

FACULTY OF LIFE SCIENCES

**SYLLABUS
of
B.Sc. (Hons.) Agriculture
(Semester I -II)
(Under Continuous Evaluation System)**

Session: 2018-19



**The Heritage Institution
KANYA MAHA VIDYALAYA
JALANDHAR
(Autonomous)**

Scheme of Studies and Examination
B.Sc. (Hons.) Agriculture (Session: 2018-19)

Semester I

Course Code	Course Name	Course Type	Marks				Examination time (in Hours)
			Total	Ext.		CA	
				L	P		
BACL-1421 BACL-1031 BACL-1431	Punjabi(Compulsory) Basic Punjabi PHC	C	50	40	-	10	3
BACL-1102	Communication Skills in English-I	C	50	40	-	10	3
BACM-1013	Fundamentals of Horticulture	C	75	40	20	15	3+3
BACM-1074	Fundamentals of Plant Pathology	C	75	40	20	15	3+3
BACM-1015	Fundamentals of Soil Sciences	C	75	40	20	15	3+3
BACM-1016	Introduction to Forestry	C	75	40	20	15	3+3
BACM-1017	Fundamentals of Agronomy	C	75	40	20	15	3+3
BACL-1018	Rural Sociology and Educational Psychology	C	50	40	-	10	3
BACM-1059	Introductory Biology /	C	50/	25	15	10	3+3/3
BACL-1339	Elementary Mathematics		50	40	-	10	
BACL-1010	Agriculture Heritage	C	25	20	-	5	3
SECH-1543	*Human Values and Ethics	VBCC	50	-	-	10	3
AECD-1161	*Drug Abuse: Problem Management and Prevention (Compulsory)	AECC	50	40	-	10	3
SECF-1492	*Foundation Programme	VBCC	25	25	-	-	2
Total			600				

***Marks of these papers will not be added in total marks and only grades will be provided.**

C-Compulsory

E-Elective

AECC- Ability Enhancement Compulsory

Course VBCC- Value Based Compulsory Course

B.Sc. (Hons.) Agriculture (Session: 2018-19)

Semester II							
Course Code	Course Name	Course Type	Marks				Examination time (in Hours)
			Total	Ext.		CA	
				L	P		
BACL-2421 BACL-2031 BACL-2431	Punjabi(Compulsory) Basic Punjabi PHC	C	50	40	-	10	3
BACM-2102	Communication Skills in English -II	C	50	25	10	15	3+3
BACM-2063	Fundamentals of Plant Biochemistry and Biotechnology	C	75	40	20	15	3+3
BACM-2344	Agricultural Microbiology	C	75	40	20	15	3+3
BACM-2015	Introductory Soil and Water Conservation Engineering	C	75	40	20	15	3+3
BACM-2076	Fundamentals of Crop Physiology	C	75	40	20	15	3+3
BACL-2177	Fundamentals of Agricultural Economics	C	75	60	--	15	3+3
BACM-2018	Fundamentals of Genetics	C	75	40	20	15	3+3
BACM-2489	Fundamentals of Entomology	C	75	40	20	15	3+3
BACM-2010	Fundamentals of Agricultural Extension Education	C	75	40	20	15	3+3
AECD-2161	*Drug Abuse: Problem Management and Prevention (Compulsory)	AECC	50	40	-	10	3
SECM-2502	*Moral Education Programme	VBCC	25	25	-	-	1
Total			700				

***Marks of these papers will not be added in total marks and only grades will be provided.**

C-Compulsory

E-Elective

AECC- Ability Enhancement Compulsory Course

VBCC- Value Based Compulsory Course

B.Sc. (Hons.) Agriculture (Semester –I)
(Session: 2018-19)

Course Code: BACL-1421

PUNJABI (COMPULSORY)

;wK L 3 xzN/

Max. Marks: 50

Theory :40

C.A. :10

gkm eqw ns/ gkm g[;seK

ਸੈਕਸ਼ਨ-ਏ

nksw nBksw (eftsk Gkr),(;zgH ;[fjzdo pho ns/ tfonkw f;zx ;zX{)
r[o{ BkBe d/t :{Bhtof;Nh, nzfwqs;o.

(ਰਸੰ ਗ ਸਹਿਤ ਹਿਆਹਿਆ, ਸਾਰ 08) nze

ਸੈਕਸ਼ਨ-ਬੀ

fJfsjk;e :kdK (fJfsjk;eb/y ;zrqfj);zgkH ;H;Hnw'b,gzikph ;kfjs gqekPB,
b[fXnkDk। (b/y 1 s'A 6)

(ਹਨਬੰ ਧ ਦਾ ਸਾਰ, ਹਿੰਣ-ਸੈਿੰੀ)

08 nze

ਸੈਕਸ਼ਨ-ਸੀ

(ਓ)g?oQk ouBk

(ਅ)g?oQk gVQ e/ gqPBK d/ T[so.

08 nze

ਸੈਕਸ਼ਨ-ਡੀ

(T)gzikph X[Bh ftT[As L T[ukoB nzt, T[ukoB ;EkB s/ ftXhnK, ;to, ftnziB,

ਸੁਰ-ਪ੍ਰਬੰ.ਧ

(n)GkPk tzBrhnK L GkPk dk Ne;kbh o{g, GkPk ns/ T[g-GkPk dk nzso,
gzikph T[gGkPktK d/ gSkDfuzBQ. 08 nze

nzetzv ns/ gohfyne bJh jdkfJsK

1H gqPB gso d/ uko Gkr j'Dr/. jo Gkr ftu d' gqPB g[S/ ikDr/.

**2H ftfdnkoEh B/ e[b gzi gqPB eoB/ jB. jo Gkr ftu'A fJe gqPB bklwh j?.
gzitK gqPB fe;/ th Gkr ftu'A ehsk ik ;edk j?.**

3H jo/e gqPB d/ 08 nze jB.

**4H g/go ;?N eoB tkbk i/eo ukj/ sK gqPBK dh tzv nr'A tX s'A tX uko T[g
gqPBK ftu eo ;edk j?.**

B.Sc. (Hons.) Agriculture (Semester –I)
(Session: 2018-19)

Course Code: BACL-1031

BASIC PUNJABI (w[Ybh gzikph)

Time: 3 Hrs.

Max. Marks: 50

Theory: 40

C.A. : 10

;?ePB J/

g?Ash nyoh, nyo eqw, g?o fpzdh tkb/ toD ns/ g?o ftu g?D tkb/ toD ns/ wksqtK
(w[Ybh ikD gSkD) brkyo (fpzdh, fNgh, nXe) L gSkD ns/ tos'A .

08nze

;?ePB ph

gzikph Ppd pDso L w[Ybh ikD gSkD (;kXkoB Ppd, ;z:[es Ppd, fwPos Ppd,
w{b Ppd, nr/so ns/ fgS/so) 08nze

;?ePB ;h

fBs tos'A dh gzikph Ppdktbh L pklko, tgko, foPs/Bks/, y/sh ns/ j'o XzfdnK nkfd
Bkb ;zpzXs. 08 nze

;?ePB vh

j]s/ d/ ;s fdBK d/ BK, pkoQK wjhfBnK d/ BK, o[sK d/ BK, fJe s'A ;" se frDsh
PpdK ftu .

08nze

nze tzv ns/ gohfyne bJh jdkfJsK

1H gqPB gZso d/ uko :{FfBN j'Dr/. jo :fBN ftu d' gqPB g[S/ ikDr/.

2H ftdnkoEh B/ e[b gzi gqPB eoB/ jB. jo Gkr ftu'A fJe gqPB bkiwh j?. gzikK
gqPB fe;/ th Gkr ftu'_ ehsk ik ;edk j?.

3H jo/e gqPB d/ nZm nze jB.

4H g/go ;?N eoB tbbk i/eo ukj/ sK gqPBK dh tzv nr'A tX s'A tX uko T[g gqPBK
ftu eo ;edk j?.

B.Sc. (Hons.) Agriculture (Semester –I)
(Session: 2018-19)
Course Code: BAAC-1431
Punjab History & Culture (From Earliest Times to C 320)
(Special Paper in lieu of Punjabi compulsory)

Time: 3 Hours

Max. Marks: 50

Theory: 40

CA: 10

Instructions for the Paper Setters

Eight questions of equal marks are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section.

Unit A

1. Physical features of the Punjab and impact on history.
2. Sources of the ancient history of Punjab

Unit- B

3. Harappan Civilization: Town planning; social, economic and religious life of the India Valley People.
4. The Indo-Aryans: Original home and settlement in Punjab.

Section C

5. Social, Religious and Economic life during later *Rig* Vedic Age.
6. Social, Religious and Economic life during later Vedic Age.

Section D

7. Teaching and impact of Buddhism
8. Jainism in the Punjab

Suggested Readings

1. L. Joshi (ed): *History and Culture of the Punjab*, Art-I, Patiala, 1989 (3rd edition)
2. L.M. Joshi and Fauja Singh (ed); *History of Punjab* , Vol.I, Patiala 1977.
3. Budha Parkash :*Glimpses of Ancient Punjab*, Patiala, 1983.
4. B.N. Sharma: *Life in Northern India*, Delhi. 1966.

**B.Sc. (Hons.) Agriculture (Semester –I)
(Session: 2018-19)**

Course Code: BACL-1102

COMMUNICATION SKILLS IN ENGLISH-I

Time: 3 Hrs.

**Max. Marks: 50
Theory: 40
C.A. :10**

The syllabus is divided in four sections as mentioned below:

Section–A

Reading Skills: Reading Tactics and strategies; Reading purposes—kinds of purposes and associated comprehension; Reading for direct meanings.

Section–B

Reading for understanding concepts, details, coherence, logical progression and meanings of phrases/ expressions.

Activities:

- Comprehension questions in multiple choice format
- Short comprehension questions based on content and development of ideas

Section–C

Writing Skills: Guidelines for effective writing; writing styles for application, personal letter, official/ business letter.

Activities

- Formatting personal and business letters.
- Organising the details in a sequential order

Section–D

Resume, memo, notices etc.; outline and revision.

Activities:

- Converting a biographical note into a sequenced resume or vice-versa
- Ordering and sub-dividing the contents while making notes.
- Writing notices for circulation/ boards

Recommended Books:

1. *Oxford Guide to Effective Writing and Speaking* by John Seely.
2. *Business Communication*, by Sinha, K.K. Galgotia Publishers, 2003.
3. *Business Communication* by Sethi, A and Adhikari, B., McGraw Hill Education 2009.
4. *Communication Skills* by Raman, M. & S. Sharma, OUP, New Delhi, India (2011).

5. *English Grammar in Use: A Self Study Reference and Practice Book Intermediate Learners Book* by Raymond Murphy, Cambridge University Press.

Instructions for the paper setter and distribution of marks:

The question paper will consist of four sections and distribution of marks will be as under:

The question paper will be divided into four sections:

Section-A: The question of theoretical nature will be set from Section-A of the syllabus with internal choice and it will consist of 8 marks.

Section-B: Two comprehension passages will be given to the students based on the Section-B and the candidates will have to attempt one carrying 8 marks.

Section-C: Two questions will be given based on the topics given in the Section-C and the candidates will have to attempt one carrying 8 marks.

Section-D: One out of the two questions will have to be attempted by the candidates based on the topics given in Section-D of the syllabus. It will carry 8 marks.

Important Note:

The candidate will have to attempt five questions in all selecting one from each section of the question paper and the fifth question may be attempted from any of the four sections.

(8 x 5 = 40 marks)

B.Sc. (Hons.) Agriculture (Semester –I)
(Session: 2018-19)

Course Code: BACM-1013

FUNDAMENTALS OF HORTICULTURE
(THEORY)

Time: 3 Hrs.

Max. Marks: 75

Theory: 40

Practical: 20

C.A :15

Instructions for the Paper Setter

Eight questions of equal marks are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section.

Unit – I

Horticulture - Its definition and branches, importance and scope; horticultural and botanical classification; climate and soil for horticultural crops.

Unit – II

Plant propagation-methods and propagating structures; Seed dormancy, Seed germination, principles of orchard establishment; Principles and methods of training and pruning.

Unit – III

Juvenility and flower bud differentiation; unfruitfulness; pollination, pollinizers and pollinators; fertilization and parthenocarpy.

Unit – IV

Medicinal and aromatic plants; importance of plant bio-regulators in horticulture. Irrigation – methods, Fertilizer application in horticultural crops.

B.Sc. (Hons.) Agriculture (Semester –I)
(Session: 2018-19)

Course Code: BACM-1013

FUNDAMENTALS OF HORTICULTURE
(PRACTICAL)

Time:3Hrs

Marks:20

Instructions for Practical Examiner : Question paper is to be set on the spot jointly by the Internal and External Examiners. Two copies of the same should be submitted for the record to COE Office ,Kanya Maha Vidyalaya,Jalandhar.

LIST OF EXPERIMENTS

1. Identification of garden tools.
2. Identification of horticultural crops.
3. Preparation of seed bed/nursery bed and sowing of vegetable seeds.
4. Practice of sexual and asexual methods of propagation
5. Exc.4 Continued
6. Micro-propagation.
7. Layout and planting of orchard.
8. Layout of nutrition garden
9. Training and pruning of fruit trees.
10. Preparation of potting mixture.
11. Fertilizer application in different crops.
12. Layout of model nursery
13. Visits to commercial nurseries/orchard.

SUGGESTED READINGS:

1. Chadha, K.L. , Handbook of Horticulture , ICAR, NewDelhi, 2002
2. Dhaliwal M.S., Handbook of vegetable crops, Kalyani Publishers, Ludhiana, 2008.
3. Jitendra Singh , Basic Horticulture , Kalyani Publishers, Ludhiana, 2011.
4. Gopaldaswami, I. *Complete Gardening in India* - ICAR New Delhi, 2009.

REFERENCE

1. <http://aggie-horticulture.tamu.edu/propagation/propagation.html>
2. <http://www.britannica.com/>
3. <http://www.horticulture.com.au/export/hmac.asp>
4. <http://www.horticultureworld.net/hort-india.htm>

B.Sc. (Hons.) Agriculture (Semester –I)
(Session: 2018-19)

Course Code :BACM-1074

FUNDAMENTALS OF PLANT PATHOLOGY
(THEORY)

Time:3Hrs

Max. Marks: 75

Theory: 40

Practical: 20

C.A. :15

Instructions for the Paper Setter

Eight questions of equal marks are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section.

Unit-I

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

Unit-II

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

Unit-III

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

Unit-IV

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

B.Sc. (Hons.) Agriculture (Semester –I)
(Session: 2018-19)

Course Code :BACM-1074

FUNDAMENTALS OF PLANT PATHOLOGY
(PRACTICAL)

Time:3Hrs

Marks:20

Instructions for Practical Examiner :Question paper is to be set on the spot jointly by the Internal and External Examiners. Two copies of the same should be submitted for the record to COE Office ,Kanya Maha Vidyalaya,Jalandhar.

LIST OF EXPERIMENTS

1. Acquaintance with various laboratory equipments and microscopy.
2. Collection and preservation of disease specimen.
3. Preparation of media, isolation and Koch's postulates.
4. General study of different structures of fungi.
5. Study of symptoms of various plant diseases.
6. Study of representative fungal genera.
7. Transmission of plant viruses.
8. Study of phanerogamic plant parasites.
9. Study of fungicides and their formulations.
10. Methods of pesticide application and their safe use.
11. Calculation of fungicide sprays concentrations.

Suggested Readings

1. Pandey, B.P. (2001) Plant Pathology, S Chand
2. M.J. Carlile, S.C. Watkinson & G.W. Gooday (2001), The Fungi 2nd Ed., Academic Press.
3. G.N. Agrios (1997), Plant Pathology 4th Ed., Academic Press.
4. R.S. Mehrotra (1980) Plant Pathology Tata McGraw Hill New Delhi

**B.Sc. (Hons.) Agriculture (Semester –I)
(Session: 2018-19)**

Course Code :BACM-1015

**FUNDAMENTALS OF SOIL SCIENCES
(THEORY)**

Time: 3 Hrs.

**Max. Marks: 75
Theory: 40
Practical: 20
C.A. :15**

Instructions for the Paper Setter

Eight questions of equal marks are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section.

Unit – I

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

Unit – II

Soil physical properties: soil-texture, structure, density and porosity, soil colour, consistence and plasticity; Elementary knowledge of soil taxonomy classification and soils of India; Soil water retention, movement and availability; Soil air, composition, gaseous exchange, problem and plant growth,

Unit – III

Soil temperature; source, amount and flow of heat in soil; effect on plant growth, Soil reaction-pH, soil acidity and alkalinity, buffering, effect of pH on nutrient availability; soil colloids inorganic and organic; silicate clays: constitution and properties; sources of charge; ion exchange, cation exchange capacity, base saturation;

Unit – IV

Soil organic matter: composition, properties and its influence on soil properties; humic substances - nature and properties; soil organisms: macro and microorganisms, their beneficial and harmful effects; Soil pollution - behaviour of pesticides and inorganic contaminants, prevention and mitigation of soil pollution.

B.Sc. (Hons.) Agriculture (Semester –I)
(Session: 2018-19)

Course Code :BACM-1015

FUNDAMENTALS OF SOIL SCIENCES
(PRACTICALS)

Time:3Hrs

Marks:20

Instructions for Practical Examiner : Question paper is to be set on the spot jointly by the Internal and External Examiners. Two copies of the same should be submitted for the record to COE Office ,Kanya Maha Vidyalaya,Jalandhar.

LIST OF EXPERIMENTS

1. Study of soil profile in field.
2. Study of soil sampling tools, collection of representative soil sample, its processing and storage.
3. Study of soil forming rocks and minerals.
4. Determination of soil density, moisture content and porosity.
5. Determination of soil texture by feel and Bouyoucos Methods.
6. Studies of capillary rise phenomenon of water in soil column and soil water movement.
7. Determination of soil pH and electrical conductivity.
8. Determination of cation exchange capacity of soil.
9. Study of soil map.
10. Determination of soil colour.
11. Demonstration of heat transfer in soil.
12. Estimation of organic matter content of soil.

SUGGESTED READINGS

- 1 Brady, N.C. and Weil, R.R., *The Nature and Properties of Soil*: Pearson Edn. Pvt. Ltd. New Delhi, 2002.
- 2 .Oswal, M.C., *Soil Physics*, Oxford & IBH publishing Co.Pvt.Ltd.New Delhi, 1994.
3. Biswas, T.D., and Mukherjee, S.K., *Text book of soil science*, Tata McGraw Hill Publishing Co. Ltd., New Delhi, 1997.
4. Troch, F.R. and Thompson, L.M. *Soils and Soil Fertility*,., Oxford Press.

REFERENCE

1. <http://newprairiepress.org/ebooks/15/>
2. Soils Laboratory Manual, K-State Edition Authors: Colby J. Moorberg, David A. Crouse
Publication: *NPP eBooks*
3. An Open-Source Laboratory Manual for Introductory, Undergraduate ...
<http://dl.sciencesocieties.org/publications/nse/pdfs/46/1/170013> by CJ Moorberg - 2

**B.Sc. (Hons.) Agriculture (Semester –I)
(Session: 2018-19)**

Course Code :BACM-1016

**INTRODUCTION TO FORESTRY
(THEORY)**

Time: 3 Hrs.

**Max. Marks: 75
Theory: 40
Practical: 20
C.A. :15**

Instructions for the Paper Setter

Eight questions of equal marks are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section.

THEORY:

Unit – I

Introduction – definitions of basic terms related to forestry, objectives of silviculture, forest classification, salient features of Indian Forest Policies.

Unit – II

Forest regeneration, Natural regeneration - natural regeneration from seed and vegetative parts, coppicing, pollarding, root suckers; Artificial regeneration – objectives, choice between natural and artificial regeneration, essential preliminary considerations.

Unit – III

Crown classification. Tending operations – weeding, cleaning, thinning – mechanical, ordinary, crown and advance thinning. Forest mensuration – objectives, diameter measurement, instruments used in diameter measurement; Non instrumental methods of height measurement - shadow and single pole method; Instrumental methods of height measurement - geometric and trigonometric principles, instruments used in height measurement; tree stem form, form factor, form quotient, measurement of volume of felled and standing trees, age determination of trees.

Unit – IV

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

B.Sc. (Hons.) Agriculture (Semester –I)
(Session: 2018-19)

Course Code :BACM-1016

INTRODUCTION TO FORESTRY
(PRACTICALS)

Time:3Hrs

Marks:20

Instructions for Practical Examiner : Question paper is to be set on the spot jointly by the Internal and External Examiners. Two copies of the same should be submitted for the record to COE Office ,Kanya Maha Vidyalaya,Jalandhar.

LIST OF EXPERIMENTS

1. Identification of tree-species.
2. Diameter measurements using calipers and tape.
3. Tree diameter measurements of forked, buttressed, fluted and leaning trees.
4. Exercise 3 continued
5. Height measurement of standing trees by shadow method, single pole method and hypsometer.
6. Exercise 5 continued
7. Volume measurement of logs using various formulae.
8. Nursery lay out, seed sowing,
9. Exercise 8 continued
10. Vegetative propagation techniques.
11. Forest plantations and their management. Visits of nearby forest based industries.
12. Visits of nearby forest based industries

SUGGESTED READINGS

- 1.Kothari, A.S., A Celebration of Indian Trees, Marg Pub, New York, 2007.
- 2.Bore, N.L., A Manual of Indian Forest Botany, International Book Dist.New Delhi, 2008.
- 3.Diwivedi, A.P., A Text Book of Silviculture, International Book Distributor., New Delhi, 1993.
4. Negi. S.S. Hand Book of Forestry, IBD Publishers, Dehra Dun, 2008

REFERENCE

- 1.www.ITTI.com
2. www.swsc.com
- 3.www.Candia.co

B.Sc. (Hons.) Agriculture (Semester –I)
(Session: 2018-19)

Course Code :BACM-1017

FUNDAMENTALS OF AGRONOMY
(THEORY)

Time: 3 Hrs.

Max. Marks: 75

Theory: 40

Practical: 20

C.A. :15

Instructions for the Paper Setter

Eight questions of equal marks are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section.

Unit – I

Agronomy and its scope, seeds and sowing, tillage and tilling, crop density and geometry, Crop nutrition, manures and fertilizers, nutrient use efficiency,

Unit – II

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

Unit – III

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

Unit – IV

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

B.Sc. (Hons.) Agriculture (Semester –I)
(Session: 2018-19)

Course Code :BACM-1017

FUNDAMENTALS OF AGRONOMY
(PRACTICAL)

Time:3Hrs

Marks:20

Instructions for Practical Examiner :Question paper is to be set on the spot jointly by the Internal and External Examiners. Two copies of the same should be submitted for the record to COE Office ,Kanya Maha Vidyalaya,Jalandhar.

LIST OF EXPERIMENTS

1. Identification of crops, seeds, fertilizers,
2. Pesticides, herbicides and implements.
3. Study of yield contributing characters and yield estimation,
4. Seed germination and viability test
5. Use of tillage implements-reversible plough, one way plough, harrow, leveler, seed drill,
6. Identification of weeds in crops.
7. Methods of herbicide and fertilizer application,
8. Study of yield contributing characters and yield estimation.
9. Seed germination and viability test.
10. Numerical exercises on fertilizer requirement, plant population, herbicides and water requirement.
11. Use of tillage implements- plough, harrow, leveler and seed drill.
12. Study of soil moisture measuring devices and measurement of field capacity.
13. Measurement of soil infiltration rate. and irrigation water..

SUGGESTED READINGS

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

REFERENCE

www.tnau.com

krishikosh.egranth.ac.in

<http://www.agriinfo.in/>

**B.Sc. (Hons.) Agriculture (Semester –I)
(Session: 2018-19)**

Course Code : BACL-1018

**RURAL SOCIOLOGY & EDUCATIONAL PSYCHOLOGY
(THEORY)**

Time: 3 Hrs.

**Max. Marks : 50
Theory: 40
C.A :10**

Instructions for the Paper Setter

Eight questions of equal marks are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section.

Unit – I

Sociology and Rural sociology: Definition and scope, its significance in agriculture extension, Social Ecology.

Unit – II

Rural society, Social Groups, Social Stratification, Culture concept,

Unit – III

Social Institution, Social Change & Development. Educational psychology: Meaning & its importance in agriculture extension.

Unit – IV

Behavior: Cognitive, affective, psychomotor domain, Personality, Learning, Motivation, Theories of Motivation, Intelligence.

SUGGESTED READINGS

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

REFERENCES

1. <http://www.agriinfo.in/default.aspx?page=topic&superid=7&topicid=516>
2. <http://www.yourarticlelibrary.com/sociology/rural-leadership-meaning-and-characteristics-of-rural-leadership/34944/>
3. www.hillagric.ac.in/edu/coa/AgriEcoExtEduRSocio/lectures/Ext121.pd

B.Sc. (Hons.) Agriculture (Semester –I)
(Session: 2018-19)

Course Code :BACM-1059

INTRODUCTORY BIOLOGY
(THEORY)

Time: 3 Hrs.

Max. Marks: 50
Theory: 25
Practical: 15
C.A :10

Instructions for the Paper Setter

Eight questions of equal marks are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section.

THEORY:

Unit – I

Introduction to the living world, diversity and characteristics of life, origin of life, Evolution and Eugenics.

Unit – II

Binomial nomenclature and classification Cell and cell division.

Unit – III

Morphology of flowering plants. Seed and seed germination.

Unit – IV

Plant systematic- viz; Brassicaceae, Fabaceae and Poaceae. Role of animals in agriculture.

B.Sc. (Hons.) Agriculture (Semester –I)
(Session: 2018-19)

Course Code :BACM-1059

INTRODUCTORY BIOLOGY
(PRACTICALS)

Time:3Hrs

Marks:15

Note/Instructions for Practical Examiner : Question paper is to be set on the spot jointly by the Internal and External Examiners. Two copies of the same should be submitted for the record to COE Office ,Kanya Maha Vidyalaya, Jalandhar.

LIST OF EXPERIMENTS

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

SUGGESTED READINGS

1. Dutta, C., *Text book of Botany*, Oxford University Press- India, 2000.
2. Bhatia K.N. and Widge, R., *Introduction of Botany*, Truman Publishers, Jalandhar, 2010.
3. Vidyarathi, S., *Text book of Botany*, S. Chand and Company, New Delhi, 2002.
4. Frederick V.T., *A Text book of Agricultural Zoology*, General Books Publications, London, 2010.

B.Sc. (Hons.) Agriculture (Semester –I)
(Session: 2018-19)

Course Code :BACL-1339

ELEMENTARY MATHEMATICS

Time: 3 Hrs.

Max. Marks: 50
Theory :40
C.A. :10

Instructions for the Paper Setter

Eight questions of equal marks are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section.

Unit – I

Straight lines : Distance formula, section formula (internal and external division), Equation of co-ordinate axes, Equation of lines parallel to axes, Slope-intercept form of equation of line, Slope-point form of equation of line, Two point form of equation of line, Intercept form of equation of line, Normal form of equation of line, General form of equation of line, Point of intersection of two straight lines, Angles between two straight lines, Parallel lines, Perpendicular lines.

Unit – II

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

Unit – III

Differential Calculus: Definition of function, limit and continuity of algebraic functions. Differentiation of algebraic functions, exponential functions and logarithmic differentiation (excluding trigonometric functions). Derivative of sum, difference, product and quotient of two functions. Integral Calculus : Integration of Product of two functions, Integration by substitution method, Definite Integrals (of algebraic functions).

Unit – IV

Matrix: Definition of Matrices, Addition, Subtraction, Multiplication, Transpose of matrix up to 3rd order.

Determinants: Properties of determinants and their evaluation, Inverse of matrix up to 3rd order. Matrix method

SUGGESTED READINGS

1. Differential Calculus: Shanti Narayan, New Delhi, Shyam Lal, 1983.
2. Integral Calculus: Shanti Narayan, Delhi, S. Chand, 1968.
3. Hussain I. et. al. Mathematics, A textbook for class XI, NCERT.
4. Joshi, D.D. et. al. Mathematics, A textbook for class XII, NCERT

B.Sc. (Hons.) Agriculture (Semester –I)
(Session: 2018-19)

Course Code :BACL-1010

AGRICULTURAL HERITAGE

Time: 3 Hrs.

Max. Marks: 25

Theory : 20

C.A. :5

Instructions for the Paper Setter

Eight questions of equal marks are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section.

Unit – I

Introduction of Indian agricultural heritage; Ancient agricultural practices, Relevance of heritage to present day agriculture;

Unit – II

Past and present status of agriculture and farmers in society; Journey of Indian agriculture and its development from past to modern era;

Unit – III

Plant production and protection through indigenous traditional knowledge; Crop voyage in India and world; Agriculture scope; Importance of agriculture and agricultural resources available in India;

Unit – IV

Crop significance and classifications; National agriculture setup in India; Current scenario of Indian agriculture; Indian agricultural concerns and future prospects.

SUGGESTED READINGS

1. Nene, Y.L., Choudhary, S.L. Agricultural Heritage in India. (2004)
2. Saxena, R.C., Choudhary S.L. and Nene Y.L. A Textbook on Ancient History of Indian Agriculture. (2009).
3. Kumari, D. and Veerpal M. Agricultural Heritage in India AGROTECH, India. (2012)
4. Choudhary, S.L., Asean Agri. History Foundation India (AHFI), (2004)

REFERENCES

1. eagri.tnau.ac.in/eagri50/AGRO102/lec11.pdf ,
2. <http://www.kiran.nic.in/Agri-Heritage.html>
3. https://en.wikipedia.org/wiki/Traditional_knowledg

**B.Sc. (Hons.) Agriculture (Semester –I)
(Session: 2018-19)**

Course Code :SECH-1543

**HUMAN VALUES AND ETHICS
(THEORY)**

Time: 3 Hours

Max. Marks: 50

Theory: 40

C.A.:10

Instructions for the Paper Setter

Eight questions of equal marks are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section.

UNIT 1

Universal human aspirations: Happiness and prosperity; Human values and ethics: Concept, definition, significance and sources.

UNIT 2

Fundamental values: Right conduct, peace, truth, love and non-violence; Ethics: professional, environmental, ICT; Sensitization towards others particularly senior citizens, developmentally challenged and gender.

UNIT 3

Spirituality, positive attitude and scientific temper; Team work and volunteering; Rights and responsibilities; Road safety; Human relations and family harmony; Modern challenges and value conflict.

UNIT 4

Sensitization against drug abuse and other social evils; Developing personal code of conduct (SWOT Analysis); Management of anger and stress.

B.Sc. (Hons.) Agriculture (Semester –I)
(Session: 2018-19)

Course Code: AECD-1161

DRUG ABUSE: PROBLEM MANAGEMENT AND PREVENTION

Time: 3Hrs

Max.Marks: 50

Theory: 40

CA: 10

Instructions for the Paper Setter

Eight questions of equal marks are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section.

Unit I

1) Meaning of Drug Abuse: Concept and Overview, Historical Perspective of Drug Abuse, Drug Dependence, Drug Addiction, Physical and Psychological Dependence: Drug Tolerance and withdrawal symptoms.

Unit II

2) Types of Abused Drugs and their Effects - I

- 1) Stimulants: Amphetamines – Bensedrine, Dexedrine, Cocaine.
- 2) Depressants: Alcohol Barbiturates: Nembutal, Seconal, Phenobarbital and Rohypnol.
- 3) Narcotics: Heroin, Morphine, Oxycodone.

Unit III

3) Types of abused drugs and their effects - II

- 1) Hallucinogens: Cannabis, Marijuana, Hashish, Hash Oil, MDMA, LSD.
- 2) Steroids.

Unit IV

4) Nature and Extent of the Problem: Magnitude or prevalence of the menace of Drug Abuse in India and Punjab, Vulnerable groups by age, gender and economic status, Signs and Symptoms of Drug Abuse: Physical, Academic, Behavioural and Psychological Indicators.

References:

1. Ahuja, Ram (2003), *Social Problems in India*, Rawat Publication, Jaipur.
2. Extent, Pattern and Trend of Drug Use in India, Ministry of Social Justice and Empowerment, Government of India, 2004.
3. Modi, Ishwar and Modi, Shalini (1997) *Drugs: Addiction and Prevention*, Jaipur: Rawat Publication.
6. National Household Survey of Alcohol and Drug abuse. (2003) New Delhi, Clinical Epidemiological Unit, All India Institute of Medical Sciences, 2004.
7. Sain, Bhim 1991, *Drug Addiction Alcoholism*, Smoking obscenity New Delhi: Mittal Publications.
8. Sandhu, Ranvinder Singh, 2009, *Drug Addiction in Punjab: A Sociological Study*. Amritsar: Guru Nanak Dev University.
9. Singh, Chandra Paul 2000. *Alcohol and Dependence among Industrial Workers*: Delhi: Shipra.

B.Sc. (Hons.) Agriculture (Semester –II)
(Session: 2018-19)

Course Code: BACL-2421

PUNJABI (COMPULSORY)

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Maximum Marks: 50

Theory: 40

C.A.:10

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ਸੈਕਸ਼ਨ-ਡੀ

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3H jo/e gqPB d/ 08 nze jB.

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B.Sc. (Hons.) Agriculture (Semester –II)
(Session: 2018-19)

Course Code:BACL-2031

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(In lieu of Compulsory Punjabi)

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Maximum Marks: 50

Theory: 40

C.A.:10

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08 nze

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08 nze

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PUNJAB HISTORY & CULTURE
(C 320 to 1000 A.D)
(Special paper in lieu of Punjabi Compulsory)

Time:3Hrs

Max. Marks: 50

Theory : 40

C.A. :10

Instructions for the Paper Setters

Question paper shall consist of four Units.Candidates shall attempt 5 questions in all, by at least selecting One Question from each unit and the 5th question may be attempted from any of the four sections.Each question will carry 8 marks.

Unit-I

1. Punjab under Chandragupta Maurya and Ashoka.
2. The Kushans and their Contribution to the Punjab.

Unit -II

3. The Panjab under the Gupta Emperor.
4. The Punjab under the Vardhana Emperors

Unit-III

5. Political Developments 17th Century to 1000 A.D. (Survey of Political)
6. Socio-cultural History of Punjab from 7th to 1000 A.D.

Unit -IV

7. Development of languages and Literature.
8. Development of art & Architecture

Suggested Readings

1. L. Joshi (ed): *History and Culture of the Punjab*, Art-I, Patiala, 1989 (3rd edition)
2. L.M. Joshi and Fauja Singh (ed); *History of Punjab* , Vol.I, Patiala 1977.
3. Budha Parkash :*Glimpses of Ancient Punjab*, Patiala, 1983.
4. B.N. Sharma: *Life in Northern India*, Delhi. 1966

**B.Sc. (Hons.) Agriculture (Semester –II)
(Session: 2018-19)**

Course Code :BACC- 2102

COMMUNICATION SKILLS IN ENGLISH-II

**Time: 3 Hrs (Theory)
3 Hrs (Practical)**

**Max. Marks: 50
Theory: 30
Practical: 10
C.A.: 10**

Course Contents:

Section–A

Listening Skills: Barriers to listening; effective listening skills; feedback skills.

Activities: Listening exercises – Listening to conversation, News and TV reports

Section–B

Attending telephone calls; note taking and note making.

Activities: Taking notes on a speech/lecture

Section–C

Speaking and Conversational Skills: Components of a meaningful and easy conversation; understanding the cue and making appropriate responses; forms of polite speech; asking and providing information on general topics.

Activities: 1) Making conversation and taking turns
2) Oral description or explanation of a common object, situation or concept

Section–D

The study of sounds of English, stress Situation
based Conversation in English Essentials of
Spoken English

Activities: Giving Interviews

Recommended Books:

1. *Oxford Guide to Effective Writing and Speaking* by John Seely.
2. *Business Communication* by Sethi, A and Adhikari, B., McGraw Hill Education 2009.

3. *Communication Skills* by Raman, M. & S. Sharma, OUP, New Delhi, India (2011).
4. *A Course in Phonetics and Spoken English* by J. Sethi and P.V. Dhamija, Phi Learning.

Instructions for the paper setters and distribution of marks:

The question paper will consist of four sections and distribution of marks will be as under:

The question paper will be divided into four sections.

Section-A: Two questions with internal choice will be set from Section-A of the syllabus and these questions will be theoretical in nature corresponding to the syllabus of Section-I. Each will carry 6 marks.

Section-B: Two questions with internal choice will be set from Section-B of the syllabus. One will be theoretical and the second will be practical in nature. Each will carry 6 marks.

Section-C: Two questions with internal choice will be set from Section-C of the syllabus and these will be theoretical in nature. Each will carry 6 marks.

Section-D: Two questions with internal choice will be set from Section-D of the syllabus. One question will be theoretical in nature and the other will be practical in nature (based on phonetic transcription and stress). Each will carry 6 marks.

Important Note:

The candidate will have to attempt five questions in all selecting one from each section of the question paper and the fifth question may be attempted from any of the four sections.

(6 x 5 = 30 marks)

PRACTICAL / ORAL TESTING

Marks: 10

Course Contents:

1. Oral Presentation with/without audio visual aids.
2. Group Discussion.
3. Listening to any recorded or live material and asking oral questions for listening comprehension.

Questions:

1. Oral Presentation will be of 5 to 7 minutes duration. (Topic can be given in advance or it can be of student's own choice). Use of audio visual aids is desirable.
2. Group discussion comprising 8 to 10 students on a familiar topic. Time for each group will be 15 to 20 minutes.

Note: Oral test will be conducted by external examiner with the help of internal examiner

B.Sc. (Hons.) Agriculture (Semester –II)
(Session: 2018-19)

Course Code :BACM-2063

FUNDAMENTALS OF PLANT BIOCHEMISTRY
AND BIOTECHNOLOGY
(THEORY)

Time:3Hrs

Max. Marks: 75
Theory: 40
Practical: 20
C.A. :15

Instructions for the Paper Setter

Eight questions of equal marks are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section.

THEORY:

UNIT-I

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

UNIT-II

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

UNIT-III

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

UNIT-IV

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

B.Sc. (Hons.) Agriculture (Semester –II)
(Session: 2018-19)

Course Code :BACM-2063

FUNDAMENTALS OF PLANT BIOCHEMISTRY
AND BIOTECHNOLOGY
(PRACTICAL)

Time:3Hrs

Marks:20

Instructions for Practical Examiner : Question paper is to be set on the spot jointly by the Internal and External Examiners. Two copies of the same should be submitted for the record to COE Office ,Kanya Maha Vidyalaya,Jalandhar.

LIST OF EXPERIMENTS

1. Preparation of solution & buffers,
2. Qualitative tests of carbohydrates, amino acids and proteins.
3. Paper chromatography for separation of amino acids/ Monosaccharides..
4. Sterilization techniques.
5. Composition of various tissue culture media and preparation of stock solutions for MS nutrient medium.
6. Callus induction from various explants, micropropagation.

SUGGESTED READINGS

1. Sarad R.Parekh (ed.). The GMO Handbook, Genetically Modified Animals, Microbes, and Plants in Biotechnology. 374 pages, Humana Press, (2004), ISBN: 1588293076.
2. Razdan M.K. Introduction to Plant Tissue Culture. : 376 pages, Science Publishers Inc 2nd edition (2003), ISBN: 1578082374.
3. Heldt H.W. Plant Biochemistry and Molecular Biology, Oxford University Press. 552 pages, Oxford University Press (1998), ISBN: 0198501803.
4. Buchanan B.B., Gruissem W., Jones L.R. Biochemistry and Molecular Biology of Plants. 1367 pages, American Society of Plant Physiologists, 1 st edition (2000), ISBN: 0943088372.

REFERENCES

<http://www.ochempal.org/index.php/alphabetical/m-n/mutarotation/>

<https://www.youtube.com/watch?v=JxK5rZxbyQY&t=3s>

<http://www.aminoacid-studies.com/amino-acids/what-are-amino-acids.html>

B.Sc. (Hons.) Agriculture (Semester –II)
(Session: 2018-19)

Course Code :BACM-2344

AGRICULTURAL MICROBIOLOGY
(THEORY)

Time:3Hrs

Max. Marks: 75

Theory: 40

Practical: 20

C.A. :15

Instructions for the Paper Setter

Eight questions of equal marks are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section.

Unit – I

Introduction. Microbial world: Prokaryotic and eukaryotic microbes. Bacteria: cell structure, chemoautotrophy, photo autotrophy, growth.

Unit – II

Bacterial genetics: Genetic recombination-transformation, conjugation and transduction, plasmids, transposon. Role of microbes in soil fertility and crop production: Carbon, Nitrogen, Phosphorus and Sulphur cycles.

Unit – III

Biological nitrogen fixation- symbiotic, associative and asymbiotic. Azolla, blue green algae and mycorrhiza. Rhizosphere and phyllosphere.

Unit – IV

Microbes in human welfare: silage production, biofertilizers, biopesticides, biofuel production and biodegradation of agro-waste.

B.Sc. (Hons.) Agriculture (Semester –II)
(Session: 2018-19)

Course Code : BACM-2344

AGRICULTURAL MICROBIOLOGY
(PRACTICALS)

Time:3Hrs

Marks:20

Instructions for Practical Examiner : Question paper is to be set on the spot jointly by the Internal and External Examiners. Two copies of the same should be submitted for the record to COE Office ,Kanya Maha Vidyalaya,Jalandhar.

LIST OF EXPERIMENTS

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

SUGGESTED READINGS

1. Pelczar Jr MJ, Chan ECS, and Krieg NR. (2004). Microbiology. 5th edition Tata McGraw Hill.
- 2.. Stanier RY, Ingraham JL, Wheelis ML and Painter PR. (2005). General Microbiology. 5th edition McMillan.
- 3.Dubey, R.C., and Maheshwari, D.K., *A text book of Microbiology*, S. Chand & Company Ltd, New Delhi, 2010.
- 4..Darralyn M., David S.and Phillip A., *Introduction to microbiology*. Black Well Publication Ltd. USA, 2001.

REFERENCES

1. <http://phytopath.ca/wp-content/uploads/2014/09/Isolation-of-Soil-Microorganisms.pdf> ,
2. https://catalog.hardydiagnostics.com/cp_prod/Content/hugo/LactophenolCottonBISn.htm
3. http://www2.highlands.edu/academics/divisions/scipe/biology/labs/rome/bacterial_smears_and_stains.htm

B.Sc. (Hons.) Agriculture (Semester –II)
(Session: 2018-19)

Course Code :BACM-2015

INTRODUCTORY SOIL AND WATER CONSERVATION ENGINEERING
(THEORY)

Time:3Hrs

Max. Marks: 75

Theory: 40

Practical: 20

C.A.: 15

Instructions for the Paper Setter

Eight questions of equal marks are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section.

Theory:

UNIT-I:

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

UNIT-II:

- 5) Gully classification
- 6) Gully control measures

UNIT-III:

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

UNIT-IV:

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

B.Sc. (Hons.) Agriculture (Semester –II)
(Session: 2018-19)

Course Code :BACM-2015

INTRODUCTORY SOIL AND WATER CONSERVATION ENGINEERING
(PRACTICAL)

Time:3Hrs

Marks:20

Instructions for Practical Examiner : Question paper is to be set on the spot jointly by the Internal and External Examiners. Two copies of the same should be submitted for the record to COE Office ,Kanya Maha Vidyalaya,Jalandhar.

LIST OF EXPERIMENTS

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

SUGGESTED READINGS

1. Fangmeier, W., Elliott, W.J., Workman, S., Huffman, R. and Schwab, G.O. 2005. Soil and Water Conservation Engineering, 5th Edition, Cengage Learning, Inc., Clifton Park, USA.
2. Frevert, R.K., Schwab, G.O. Edminster, T.W. and Barnes, K.K. 2009. Soil and Water Conservation Engineering, 4th Edition, John Wiley and Sons, New York.
3. Michael, A.M. and Ojha, T.P. 2003. Principles of Agricultural Engineering. Volume II. 4th Edition, Jain Brothers, New Delhi.
4. Murthy, V.V.N. 2002. Land and Water Management Engineering. 4th Edition, Kalyani Publishers, New Delhi.

REFERENCES

1. <https://www.qld.gov.au/dsiti/assets/soil/gully-erosion.pdf>
2. <https://www.qld.gov.au/dsiti/assets/soil/wind-erosion.pdf>
3. http://megapib.nic.in/soil_conservation_control.htm

B.Sc. (Hons.) Agriculture (Semester –II)
(Session: 2018-19)

Course Code :BACM-2076

FUNDAMENTALS OF CROP PHYSIOLOGY
(THEORY)

Time:3Hrs

Max. Marks: 75
Theory: 40
Practical: 20
C.A. :15

Instructions for the Paper Setter

Eight questions of equal marks are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section.

Unit – I

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

Unit – II

Mineral nutrition of Plants: Functions and deficiency symptoms of nutrients, nutrient uptake mechanisms; Photosynthesis: Light and Dark reactions, C3, C4 and CAM plants;

Unit – III

Respiration: Glycolysis, TCA cycle and electron transport chain; Fat Metabolism: Fatty acid synthesis and Breakdown; Plant growth regulators: Physiological roles and agricultural uses

Unit – IV

Physiological aspects of growth and development of major crops: Growth analysis, Role of Physiological growth parameters in crop productivity.

B.Sc. (Hons.) Agriculture (Semester –II)
(Session: 2018-19)

Course Code :BACM-2076

FUNDAMENTALS OF CROP PHYSIOLOGY
(PRACTICALS)

Time:3Hrs

Marks:20

Instructions for Practical Examiner :Question paper is to be set on the spot jointly by the Internal and External Examiners. Two copies of the same should be submitted for the record to COE Office ,Kanya Maha Vidyalaya,Jalandhar.

LIST OF EXPERIMENTS

- 1 Study of plant cells, structure and distribution of stomata.
- 2 Study of imbibitions, osmosis, plasmolysis.
- 3 Measurement of root pressure, rate of transpiration.
- 4 Separation of photosynthetic pigments through paper chromatography.
- 5 Rate of transpiration, photosynthesis, respiration.
- 6 Tissue test for mineral nutrients.
- 7 Estimation of relative water content.
- 8 Measurement of photosynthetic CO₂ assimilation by Infra Red Gas Analyser (IRGA).

SUGGESTED READINGS

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

REFERENCES

- 1.<http://www.cropnutrition.com/nutrient-knowledge>
- 2.www.biologydiscussion.com/plants/
- 3.<http://www.biologyreference.com/Ta-Va/Translocation.html>

B.Sc. (Hons.) Agriculture (Semester –II)
(Session: 2018-19)

Course Code :BACM-2177

FUNDAMENTALS OF AGRICULTURAL ECONOMICS

Time:3Hrs

Max.Marks :75

Theory : 60

C.A :15

Instructions for the Paper Setter

Eight questions of equal marks are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section.

UNIT-I

Basic concepts: Goods and services, desire, want, demand, utility, cost and price, wealth, capital, income and welfare. Agricultural economics: meaning, importance role of Agriculture in economic development. Agricultural planning and development in the country. *Demand*: meaning, law of demand, schedule and demand curve, determinants, utility theory; law of diminishing marginal utility, equi-marginal utility principle.

UNIT-II

Consumer's equilibrium and derivation of demand curve, concept of consumer surplus.

Elasticity of demand: concept and measurement of price elasticity, income elasticity and cross elasticity. Production: input output relationship. *Laws of returns*: Law of variable proportions and law of returns to scale. *Cost*: concepts, short run and long run cost curves. Supply: Stock v/s supply, law of supply, schedule, supply curve, determinants of supply, elasticity of supply.

UNIT-III

Market structure: meaning and types of market, basic features of perfectly competitive and imperfect markets. Price determination under perfect competition; short run and long run equilibrium of firm and industry, *National income*: Meaning concepts of national income approaches to measurement, difficulties in measurement. Population: Malthusian theory.

UNIT-IV

Money: Barter system of exchange and its problems, meaning and functions of money,

classification of money, Agricultural and public finance: micro v/s macro finance, need for agricultural finance, public revenue and public expenditure. *Tax*: meaning, direct and indirect taxes, agricultural taxation, socialistic and mixed economies, Elements of economic planning.

SUGGESTED READINGS

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

B.Sc. (Hons.) Agriculture (Semester –II)
(Session: 2018-19)

Course Code :BACM-2018

FUNDAMENTALS OF GENETICS
(THEORY)

Max. Marks: 75

Time: 3 Hrs. Theory: 40

Practical: 20

C.A. :15

Instructions for the Paper Setter

Eight questions of equal marks are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section.

THEORY:

Unit – I

Pre and Post Mendelian concepts of heredity, Mendelian principles of heredity. Architecture of chromosome; chromonemata, chromosome matrix, chromomeres, centromere, secondary constriction and telomere; special types of chromosomes.

Unit – II

Chromosomal theory of inheritance- cell cycle and cell division - mitosis and meiosis. Probability and Chi-square . Dominance relationships, Epistatic interactions with example. Multiple alleles, pleiotropism and pseudoalleles, Sex determination and sex linkage, sex limited and sex influenced traits, Blood group genetics, Linkage and its estimation, crossing over mechanisms, chromosome mapping.

Unit – III

Structural and numerical variations in chromosome and their implications, Use of haploids, dihaploids and doubled haploids in Genetics. Mutation, classification, Methods of inducing mutations & CIB technique, mutagenic agents and induction of mutation. Qualitative & Quantitative traits, Polygenes and continuous variations, multiple factor hypothesis, Cytoplasmic inheritance.

Unit – IV

Genetic disorders. Nature, structure & replication of genetic material. Protein synthesis, Transcription and translational mechanism of genetic material, Gene concept: Gene structure, function and regulation, Lac and Trp operons.

B.Sc. (Hons.) Agriculture (Semester –II)
(Session: 2018-19)

Course Code :BACM-2018

FUNDAMENTALS OF GENETICS
(PRACTICAL)

Time:3Hrs

Marks:20

Instructions for Practical Examiner : Question paper is to be set on the spot jointly by the Internal and External Examiners. Two copies of the same should be submitted for the record to COE Office ,Kanya Maha Vidyalaya,Jalandhar.

LIST OF EXPERIMENTS

1. Study of microscope.
2. Study of cell structure.
3. Preparation of micro slides and identification of various stage of cell division.
4. Experiments on monohybrid, dihybrid, trihybrid, test cross and back cross.
5. Experiments on epistatic interactions including test cross and back cross.
6. Practice on mitotic and meiotic cell division.
7. Continuation of Exercise 6
8. Experiments on probability and Chi-square test.
9. Determination of linkage and cross-over analysis (through two point test cross and three point test cross data).
10. Study on sex linked inheritance in *Drosophila*.
11. Demonstration of structural aberrations and polyploidy.
12. Study of models on DNA and RNA structures.

SUGGESTED READINGS

1. Strickberger, M.W.2001.Genetics. Prentice Hall of India. Pvt. Ltd., New Delhi.
- 2.Singh, B.D., Fundamentals of Genetics ,Kalyani Publishers, Ludhiana, 2006.
- 3.Gardner, E.J., Principles of Genetics, John Wiley and Sons, New York, 1991.
- 4.Singh, P., Genetics, Kalyani Publishers Ludhiana, 2000.

REFERENCE

1. www.nmsu.edu
2. www.biology200.gsu.edu

B.Sc. (Hons.) Agriculture (Semester –II)
(Session: 2018-19)

Course Code :BACM-2489

FUNDAMENTALS OF ENTOMOLOGY
(THEORY)

Time:3Hrs

Max. Marks: 75

Theory: 40

Practical: 20

C.A. :15

Instructions for the Paper Setter

Eight questions of equal marks are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section.

Unit – I

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

Unit – II

Insect Ecology: Introduction, Environment and its components. Effect of abiotic factors— temperature, moisture, humidity, rainfall, light, atmospheric pressure and air currents. Effect of biotic factors – food competition, natural and environmental resistance. Categories of pests. Concept of IPM, Practices, scope and limitations of IPM. Classification of insecticides, toxicity of insecticides and formulations of insecticides. Chemical control importance, hazards and limitations. Recent methods of pest control, repellents, anti feed ants, hormones, attractants, gamma radiation. Insecticides Act 1968- Important provisions. Application techniques of spray fluids. Symptoms of poisoning, first aid and antidotes.

Unit – III

Systematics: Taxonomy –importance, history and development and binomial nomenclature. Definitions of Biotype, Sub-species, Species, Genus, Family and Order. Classification of class Insecta upto Orders, basic groups of present day insects with special emphasis to orders and families of Agricultural importance like Orthoptera: Acrididae, Tettigonidae, Gryllidae, Gryllotalpidae; Dictyoptera: Mantidae, Blattidae; Odonata; Isoptera: Termitidae; Thysanoptera: Thripidae; Hemiptera: Pentatomidae, Coreidae, Cimicidae, Pyrrhocoridae, Lygaeidae, Cicadellidae, Delphacidae, Aphididae, Coccidae, Lophophidae,

Unit – IV

Aleurodidae, Pseudococcidae; Neuroptera: Chrysopidae; Lepidoptera: Pieridae, Papilionidae, Noctuidae, Sphingidae, Pyralidae, Gelechiidae, Arctiidae, Saturniidae, Bombycidae; Coleoptera: Coccinellidae, Chrysomelidae, Cerambycidae, Curculionidae, Bruchidae, Scarabaeidae; Hymenoptera: Tenthredinidae, Apidae, Trichogrammatidae, Ichneumonidae, Braconidae, Chalcididae; Diptera: Cecidomyiidae, Tachinidae, Agromyziidae, Culicidae, Muscidae, Tephritidae.

B.Sc. (Hons.) Agriculture (Semester –II)
(Session: 2018-19)

Course Code :BACM-2489

FUNDAMENTALS OF ENTOMOLOGY
(PRACTICALS)

Time:3Hrs

Marks:20

Instructions for Practical Examiner :Question paper is to be set on the spot jointly by the Internal and External Examiners. Two copies of the same should be submitted for the record to COE Office ,Kanya Maha Vidyalaya,Jalandhar.

LIST OF EXPERIMENTS

- 1 Methods of collection and preservation of insects including immature stages.
- 2 External features of Grasshopper/Blister beetle;.
- 3 Types of insect antennae, mouthparts and legs;
- 4 Wing venation, types of wings and wing coupling apparatus.
- 5 Types of insect larvae and pupae.
- 6 Dissection of digestive system in insects (Grasshopper).
- 7 Dissection of male and female reproductive systems in insects (Grasshopper).
- 8 Study of characters of orders Orthoptera, Dictyoptera, Odonata, Isoptera,
- 9 Thysanoptera, Hemiptera, Lepidoptera, Neuroptera, Coleoptera, Hymenoptera, Diptera and their families of agricultural importance.
- 10 Insecticides and their formulations.
- 11 Pesticide appliances and their maintenance.
- 12 Sampling techniques for estimation of insect population and damage.

SUGGESTED READINGS

- 1.Mani, M.S., General Entomology, Oxford & I.B.H. Pub. New Delhi, 1973.
- 2.David, B.V. and Ananthkrishnan, T.N., General and applied Entomology Second Edition, Tata Mcgraw Hill, New Delhi, 2006.
- 3.Atwal, A.S. and Dhariwal G.S., Agricultural pests of India and South-East Asia, Kalyani Publishers, Ludhiana, 2007.
- 4.Srivastva, K.P., Text book of Applied Entomology. Kalyani Publishers. Ludhiana, 2009.

REFERENCES

- 1 www.entomology.ifas.ufl.edu/capinera/eny5236/pest1/content/04/4_handout.pdf
2. www.ucmp.berkeley.edu/arthropoda/arthropoda.html
3. coursesonline.iasri.res.in/mod/page/view.php?id=101147

**B.Sc. (Hons.) Agriculture (Semester –II)
(Session: 2018-19)**

4. Course Code : BACM-2010

**FUNDAMENTALS OF
AGRICULTURAL EXTENSION EDUCATION
(THEORY)**

Time:3Hrs

Max. Marks: 75

Theory: 40

Practical: 20

C.A. :15

Instructions for the Paper Setter

Eight questions of equal marks are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section.

Unit – I

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

Unit – II

Extension systems in India: extension efforts in pre-independence era (Sriniketan, Marthandam, Firka Development Scheme, Gurgaon Experiment, etc.) and post-independence era (Etawah Pilot Project, Nilokheri Experiment, etc.); various extension/ agriculture development programmes launched by ICAR/ Govt. of India (IADP, IAAP, HYVP, KVK, IVLP, ORP, ND,NATP, NAIP, etc.). New trends in agriculture extension: privatization extension, cyber extension/ e-extension, market-led extension, farmer-led extension, expert systems, etc.

Unit – III

Rural Development: concept, meaning, definition; various rural development programmes launched by Govt. of India. Community Dev.-meaning, definition, concept & principles,Philosophy of C.D. Rural Leadership: concept and definition, types of leaders in rural context; extension administration: meaning and concept, principles and functions.

Unit – IV

Monitoring and evaluation: concept and definition, monitoring and evaluation of

extension programmes; transfer of technology: concept and models, capacity building of extension personnel; extension teaching methods: meaning, classification, individual, group and mass contact methods, ICT Applications in TOT (New and Social Media), media mix strategies; communication: meaning and definition; Principles and Functions of Communication, models and barriers to communication. Agriculture journalism; diffusion and adoption of innovation: concept and meaning, process and stages of adoption, adopter categories.

B.Sc. (Hons.) Agriculture (Semester –II)
(Session: 2018-19)

Course Code : BACM-2010

FUNDAMENTALS OF
AGRICULTURAL EXTENSION EDUCATION
(PRACTICALS)

Instructions for Practical Examiner : Question paper is to be set on the spot jointly by the Internal and External Examiners. Two copies of the same should be submitted for the record to COE Office ,Kanya Maha Vidyalaya,Jalandhar.

LIST OF EXPERIMENTS

- 1 To get acquainted with university extension system.
- 2 Group discussion- exercise.
- 3 Handling and use of audio visual equipment's and digital camera and LCD projector.
- 4 Preparation and use of AV aids.
- 5 Preparation of extension literature – leaflet, booklet, folder, pamphlet news stories and success stories
- 6 Presentation skills exercise; micro teaching exercise.
- 7 A visit to village to understand the problems being encountered by the villagers/ farmers.
- 8 To study organization and functioning of DRDA and other development departments at district level.
- 9 A visit to NGO and learning from their experience in rural development.
- 10 Understanding PRA techniques and their application in village development planning.
- 11 Exposure to mass media.
- 12 Visit to community radio and television studio for understanding the process of programme production.
- 13 Script writing, writing for print and electronic media, developing script for radio and television.

SUGGESTED READINGS

1. Mondal, S. and Ray G.L., *A Text book of Rural Development*. Kalyani Publishers, Chennai, 2007.
2. Dharma, O.P. and Bhatnagar, O.P., *Education and Commnication for Development*. Oxford, IBH, New Delhi, 2003.
3. Desai, A.R., *Rural Sociology in India*. Popular Prakashan, Bombay, 2003.
4. Ray G.L., *Extension Communication and Management*, Kalyani Publishers, Chennai, 2007.

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<http://eagri.tnau.ac.in/eagri50/AEXT392/lec3.html>
<http://www.agri.kkwagh.edu.in/Theory%20N/EXTN353>.

<http://www.manage.gov.in/publications/edigest/1999-1.pdf>

**B.Sc. (Hons.) Agriculture (Semester –II)
(Session: 2018-19)**

Course Code :AECD-2161

DRUG ABUSE: PROBLEM MANAGEMENT AND PREVENTION

Time:3 Hrs

Max.Marks: 50

Theory: 40

CA: 10

Instructions for the Paper Setter

Eight questions of equal marks are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section.

UNIT I

1) Consequences of Drug Abuse for:

- 1) Individual – Education, employment and income issues.
- 2) Family – Violence
- 3) Society – Crime.
- 4) Nation – Law and order problem.

UNIT II

2) Management of Drug abuse:

- 1) Medical Management: Medication for treatment and to reduce withdrawal effects, Drug De-addiction clinics, Relapse management.
- 2) Psycho-Social Management: Counselling, family and group therapy, behavioural and cognitive therapy, Environmental Intervention.

UNIT III

3) Prevention of Drug Abuse:

- 1) Role of family: Parent child relationship, Family support, Supervision, Shaping values, Active Scrutiny.
- 2) School
Counselling, Teacher as role-model. Parent-Teacher-Health Professional Coordination, Random testing on students.

UNIT IV

4) Awareness of drug abuse

- 1) Media:

Restraint on advertisements of drugs, advertisements on bad effects of drugs, Publicity and media, Campaigns against drug abuse, Educational and awareness program.

- 2) legislation:

NDPs act, statutory warnings, policing of borders, checking supply/ smuggling of drugs, strict enforcement of laws, time bound trial.

B.Sc. (Hons.) Agriculture (Semester –II)
(Session: 2018-19)

References:

1. Ahuja, Ram (2003), *Social Problems in India*, Rawat Publication, Jaipur.
2. Extent, Pattern and Trend of Drug Use in India, Ministry of Social Justice and Empowerment, Government of India, 2004.
3. Modi, Ishwar and Modi, Shalini (1997) *Drugs: Addiction and Prevention*, Jaipur: Rawat Publication.
6. National Household Survey of Alcohol and Drug abuse. (2003) New Delhi, Clinical Epidemiological Unit, All India Institute of Medical Sciences, 2004.
7. Sain, Bhim 1991, *Drug Addiction Alcoholism*, Smoking obscenity New Delhi: Mittal Publications.
8. Sandhu, Ranvinder Singh, 2009, *Drug Addiction in Punjab: A Sociological Study*. Amritsar: Guru Nanak Dev University.
9. Singh, Chandra Paul 2000. *Alcohol and Dependence among Industrial Workers*: Delhi: Shipra.