teaching Aids : Teachers can use lecture, lecture cum demonstration, project, assignments, problem solving, inductive and deductive methods, and can use L.C. Display, L.E. Display, Multimedia projector in addition to black/white board.

SECTION-I

Pest: definition and its categories, losses from pests to agricultural crops and their products.
Natural Control of insect-pests, factors causing pest outbreak in agriculture.
Concept of economic injury and economic thresh hold level. Principal and methods of pest control in reference to IPM- its components *viz.,* physical, legal, cultural, biological and chemical.

SECTION-II

Distribution, host range, life cycle, damage and control of major insect-pests of cereals and millets : Pests of Rice (Rice hoppers, rice hispa, yellow stem borer), Pests of wheat (termites, wheat stem borer and wheat aphid), Pests of Sorghum (shoot fly, stem borer, inflorescence ear head bug), Pests of Bajra (shoot fly, grasshopper and stem borer).

Distribution, host range, life cycle, damage and management of major insect -pests of pulses (gram dohra, pod fly, gram pod borer).

SECTION III

Distribution, host range, life cycle, damage and control of major insect-pests of Oil seeds: Groundnut (red hairy caterpillars, leaf miner), Mustard (mustard aphid, painted bugs).

SECTION IV

Distribution, host range, life cycle, damage and control of major insect-pests of cotton (cotton boll worms, cotton jassid, whitefly), pest of sugarcane (internode borer, termites, woolly aphid, pyrilla), Stored grain Pests (rice weevil, khapra beetle, rice moth).

Practical

Max. Marks: 30

Practical Exam: 25 **Internal Assessment: 05**

Identifications of various above mentioned insect-pests, their behaviors and damaging stages and their control measures.

Suggested Readings:

Srivastva, K.P., *Text book of Applied Entomology.* Kalyani Publishers. Ludhiana, 2009.

Atwal, A.S., and Dhaliwal, G.S., *Agriultural pest of south Asia and their management,* Kalyani Publishers. Ludhiana, 2005.

Dhaliwal, G.S., and Kukal, S.S., *Essentials of Environment Science,* Kalyani Publishers. Ludhiana, 2005.

Course Title: POMOLOGY-I **Course Number** : 47EH01

Objectives: To make the students familiar with basics of fruit production.

MAX. MARKS :100

1.	THEORY : 70	WRITTEN EXAM:55	INTERNAL ASSESSMENT: 15
2.	PRACTICAL:30	WRITTEN EXAM: 25	INTERNAL ASSESSMENT: 5

PERIOD PER WEEK – 1. THEORY–THREE OF 45 MINUTES DURATION
2. PRACTICAL– ONE OF THREE HOURS DURATION

INSTRUCTIONS FOR PAPER SETTER:

Question paper will have five sections. First Question will contain 10 short answer type parts of one and half marks each and will cover whole of the syllabus. All parts of this question will be compulsory. Section 'I', 'II', 'III' and 'IV' will have two questions each from respective section, out of which one from each section is to be attempted. Total five questions are to be attempted. Question paper should be as per standard, strictly according to the syllabus. Language of the questions should be simple and straight.

Teaching Aids : Teachers can use lecture, lecture cum demonstration, project, assignments, problem solving, inductive and deductive methods, and can use L.C. Display, L.E. Display, Multimedia projector in addition to black/white board.

SECTION-I

Origin and domestication of horticultural plants and definitions.
Scope and impact of horticultural crops.
Classification of horticultural plants based on botanical, geographical position and parts used. Horticultural zones of India and Punjab including hilly and high rainfall zone crops.
Development of horticulture in India – phases in development after independence – institutions involved in horticulture.

SECTION-II

Nutritive value and nutra- ceutical properties of horticultural crops
Growth and development of horticultural plants – different stages of growth – juvenile phase, flowering and fruiting
Physiological changes in growth and development – respiration and photosynthesis
Factors influencing seed, dormancy and germination.
Factors influencing growth and development – soil and light.

SECTION-III

Factors influencing growth and development – temperature, rainfall, humidity and wind, Propagation – definition, merits and demerits – sexual and a sexual propagation.
Seed propagation – seed treatments, sowing and seedling establishment.
Vegetative propagation and factors influencing the success of vegetative propagation
Methods of vegetative propagation – cutting and layering.
Methods of vegetative propagation – grafting and budding.
Influence of rootstock on scion, stock / scion relationship.
Use of specialized organs and structure for propagation.

SECTION IV

Micro propagation – merits, demerits and techniques
Cropping systems – intercropping, cover crop, multi-tier cropping practiced in horticultural crops.
Intercultural operations – weed, water and fertilizer management.
Bearing habits and crop regulation including training, pruning and growth regulators.
Pre and post-harvest operations including canopy management and crop loading.
Maturity indices for horticultural crops and harvesting methods.

Practical

Max. Marks : 30

Practical Exam : 25 **Internal Assessment : 05**

Visit to Orchard and study of different components. Horticultural tools and implements used for various operations. Preparation of pot mixture, potting and repotting. Preparation of growth regulators and method of application in horticultural crops. Demonstration of propagation through layering and cutting. Demonstration of propagation through budding. Demonstration of propagation through grafting and top working. Propagation through specialized plant parts. Methods of manuring and irrigation.

Suggested Readings :

Adams, C.R. and. Early M. P. 2004. *Principles of horticulture*. Butterworth – Heinemam, Oxford University Press.

Chadha, K.L. 2001, *Handbook of Horticulture*, ICAR, New Delhi.

Chattopadhyaya, P.K.2001. *A text book on Pomology (Fundamentals of fruit growing)* Kalyani Publication, New Delhi.

Christopher, E.P. 2001. *Introductory Horticulture*, Biotech Books, New Delhi.

Edmond, J.B. T.L.Senn, F.S. Andrews and P.G.Halfacre,1975. *Fundamentals of Horticulture*, Tata MC. Graw Hill Publishing Co.New Delhi.

George Acquaah, 2002, *Horticulture-principles and practices*. Prentice– Hall of India Pvt. Ltd., New Delhi.

Hartman, H.T. and Kester, D.E. 1986. *Plant propagation – Principles and Practices* – Prentice Hall of India Ltd., New Delhi.

Jitendra Singh. 2006. *Basic Horticulture*. Kalyani Publishers, New Delhi.

Rajan, S. and B.L. Markose. 2007. *Propagation of horticultural crops*. New India Publishing, New Delhi.

Singh, N.P. 2005. *Basic concepts of fruit science*. International Book Distributing Co., Lucknow.

Surendra Prasad and U. Kumar. 1999. *Principles of horticulture*, Agro-botanica, Bikaner, India.

Course Title: NURSERY PRODUCTION **Course Number** : 47EH02

Objectives : To make the students familiar with basics of nursery raising.

MAX. MARKS :100

1.	THEORY :70	WRITTEN EXAM:55	INTERNAL ASSESSMENT: 15
2.	PRACTICAL:30	WRITTEN EXAM:25	INTERNAL ASSESSMENT:5

PERIOD PER WEEK – 1. THEORY–THREE OF 45 MINUTES DURATION
2. PRACTICAL– ONE OF THREE HOURS DURATION

INSTRUCTIONS FOR PAPER SETTER:

Question paper will have five sections. First Question will contain 10 short answer type parts of one and half marks each and will cover whole of the syllabus. All parts of this question will be compulsory. Section 'I', 'II', 'III' and 'IV' will have two questions each from respective section, out of which one from each section is to be attempted. Total five questions are to be attempted. Question paper should be as per standard, strictly according to the syllabus. Language of the questions should be simple and straight.

Teaching Aids : Teachers can use lecture, lecture cum demonstration, project, assignments, problem solving, inductive and deductive methods, and can use L.C. Display, L.E. Display, Multimedia projector in addition to black/white board.

SECTION I

Scope and importance of vegetable and flower nurseries
planning I - location, soil, topography, layout, paths, roads, nursery beds, office, store, potting yard
planning II - water, containers, electricity, fencing, shelter belts – Propagation structures - greenhouses,
Mist chambers, polyhouses – growing media - selection of media, quality of media, soil, sand, peat, leaf mould, saw dust, sphagnum moss, coco peat.

SECTION II

Propagation – seed germination – dormancy-methods of breaking dormancy – pre-sowing seed treatment.
seed hardening – seed priming-seed pelleting- methods of sowing – irrigation systems- nutrient management – water soluble and liquid fertilizers – use of biocontrol agents-growth regulators-plant protection-techniques to harden the seedlings
Transport and packing of nursery plants – quality control-sales promotion.

SECTION III

Varieties and F_1 hybrids – seed rate – seed treatments –sowing – media-management for water, nutrients and plant protection, hardening, packaging, storage, transport and marketing of tomato, brinjal, chilli, capsicum, cucurbits, cabbage, cauliflower, carrot, radish, china aster, marigold, gaillardia, zinnia, petunia, gomphrena.

SECTION IV

Varieties and F_1 hybrids – seed rate – seed treatments –sowing – media-management for water, nutrients and plant protection, hardening, packaging, storage, transport and marketing of mango, citrus, lichi, lemon, apple, pear, peach, guava, forest trees like popular, eucalyptus and important ornamental trees.

Practical

Max. Marks: 30

Practical Exam: 25 **Internal Assessment: 05**

Cataloguing the sources of varieties and new F1 hybrids for seedling and seed production.
Features of nursery-factors to be considered for setting up of nursery
Studying the problems of nursery business
Visit to commercial vegetables, flower crops nursery
Construction of protected structure for seedling production-working out cost economics
Seed sowing-vegetable crops-annual flower crops
Application of growth regulators for nursery
Irrigation and nutrient management-liquid fertilization
Plant protection-use of botanicals
Care of nursery plants (shifting of plants, weeding, shade provision, watering, hardening).

Suggested Readings:

Grewal, H.S. 1999. *Propagation of ornamental plants*, Kalyani Publishers, New Delhi
Hartmann, H.T. and D.E. Kester; 1989. *Plant propagation-Principles and practices*. Prentice – Hall of India, New Delhi.
Nanda, K.K. and V.K. Kochhar; 1991. *Vegetative propagation and management*. Indus Publishing Company, New Delhi.
Sadhu, N.K. 1989. *Plant propagation*, Wiley Eastern Ltd., New Delhi.
Agarwal, R.L. 2005. *Seed Technology*. Oxford and IBH publishing Co. New Delhi.

Course Title : INSECTS-PESTS OF HORTICULTURE AND VEGETABLES **Course Number:** 47EH03

Objectives: To make the students familiar with various pests of horticulture and vegetables crops.

MAX. MARKS :100

1.	THEORY : 70	WRITTEN EXAM:55	INTERNAL ASSESSMENT: 15
2.	PRACTICAL:30	WRITTEN EXAM:25	INTERNAL ASSESSMENT: 5

PERIOD PER WEEK – 1. THEORY–THREE OF 45 MINUTES DURATION
2. PRACTICAL– ONE OF THREE HOURS DURATION

INSTRUCTIONS FOR PAPER SETTER:

Question paper will have five sections. First Question will contain 10 short answer type parts of one and half marks each and will cover whole of the syllabus. All parts of this question will be compulsory. Section 'I', 'II', 'III' and 'IV' will have two questions each from respective section, out of which one from each section is to be attempted. Total five questions are to be attempted. Question paper should be as per standard, strictly according to the syllabus. Language of the questions should be simple and straight.

Teaching Aids : Teachers can use lecture, lecture cum demonstration, project, assignments, problem solving, inductive and deductive methods, and can use L.C. Display, L.E. Display, Multimedia projector in addition to black/white board.

SECTION- I

Pest: definition and its categories, losses from pests to agricultural crops and their products.
Natural Control of insect-pests, factors causing pest outbreak in agriculture.
Concept of economic injury and economic thresh hold level. Principal and methods of pest control in reference to IPM- its components *viz.,* physical, legal, cultural, biological and chemical.

SECTION- II

Distribution, host range, life cycle, damage and control of insect-pests of winter vegetables (potato tuber moth, potato aphid, white grubs; onion maggots, onion thrips; pea leaf miner, pea aphid, pea pod borer).

Distribution, host range, life cycle, damage and control of insect-pests of summer vegetables (melon fruit fly, red pumpkin beetle, hadda beetle; sweet potato weevil)

Distribution, host range, life cycle, damage and control of insect-pests of chillies (thrips, aphid, pod borer) and turmeric (rhizome scale, leaf roller).

SECTION- III

Distribution, host range, life cycle, damage and control of insect-pests of temperate fruits (Apple root borer, apple stem borer, Apple woolly aphis, Tent caterpiller, codling moth, peach stem borer, peach leaf curl aphid, peach fruit fly, cherry stem borer, walnut weevil, almond weevil)

SECTION- IV

Distribution, host range, life cycle, damage and control of insect-pests of Sub tropical fruits (citrus caterpillar, citrus psylla, citrus leaf miner, citrus white fly, bark caterpillar, citrus mealy bug, citrus mite, ber fruit fly, ber beetle, litchi bug, bark eating caterpillar of loquat).

Practical

Max. Marks : 30

Practical Exam: 25 **Internal Assessment : 05**

Identifications of various above mentioned insect-pests, their behaviors and damaging stages and their control measures.

Suggested Readings:

Srivastva, K.P., *Text book of Applied Entomology.* Kalyani Publishers. Ludhiana, 2009.

Atwal, A.S., and Dhaliwal, G.S *Agriultural pest of south Asia and their management,* Kalyani Publishers.Ludhiana,2005.

Singh, R., *Fruits,* National Book Trust of India, New Delhi, 1969.

Das , P.C., *Vegetable crops of India*, Kalyani Publishers, Ludhiana, 1993.

Chauhan, D.V., *Vegetable production in India*, S. Ram Prasad and Sons, Agra, 1993

Package of Practices for Vegetable crops, P.A.U. Publications Ludhiana, Corresponding year.

SEMESTER VIII

Course Title : RECENT TRENDS IN AGRICULTURE **Course Number** : 481

Objectives : To make the students familiar with latest practices in commercial agriculture.

MAX. MARKS :100

1.	THEORY :70	WRITTEN EXAM:55	INTERNAL ASSESMENT:15
2.	PRACTICAL:30	WRITTEN EXAM:25	INTERNAL ASSESMENT:5

PERIOD PER WEEK – 1. THEORY–THREE OF 45 MINUTES DURATION
2. PRACTICAL– ONE OF THREE HOURS DURATION

INSTRUCTIONS FOR PAPER SETTER:

Question paper will have five sections. First Question will contain 10 short answer type parts of one and half marks each and will cover whole of the syllabus. All parts of this question will be compulsory. Section 'I', 'II', 'III' and 'IV' will have two questions each from respective section, out of which one from each section is to be attempted. Total five questions are to be attempted. Question paper should be as per standard, strictly according to the syllabus. Language of the questions should be simple and straight.

Teaching Aids : Teachers can use lecture, lecture cum demonstration, project, assignments, problem solving, inductive and deductive methods, and can use L.C. Display, L.E.Display, Multimedia projector in addition to black/white board.

SECTION-I

Cultivation of crops for biofuels
Molecular marker assisted introgression
Zero tillage concepts

SECTION-II

Vertical farming
Genetically engineered crops Advantages and Disadvantages
Baby corn cultivation and other frozen vegetable food.

SECTION-III

Organic crop cultivation
New agronomic practices growing crops on raised beds e.g. wheat
Drip irrigation system.

SECTION-IV

Green house cultivation
E-commerce, the sales in agriculture has been improving
WTO – Agreement on Agriculture.

Practical

Max Marks: 30

Practical Exam: 25 **Internal Assessment: 05**

Practical work will be decided as per discussion in class on most recent topic.

Suggested Readings :

Tarafdar JC, Tripathi KP & Mahesh Kumar 2007. *Organic Agriculture*. Scientific Publ.
Dwivedi P, Dwivedi SK & Kalita MC. 2007. *Biodiversity and Environmental Biotechnology.* Scientific Publ.
Narasaiah ML. 2004. *World Trade Organization and Agriculture*. Sonali Publ.

Course Title : IRRIGATION & WATER MANAGEMENT : **Course Number** : 482

Objectives : To acquaint students about soil water relationship in context to crops.

MAX. MARKS :100

1.	THEORY : 70	WRITTEN EXAM:55	INTERNAL ASSESSMENT: 15
2.	PRACTICAL:30	WRITTEN EXAM:25	INTERNAL ASSESSMENT: 5

PERIOD PER WEEK –
1. THEORY–THREE OF 45 MINUTES DURATION
2. PRACTICAL– ONE OF THREE HOURS DURATION

INSTRUCTIONS FOR PAPER SETTER:

Question paper will have five sections. First Question will contain 10 short answer type parts of one and half marks each and will cover whole of the syllabus. All parts of this question will be compulsory. Section 'I', 'II', 'III' and 'IV' will have two questions each from respective section, out of which one from each section is to be attempted. Total five questions are to be attempted. Question paper should be as per standard, strictly according to the syllabus. Language of the questions should be simple and straight.

Teaching Aids : Teachers can use lecture, lecture cum demonstration, project, assignments, problem solving, inductive and deductive methods, and can use L.C. Display, L.E.Display, Multimedia projector in addition to black/white board.

SECTION-I

Irrigation and its importance, Time of irrigation. Principal of irrigation, soil moisture relationship and tension curve. Methods of moisture estimation in soils. Basis for scheduling irrigation to crops : plant basis and climatological approach.

SECTION-II

Sources and modes of irrigation, irrigation system of Punjab, Flood irrigation, furrow irrigation, sub surface irrigation and sprinkler irrigation. Methods of measurement of irrigation water. Efficiency of irrigation. Water requirement of different crops.

SECTION-III

Waterlogging, different types of water movement in soil. Principal of drainage: surface drainage and sub surface drainage. Kind of sub surface drains. Crop response to quality of irrigation water. Irrigation management and problem, Soil irrigation for frost protection.

SECTION-IV

Erosion problems in Punjab and India. Causes and effects of erosion, Factors responsible for water and wind erosion. Universal soil loss equation. Land use capability classification. Form of wind and water erosion. Different methods of water conservation. Erosion control measures.

Practical

Max. Marks: 30

Practical Exam: 25 Internal Assessment : 05

Determination of soil moisture by different methods. Measurement of field capacity and permanent wilting points. Simple calculation to determine the water deficit, time of irrigation area to be irrigated and discharge needed for irrigation. Measurement of irrigation water. Preparation of land for different methods of irrigation. Visit to area affected by erosion. Visit to soil conservation research and demonstration center.

Suggested Readings:

Iraeslon, *Irrigation Principles,* John Willey & Sons New Delhi 1996.
Gandhi R T., Gupta, P.C., Joseph, A.P. and Rage, N. I, Handbook of Irrigation Water Management.
Mickael, A.M., Irrigation Theory and Practices.

Course Title : INTERNSHIP IN AGRICULTURAL RELATED IND./VET. HOP/ VILLAGE/GOVT. NURSERIES **Course Number** : 483

Objectives : To make students familiar with practical area of agriculture and its allied area.

MAX. MARKS :100

PRACTICAL TRAINING OF ONE MONTH DURATION

Students will be evaluated from time to time during their internship period depending upon their interaction, involvement and knowledge exchange.

Course Title : WEED CONTROL **Course Number** : 48EAG1

Objectives: To familiarize the students about the weeds, herbicides and methods of weed control.

MAX. MARKS :100

1.	THEORY :70	WRITTEN EXAM:55	INTERNAL ASSESSMENT:15
2.	PRACTICAL:30	WRITTEN EXAM:25	INTERNAL ASSESSMENT:5

PERIOD PER WEEK – 1. THEORY--THREE OF 45 MINUTES DURATION
2. PRACTICAL— ONE OF THREE HOURS DURATION

INSTRUCTIONS FOR PAPER SETTER:

Question paper will have five sections. First Question will contain 10 short answer type parts of one and half marks each and will cover whole of the syllabus. All parts of this question will be compulsory. Section 'I', 'II', 'III' and 'IV' will have two questions each from respective section, out of which one from each section is to be attempted. Total five questions are to be attempted. Question paper should be as per standard, strictly according to the syllabus. Language of the questions should be simple and straight.

Teaching Aids : Teachers can use lecture, lecture cum demonstration, project, assignments, problem solving, inductive and deductive methods, and can use L.C. Display, L.E.Display, Multimedia projector in addition to black/white board.

SECTION-I

Weed biology and ecology - crop – weed interference – principles of weed management – classification of weed management techniques – weed indices.
Herbicides – introduction – history – classification based on chemical, physiological, methods of application and selectivity– mode and mechanism of action – herbicide selectivity – herbicide antidotes/safeners.

SECTION-II

Herbicide structure and properties – factors affecting the efficiency of herbicides –herbicide formulations – herbicide mixtures -Degradation of herbicides in soil and plants -Herbicide resistance in weeds and management – weed shift in cropping systems – weed control through bioherbicides and allelochemicals— herbicide resistant crops - herbicide rotation

SECTION-III

Weed control/ management in major *rabi* crops (wheat, barley, winter maize, spring maize, gram, lentil and summer moong) cropping systems and non – cropped situations —control of parasitic weeds – control of aquatic and perennial weeds.

SECTION-IV

Weed control/ management in major *kharif* crops (rice, maize, bajra, cotton, sugarcane and soybean)
Integrated weed management - economics of weed management – new trends in weed management
Genetically modified crops for herbicide resistance: their advantages and possible risks.

Practical

Max Marks: 30

Practical Exam : 25 Internal Assessment: 05

Identification of important weeds and preparation of herbarium
Weed survey in crops and cropping systems
Crop - weed competition studies
Calibration of sprayers
Calculation of herbicide requirements
Use of various types of spray pumps and nozzles
Preparation of spray solutions and application of herbicides
Herbicide residue bioassay
Studies on allelopathic influence of various crops and weeds
Planning and execution of weed control experiments

Suggested Readings:

Aldrich, R.J., Kramer, R.J. 1997. *Principles in Weed Management*. Panima publ.

Ashton, F.M and Crafts, A.S. 1981. *Mode of Action of Herbicides* (2nd Ed). Wiley Inter Science.
Gupta,O.P. 2007. *Weed Management – Principles and Practices*. Agrobios
Mandal, R. C, 1990. *Weed, Weedicides and Weed Control – Principles and Practices*. Agro – Botanical Publ.
Rao, V.S. 2000. *Principles of Weed Science.* Oxford & IBH
Subramanian, S. Ali, A.M and Kumar, RJ. 1997. *All About Weed Control*. Kalyani
Zimdahl RL. 1999. *Fundamentals of Weed Science* (2nd Ed). Academic Press.

Course Title : BIOFERTILIZERS **Course Number** : 48EAG2

Objectives : To make the students familiar with principle and uses of biofertilizers.

MAX. MARKS:-100

1.	THEORY : 70	WRITTEN EXAM:55	INTERNAL ASSESSMENT:15
2.	PRACTICAL: 30	WRITTEN EXAM:25	INTERNAL ASSESSMENT: 5

PERIOD PER WEEK – 1. THEORY-THREE OF 45 MINUTES DURATION
2. PRACTICAL- ONE OF THREE HOURS DURATION

INSTRUCTIONS FOR PAPER SETTER:

Question paper will have five sections. First Question will contain 10 short answer type parts of one and half marks each and will cover whole of the syllabus. All parts of this question will be compulsory. Section 'I', 'II', 'III' and 'IV' will have two questions each from respective section, out of which one from each section is to be attempted. Total five questions are to be attempted. Question paper should be as per standard, strictly according to the syllabus. Language of the questions should be simple and straight.

Teaching Aids : Teachers can use lecture, lecture cum demonstration, project, assignments, problem solving, inductive and deductive methods, and can use L.C. Display, L.E.Display, Multimedia projector in addition to black/white board.

SECTION-I

Introduction and importance of biofertilizers
Biofertilizer classification, Biofertilizer demand and production.
Standard and quality control.
Effect of biofertilizer on crop yield and contribution of biofertilizer to agriculture
Different agriculturally important beneficial microorganisms – free living, symbiotic (rhizobial, actinorhizal), associative and endophytic nitrogen fixers including cyanobacteria.

SECTION-II

Different agriculturally important beneficial microorganisms – phosphate solubilizing bacteria and fungi, including mycorrhiza.
Bacterial biofertilizers
Cynobacterial biofertiliser, phosphate solublizing micro organism
Commercial production of bacterial biofertilizers.

SECTION-III

Different agriculturally important beneficial microorganisms – plant growth promoting rhizobacteria.
Production of arbuscular mycorrhiza
Different agriculturally important beneficial microorganisms for recycling of organic waste and compositing, bioremediators and other related microbes.

SECTION-IV

Different agriculturally important beneficial microorganisms - selection, establishment, competitiveness, crop productivity, soil and plant health, mass scale production and quality control of bio inoculants. Biofertilizer inoculation and microbial communities in the soil.
Advantages and limitation of biofertilizers.

Practical

Max. Marks: 30
Practical Exam: 25 **Internal Assessment: 05**

Laboratory Equipments
Efficient use of biofertilizers, technique of treating legume seeds with *Rhizobium* cultures
Method of application of biofertilizers
Economics of biofertilizer production
Media preparation
Isolation and identification of *Azotobacter*
Visit to commercial biofertilizer production unit

Suggested Readings:

Sharma, A.K. 2005. *Biofertilizers for Sustainable Agriculture*. Agrobios (India), Jodhpur.
Alexander, M. 1961. *Introduction to Soil Microbiology* John Wiley & Sons, Inc., New York
Kannaiyan S. Kumar, K & Govindarajan K. 2004. *Biofertilizers Technology*. Scientific Publ.
Gaur, A.C. 2006. *Biofertilizers in Sustainable Agriculture*. ICAR, New Delhi.

Course Title : APPLIED PLANT PATHOLOGY **Course Number** : 48EAG3/ 48EPB3

Objectives : To make the students familiar with various plant diseases principles.

MAX. MARKS :100

1.	THEORY :70	WRITTEN EXAM:55	INTERNAL ASSESSMENT:15
2.	PRACTICAL:30	WRITTEN EXAM:25	INTERNAL ASSESSMENT: 5

PERIOD PER WEEK – 1. THEORY-THREE OF 45 MINUTES DURATION
2. PRACTICAL- ONE OF THREE HOURS DURATION

INSTRUCTIONS FOR PAPER SETTER:

Question paper will have five sections. First Question will contain 10 short answer type parts of one and half marks each and will cover whole of the syllabus. All parts of this question will be compulsory. Section 'I', 'II', 'III' and 'IV' will have two questions each from respective section, out of which one from each section is to be attempted. Total five questions are to be attempted. Question paper should be as per standard, strictly according to the syllabus. Language of the questions should be simple and straight.

Teaching Aids : Teachers can use lecture, lecture cum demonstration, project, assignments, problem solving, inductive and deductive methods, and can use L.C. Display, L.E.Display, Multimedia projector in addition to black/white board.

SECTION-I

Definition of Plant Pathology –history of Plant Pathology.
Cause of Plant diseases – pathogen – fungi - bacteria, rickettsia like bacteria, phytoplasma, fastidious vascular bacteria, spiroplasms like organism, virus viroids, algae and phanerogamic parasites.
General characters of fungi, mycelium – asexual and sexual spores.
General characters of myxomycota, mastigomycotina and taxonomy
Symptoms of club root and cabbage, damping off and life cycles and Plasmodiophora,
Pythium and Phytophthora.
Symptoms of downy mildew and white rust – life cycles of Sclerospora, Albugo.

SECTION-II

General characters of zygomycotina and taxonomy– Symptoms of fruit rot –life cycle of Rhizopus and Mucor.
General characters of Ascomycotina and taxonomy.
Classification, symptoms and life cycle of powdery mildew – Erysiphe and conidial stages of powdery mildew pathogens and Claviceps.
General characters of Basidiomycotina and taxonomy – Edible Mushrooms
Symptoms of rust – Life cycle of Puccinia.
Symptoms of smut and life cycle of Ustilago and Neovassia

SECTION-III

General characters of Deuteromycotina and taxonomy.
Symptoms of leaf spot, leaf blight, root rot and wilt and diseases cycles of – Alternaria,

Helminthosporium, Colletrotrichum Pyricularis, Macrophomina and Fusarium.
Symptoms of bacterial diseases – leaf spot, streak, blight, canker, scab, wilt crown gall and soft rot.
General characters – Symptoms of phytoplasma diseases – phyllody, little leaf, dwarf,
yellows and sandal spike, spiroplasma and fastidious vascular bacteria and characters of algal parasite – Cephaleuros.
Virus – definition, nature and properties of plant virus common symptoms of virus and viroid diseases – Chlorosis, mosaic, stripe, vein clearing, vein banding, crinkle/ enation, necrosis/ dwarfing, rosette, bunchy top and twisting, cadang of coconut, potato spindle tuber.
Phanerogamic parasite total – partial – stem and root – Cuscuta, Orobanche, Loranthus and Striga.

SECTION-IV

Principles of diseases management – Avoidance of pathogens – Exclusion – plant quarantine domestic and foreign embargo – Exotic diseases, Phytosanitary certificate.
Eradication – physical, chemicals and cultural methods.
Protection – chemical protection, cultural methods – Cross protection.
Types of resistance, vertical resistance and horizontal resistance – Development of resistance varieties.
Biological control – biocontrol agents, fungi, bacterial, and plant products – methods of
application of biocontrol agents – Plant products and anti viral principles.
Biotechnological approaches of crop disease management such as meristem tip culture,
somoclonal variation, Coast protein mediated resistance and Genetic Engineering.

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Practical

Max. Marks: 30
Practical Exam : 25 **Internal Assessment : 05**

General characters of fungi – Types of mycelium and resting bodies. Types of asexual and sexual spores.. Study of symptoms and host parasite relationship and systematic position of plant pathogens– Club root, Damping off, White rust and downy mildew Rhizopus rot, Powdery mildews, sugary diseases and sooty mould
Rusts, Smuts and Edible mushrooms (Oyster, Milky and button)
Root rot, stem rot, foot rot, collar rot and wilt.
Leaf spots, blights and Anthracnose.

Symptoms of bacterial diseases – leaf spot, blight, canker, scab, crown gall, wilt and soft rot– Phytoplasma diseases.
Symptoms and vectors of viral diseases – Chlorosis, mosaic, stripe, vein clearing, vein bandling, leaf crinkle and leaf curl, Enation, necrosis, dwarfing, rosette, bunchy top and twisting.
Symptoms of algal diseases – *Cephaleurous* and Phanerogamic parasites.
Field visit

Suggested Readings:

Agrios, G.N.1998, Plant Pathology, 3rd Edition Academic Press, New York.
Alexopolus, C.J. and Mims, 1989, Introductory Mycology, Willey Eastern Ltd., New Delhi.
Alice, D., C.Jayalakshmi and K.Sethuraman 2007. Hand Book on Introductory Plant Pathology, A.E. Publication, Coimbatore.
CHattopadhyay, S.G.1998. Principles and Procedure of Plant Protection – Oxford and IBH publications, New Delhi.
Dasgupta, M.K.1988. Principles of Plant Pathology, Allied Publishers Pvt.Ltd. Banagalore
Maramorach, K. 1998. Plant Diseases of Viral, Viroid, Mycoplasma and uncertain Etiology, Oxford and IBM publications, New Delhi.
Mehrotra, R.S. 1990. An Introductions to Mycology, Willey Eastern Ltd., New Delhi.
Narayanasamy, P.1997. Plant Pathogens and Detections and Diseases Control Oxford and IBH Publishing Co. Ltd, New Delhi.
Nene, Y.L. and Thapliyal, P.N.1998. Fungicides in plant diseases control. Oxford and IBH publishing Co.Ltd, New Delhi.
Prakasam, V., T.Raguchander, and K. Prabakar, 2006. Applied Plant Pathology, A.E. Publications, Coimbatore.
Vidyasekaran, P.1993, Principles of Plant Pathology, CBS publishers and Distributors, New Delhi.

Course Title : BREEDING FIELD CROPS Course Number : 48EPB1

Objectives : To learn basic plant breeding and genetic principles for crop improvement.

MAX. MARKS :100

1.	THEORY :70	WRITTEN EXAM:55	INTERNAL ASSESSMENT: 15
2.	PRACTICAL:30	WRITTEN EXAM:25	INTERNAL ASSESSMENT:5

PERIOD PER WEEK –
1. THEORY-THREE OF 45 MINUTES DURATION
2. PRACTICAL- ONE OF THREE HOURS DURATION

INSTRUCTIONS FOR PAPER SETTER:

Question paper will have five sections. First Question will contain 10 short answer type parts of one and half marks each and will cover whole of the syllabus. All parts of this question will be compulsory. Section 'I', 'II', 'III' and 'IV' will have two questions each from respective section, out of which one from each section is to be attempted. Total five questions are to be attempted. Question paper should be as per standard, strictly according to the syllabus. Language of the questions should be simple and straight.

Teaching Aids : Teachers can use lecture, lecture cum demonstration, project, assignments, problem solving, inductive and deductive methods, and can use L.C. Display, L.E.Display, Multimedia projector in addition to black/white board.

SECTION-I

Breeding objectives and important concepts of breeding in crops like wheat, barley, gram, lentil.

SECTION-II

Breeding objectives and important concepts of breeding for fodder crops like fodder maize, oat, barseem and Lucerne

SECTION-III

Breeding objectives and important concepts of breeding in crops like rice, maize, bajra and pigean pea.

SECTION-IV

Breeding objectives and important concepts of breeding cotton, sugarcane, groundnut and basmati rice.

Practical

Max. Marks :30

Practical Exam : 25 **Internal Assessment :05**

Emasculation and Hybridization techniques
Study of morphological and pattern of variations in different crop plants

Field layout of experiments; Field trials, maintenance of records and registers

Suggested readings :

Allard, R.W., *Principles of Plant Breeding*, John Wiley & Sons, New York, 1999.

Singh, B.D., *Plant Breeding*, Kalyani Publishers. New Delhi, 2009.

Poehlman, J.N. and Borthakur, D.N, *Breeding Asian Field Crops*, Oxford and IBH Pub. Co., New Delhi, 2000.

Singh, P., *Essentials of Plant Breeding*, Kalyani Publishers. New Delhi, 2009.

Course Title : GENERAL GENETICS **Course Number** : 48EPB2

Objectives : To learn basic genetic principles for crop improvement.

MAX. MARKS :100

1.	THEORY :70	WRITTEN EXAM:55	INTERNAL ASSESSMENT: 15
2.	PRACTICAL-30	WRITTEN EXAM:25	INTERNAL ASSESSMENT: 5

PERIOD PER WEEK – 1. THEORY-THREE OF 45 MINUTES DURATION
2. PRACTICAL- ONE OF THREE HOURS DURATION

INSTRUCTIONS FOR PAPER SETTER:

Question paper will have five sections. First Question will contain 10 short answer type parts of one and half marks each and will cover whole of the syllabus. All parts of this question will be compulsory. Section 'I', 'II', 'III' and 'IV' will have two questions each from respective section, out of which one from each section is to be attempted. Total five questions are to be attempted. Question paper should be as per standard, strictly according to the syllabus. Language of the questions should be simple and straight.

Teaching Aids : Teachers can use lecture, lecture cum demonstration, project, assignments, problem solving, inductive and deductive methods, and can use L.C. Display, L.E.Display, Multimedia projector in addition to black/white board.

SECTION-I

Introduction and history of genetics, future of genetics, basic concepts and branches of genetics.
Introduction to Mendelian traits in human, variation in gene expression, human pedigree and inheritance patterns.

Gene interaction and modified mendelian ratio: gene interaction that produce noval phenotype. Examples of epistasis, complementary interaction, supplementary, lethal interaction and polygenic inheritance.

SECTION-II

Multiple alleles : characterstics of multiple alleles, multiple alleles in animals. ABO blood group in humans. RH blood group.
Linkage, Morgan's concept of linkage, arrangement of linked genes, linkage in drosophila. Examples of crossing over and mechanism of crossing over. Kinds of crossing overs.
Theories of crossing over and cytological evidence of crossing over.

SECTION-III

Concept of morphological, Isozyme and DNA markers.
Different types of sex determination mechanisms.

Gene mutation and its molecular basis detection of mutation by CIB method.

SECTION-IV

Human disorder associated with haemoglobin : sickle cell anaemia, thalassemia.
Other genetic disorder like duchenne muscular dystrophy, cystic fiberosis, hypertension and intersexes.

Gene regulation in bacteria : operon structure, inducible & repressible operons, *lac* operon in E. coli.

Positive control and catabolic repression.

Practical

Max. Marks: 30

Practical Exam : 25 Internal Assessment: 05

Numerical exercises related to mendalian principles and gene interactions.
Study of multiple alleles taking human blood group example.
Study and estimation of linkage.
Study of simple human trait variations in class.
Construction of linkage map among three linked genes.

Suggested Readings:

Gardner EJ & Snustad DP. 1991. *Principles of Genetics*. John Wiley & Sons.
Russell PJ. 1998. *Genetics*. The Benzamin/Cummings Publ. Co.
Strickberger MW. 2005. *Genetics (III Ed)*. Prentice Hall, New Delhi, India
Singh P. 2002. *Objective Genetics and Plant Breeding*. Kalyani.

Course Title : POMOLOGY-II **Course Number** : 48EHO1

Objectives: To make the students familiar with basics of fruit production.

MAX. MARKS :100

1. THEORY :70	WRITTEN EXAM:55	INTERNAL ASSESSMENT: 15
2. PRACTICAL:30	WRITTEN EXAM:25	INTERNAL ASSESSMENT: 5

PERIOD PER WEEK – 1. THEORY-THREE OF 45 MINUTES DURATION
2. PRACTICAL- ONE OF THREE HOURS DURATION

INSTRUCTIONS FOR PAPER SETTER:

Question paper will have five sections. First Question will contain 10 short answer type parts of one and half marks each and will cover whole of the syllabus. All parts of this question will be compulsory. Section 'I', 'II', 'III' and 'IV' will have two questions each from respective section, out of which one from each section is to be attempted. Total five questions are to be attempted. Question paper should be as per standard, strictly according to the syllabus. Language of the questions should be simple and straight.

Teaching Aids : Teachers can use lecture, lecture cum demonstration, project, assignments, problem solving, inductive and deductive methods, and can use L.C. Display, L.E.Display, Multimedia projector in addition to black/white board.

SECTION-I

Principles of breeding of horticultural crops improvement of fruits.
Importance of fruits and vegetable in human nutrition.
Area, production and Contribution of Horticulture fruit crops in National Economy and exports.
Programmes of development - National Horticulture Mission.

SECTION-II

Growth and Development physiology of flowering, fruit set and development, parthenocarpy and seedlessness.
Maturity and ripening plant growth regulators and their role.
Physiological basis and morphology of flowering and fruiting (berry, stone, pome, nut).
Improved production technology of fruits, high density planting. Integrated nutrient and water management, fertigation precision farming in horticulture watershed management for promotion of horticulture.

SECTION-III

Protected cultivation training. pruning and canopy management.
Genetic terminology relation to fruit breeding like self incompatibility, type of dichogamy, allopolyploids, auto polyploidy, vivipary and heterostyly .
Biotic and abiotic stress breeding, biotechnological tools for breeding for fruits.
Micropropogation, meristem culture, ovule culture, in vitro pollination.

SECTION-IV

Production of' bio-agents and bio-fertilizer and green house management stionic relations and rootstock.

Importance of post harvest handling, in horticultural crops,

Different method of storages cool chain management, processing for value addition and product diversification disease management in storage, packing and grading and packing technology.
Quality assurance and food laws.

Practical

Max. Marks: 30
Practical Exam : 25 **Internal Assessment : 05**

Visit to identify temperate, tropical and sub tropical fruit plants.

Visit to fruit processing units.

Bearing habits and training practices in horticultural crops.

Pruning practices in horticultural crops.

Maturity indices for various horticultural crops, handling, storage and packing techniques.

Visit to private orchards to identify different layout and cultural practices.

Suggested Readings:

Adams, C.R. and M. P. Early. 2004. *Principles of Horticulture*. Butterworth – Heinemam, Oxford University Press.

Chadha, K.L. 2001, *Handbook of Horticulture*, ICAR, New Delhi.

Chattopadhyaya, P.K.2001. *A Text Book on Pomology (Fundamentals of Fruit Growing)* Kalyani Publication, New Delhi

Christopher, E.P. 2001. *Introductory Horticulture*, Biotech Books, New Delhi

Edmond, J.B. T.L. Senn, F.S. Andrews and P.G.Halfacre, 1975. *Fundamentals of Horticulture*, Tata MC. Graw Hill Publishing Co.New Delhi

George Acquaah, 2002, *Horticulture-principles and practices*. Prentice-Half of India pvt. Ltd., New Delhi.

Hartman, H.T. and Kester, D.E. 1986. *Plant Propagation – Principles and Practices* – Prentice Hall of India Ltd., New Delhi.

Jitendra Singh. 2006. *Basic Horticulture*. Kalyani Publishers, New Delhi.

Rajan, S. and B.L. Markose. 2007. *Propagation of Horticultural Crops*. New India Publishing, New Delhi.

Singh, N.P. 2005. *Basic Concepts of Fruit Science*. International Book Distributing Co.,Lucknow.

Surendra Prasad and U. Kumar. 1999. *Principles of Horticulture*, Agro-Botanica, Bikaner, India.

Course Title : CULTURING VEGETABLE **Course Number** : 48EHO2

Objectives : To make the students familiar with basics culturing vegetable.

MAX. MARKS :100

1.	THEORY : 70	WRITTEN EXAM :55	INTERNAL ASSESSMENT:15
2.	PRACTICAL:30	WRITTEN EXAM: 25	INTERNAL ASSESSMENT: 5

PERIOD PER WEEK – 1. THEORY-THREE OF 45 MINUTES DURATION
2. PRACTICAL- ONE OF THREE HOURS DURATION

INSTRUCTIONS FOR PAPER SETTER:

Question paper will have five sections. First Question will contain 10 short answer type parts of one and half marks each and will cover whole of the syllabus. All parts of this question will be compulsory. Section 'I', 'II', 'III' and 'IV' will have two questions each from respective section, out of which one from each section is to be attempted. Total five questions are to be attempted. Question paper should be as per standard, strictly according to the syllabus. Language of the questions should be simple and straight.

Teaching Aids : Teachers can use lecture, lecture cum demonstration, project, assignments, problem solving, inductive and deductive methods, and can use L.C. Display, L.E.Display, Multimedia projector in addition to black/white board.

SECTION-I

Types of vegetable garden : kitchen garden, market garden, truck garden, floating garden.
Botanical classification of vegetables crops.

Nursery raising, seed bed preparation and transplanting of vegetable crops.

SECTION-II

Seed rate, climate and soil requirement of important vegetable crops (tomato, brinjal, potato, chilli, capsicum, cucarbits, cole crops, root crops)

Weed management and irrigation, fertilizers and manure requirement of tomato, brinjal, potato, chilli, capsicum, cucarbits , cole crops, root crops.

SECTION-III

Harvesting and yield of vegetable crops.
Tolerance of vegetable crops to soil acidity and soil salinity.
Isolation distance for certified seed production in vegetables.

SECTION-IV

Preservation and processing of vegetables.
Genetically modified vegetable crops for human welfare.
Storage life and storage methods for vegetables.
Growing of off season vegetables in green houses and polyhouses.

Practical

Max. Marks: 25

Practical Exam: 20 **Internal Assessment : 05**

Sowing and identification of various vegetable crops, varieties and seeds. Preparation of the field for sowing/ transplanting of various crops.

Application of manure and fertilizers, watering, hoeing, other cultural operations.

Prepare calendar of operation for various vegetables growing in Punjab.

Suggested Readings:

Dhaliwal M.S., *Handbook of Vegetable Crops*, Kalyani Publishers, Ludhiana, 2008.
Das , P.C., V*egetable Crops of India*, Kalyani Publishers, Ludhiana, 1993.
Chauhan, D.V., *Vegetable Production in India*, S. Ram Prasad and Sons, Agra, 1993
Package of Practices for Vegetable Crops, P.A.U. Publications Ludhiana, Corresponding year.

Course Title : DISEASES OF FRUITS AND VEGETABLES **Course Number** : 48EHO3

Objectives : To acquaint with diseases of fruits and vegetables crop plants and their management.

MAX. MARKS :100

1. THEORY : 70 WRITTEN EXAM:55 INTERNAL ASSESSMENT: 15
2. PRACTICAL: 30 WRITTEN EXAM:25 INTERNAL ASSESSMENT: 5

PERIOD PER WEEK – 1. THEORY-THREE OF 45 MINUTES DURATION
2. PRACTICAL- ONE OF THREE HOURS DURATION

INSTRUCTIONS FOR PAPER SETTER:

Question paper will have five sections. First Question will contain 10 short answer type parts of one and half marks each and will cover whole of the syllabus. All parts of this question will be compulsory. Section 'I', 'II', 'III' and 'IV' will have two questions each from respective section, out of which one from each section is to be attempted. Total five questions are to be attempted. Question paper should be as per standard, strictly according to the syllabus. Language of the questions should be simple and straight.

Teaching Aids : Teachers can use lecture, lecture cum demonstration , project, assignments, problem solving, inductive and deductive methods, and can use L.C. Display, L.E.Display, Multimedia projector in addition to black/white board.

SECTION-I

Symptoms, life cycle, host range their management and control of different diseases of fruit. like apple, peach, mango, citrus, papaya, sapota, grapes, guava.

SECTION-II

Symptoms, life cycle, host range, their management and control of different diseases of fruit, fruits like pear, peach, plum, apricot, cherry, walnut, almond, strawberry, ber, loquat.

SECTION- III

Symptoms, life cycle, host range their management and control of different diseases of winter vegetables (cabbage, potato, onion and peas)
Symptoms, life cycle, host range their management and control of different diseases of summer vegetables (brinjal, melon, pupkin, sweet potato)
Symptoms, life cycle, host range their management and control of different diseases of chillies and turmeric.

SECTION- IV

Symptoms, life cycle, host range their management and control of different diseases of ornamental plants such as rose, jasmine, gladiolus, tulip, carnation, marigold, chrysanthemum.

Practical

Max. Marks: 30 Practical Exam: 25 Internal Assessment: 05

Detailed study of symptoms and host parasite relationship of representative diseases of the above mentioned crops. Collection and dry preservation of diseased specimens of important crops.

Suggested Readings:

Gupta VK &.Sharma SK. 2000. *Diseases of Fruit Crops*. Kalyani Publ.,New Delhi.
Pathak VN. 1980. *Diseases of Fruit Crops*. Oxford & IBH, New Delhi.
Singh RS. 2000. *Diseases of Fruit Crops*. Oxford & IBH, New Delhi.
Walker JC. 2004. *Diseases of Vegetable Crops*. TTPP, India.
Package of Practices for Vegetable Crops, P.A.U. Publications Ludhiana, Corresponding year.

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