

FACULTY OF LIFE SCIENCES

CURRICULUM AND SCHEME OF EXAMINATIONS: 2021- 22

For

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

(Under Continuous Evaluation Grading System)



The Heritage Institution

**KANYA MAHA VIDYALAYA
JALANDHAR
(Autonomous)**

Bachelor of Science (Honours.) Agriculture (Session: 2021-22)
Semester V

Course code	Course Name	Course Type	Marks				Examination time (in hours)
			Total	Mode of Assessment			
				External		Internal	
				L	P	CA	
BACM-5011	Crop Improvement-I (<i>Kharif Crops</i>)	C	50	25	15	10	3+3
BACM-5012	Principles of Integrated Pest and Disease Management	C	75	40	20	15	3+3
BACM-5013	Manures, Fertilizers and Soil Fertility Management	C	75	40	20	15	3+3
BACM-5014	Pests of Crops and Stored Grain and their Management	C	75	40	20	15	3+3
BACM-5015	Diseases of Field and Horticultural Crops and their Management -I	C	75	40	20	15	3+3
BACM-5016	Post-harvest Management and Value Addition of Fruits and Vegetables	C	50	25	15	10	3+3
BACM-5017	Principles of Organic Farming	C	50	25	15	10	3+3
	Elective Courses						
BACM-5018 (OPT-I)	Mushroom Cultivation	E	75	40	20	15	3+3
BACM-5018 (OPT-II)	Micro propagation Techniques	E	75	40	20	15	3+3
BACM-5099	Entrepreneurship Development and Business Communication	C	50	25	15	10	3+3
BACP-5010	Practical Crop Production – I (<i>Kharif crops</i>)	C	50	-	40	10	3
			625				

C-Compulsory
E-Elective

Bachelor of Science (Honours.) Agriculture (Session: 2021-22)
Semester VI

Course code	Course Name	Course Type	Marks				Examination time (in hours)
			Total	Mode of Assessment			
				External		Internal	
				L	P	CA	
BACL-6011	Principles of Food Science & Nutrition	C	50	40	0	10	3
BACL-6012	Intellectual Property Rights	C	25	20	0	5	3
BACM-6013	Crop Improvement-II (<i>Rabi Crops</i>)	C	50	25	15	10	3+3
BACM-6014	Management of Beneficial Insects	C	50	25	15	10	3+3
BACM-6015	Rainfed Agriculture & Watershed Management	C	50	25	15	10	3+3
BACM-6016	Protected Cultivation and Secondary Agriculture	C	50	25	15	10	3+3
BACM-6017	Diseases of Field and Horticultural Crops and their Management-II	C	75	40	20	15	3+3
BACM-6018	Farm Management, Production & Resource Economics	C	50	25	15	10	3+3
BACM-6019	Geoinformatics and Nano-technology and Precision Farming	C	50	25	15	10	3+3
	Elective Courses						
BACM-6020 (OPT-I)/	Weed Management/	E	75	40	20	15	3+3
BACM-6020 (OPT-II)/	Food Safety & Standards/	E	75	40	20	15	3+3
BACM-6020 (OPT-III)	Hi-Tech Horticulture	E	75	40	20	15	3+3
BACP-6010	Practical Crop Production-II (<i>Rabi Crops</i>)	C	50	0	40	10	3
			575				

C – Compulsory

E – Elective

Bachelor of Science (Honours.) Agriculture (Session: 2021-22)
Semester VII

Experiential Learning Programmes

Modules for skill development and entrepreneurship. A student has to register for two modules from the following package of modules: (Any two)

Sr · N	Course	Experiential Learning Modules/	Number of weeks	M.Mark s
		Any two of the following options: -		
	BACP-7010	Production Technology Bio-agents and Bio-fertilizer	10	250
	BACP-7011	Mushroom Cultivation Technology		
	BACP-7012	Soil, Plant, Water and Seed Testing		
	BACP-7013	Commercial Beekeeping	10	250
	BACP-7014	Floriculture and Landscaping		
	BACP-7015	Commercial Horticulture		
		Total		500

Bachelor of Science (Honours.) Agriculture (Session: 2020-21)
Semester VIII

Rural Agricultural Work Experience and Agro-Industrial

Attachment

Sr. No.	Course	Training Components	Number of weeks	M.Marks
1.	BACP-7016	General Orientation & On campus Training by different faculties	3	75
2.	BACP-7017	Plant Clinic	3	75
3.	BACP-7018	Village Attachment	8	200
4.	BACP-7019	Agro-Industrial Attachment-I	3	75
5.	BACP-7020	Agro-Industrial Attachment-II	3	75
		Total	20	500

Bachelor of Science (Honours.) Agriculture

(Session: 2021-22)

Programme Specific Outcomes (PSO)–

Upon successful completion of this course, students will be able to:

PSO1. Acquire, integrate, and apply the plant-science knowledge in a holistic manner needed for agriculturists.

PSO2. Develop interdisciplinary knowledge and have the ability to actually perform physical tasks that require practice and training.

PSO3. Develop creative skills to solve problems and improve current systems and can intervene to make improvements or correct deficiencies.

PSO4. Develop leadership skills and exhibit a high level of professionalism and effective communication.

B.Sc. (Hons.) Agriculture (Semester-V)
(Session: 2021-22)

Course Code: BACM-5011

Crop Improvement-I (*Kharif Crops*)

(THEORY)

COURSE OUTCOMES (CO):

After the course students will be able to:

CO1: recognize the biodiversity in *kharif* crops and understand the floral morphology.

CO2: identify characteristics of self- and cross-pollinated plants.

CO3: master various techniques in varietal development in *kharif* crops.

CO4: maintain the germplasm for the improvements in varieties.

B.Sc. (Hons.) Agriculture (Semester-V)
(Session: 2021-22)

Course Code: BACM-5011

Crop Improvement-I (*Kharif Crops*)

(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.

Unit – I

Centers of origin, distribution of species, wild relatives in different cereals; pulses; oilseeds; fibres; fodders and cash crops; vegetable and horticultural crops.

Unit – II

Plant genetic resources, its utilization and conservation, study of genetics of qualitative and quantitative characters; Important concepts of breeding self-pollinated, cross pollinated and vegetatively propagated crops

Unit – III

Major breeding objectives and procedures including conventional and modern innovative approaches for development of hybrids and varieties for yield, adaptability, stability, abiotic and biotic stress tolerance and quality (physical, chemical, nutritional).

Unit – IV

Hybrid seed production technology in Maize, Rice, Sorghum, Pearl millet and Pigeonpea, etc. Ideotype concept and climate resilient crop varieties for future.

B.Sc. (Hons.) Agriculture (Semester-V)
(Session: 2021-22)

Course Code: BACM-5011

Crop Improvement-I (*Kharif Crops*)

(PRACTICAL)

COURSE OUTCOMES (CO):

After passing this course student will be able to:

CO1: understanding floral biology of major commercial crops & various hybridization techniques.

CO2: identify characteristics of self- and cross-pollinated plants.

CO3: master various techniques in varietal development in *kharif* crops.

CO4: maintain the germplasm for the improvements in varieties.

B.Sc. (Hons.) Agriculture (Semester-V)
(Session: 2021-22)

Course Code: BACM-5011

Crop Improvement-I (*Kharif Crops*)

(PRACTICAL)

Time: 3 Hrs

Marks: 15

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. Floral morphology of kharif cereals crop (rice, maize, sorghum and pearl millet).
2. Floral biology in kharif pulse and oilseed crops (pigeon pea, mung bean, cowpea and groundnut).
3. Emasculation and hybridization in cereals - rice and maize sorghum and bajra
4. Emasculation and hybridization in major pulses and oilseed crops. (pigeonpea, urd bean, mung bean and cowpea)
5. Floral morphology in cotton and vegetables crop species (brinjal, okra and cucurbitaceous crops).
6. Emasculation and hybridization in vegetables crop species (brinjal, okra and cucurbitaceous crops)
7. Handling of germplasm and segregating populations by different methods like pedigree, bulk and single seed decent .
8. Estimation of heterosis, inbreeding depression and heritability.
9. Study of field techniques for seed production and hybrid seeds production in *Kharif* crops
10. Study of donor parents for quality characters
11. To visit to seed production plots of different field crops

SUGGESTED READINGS

1. Chahal G S and Gosal S S 2002. Principles and procedure of plant breeding: biotechnological and conventional approaches. CRC Press, Florida.
2. Chopra, V L 2000. *Breeding of field crops* (edt.). Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.
3. Manjit S. Kang 2004. *Crop improvement: challenges in the twenty-first century* (edt). International Book Distributing Co., Lucknow.
4. Sharma, A K 2005. *Breeding technology of crop plants* (edt.). Yash Publishing house, Bikaner.
5. Ram. H H. 2005. *Vegetable breeding — principles and practices*. Kalyani publishers, New Delhi.

Selected websites:

<https://www.agrimoon.com/breeding-of-field-horticultural-crops-icar-ecourse-pdf-book/>
http://www.battaly.com/science/flowerlab_no.htm
http://www.agriquest.info/hybrid_seed.php
http://en.citizendium.org/wiki/Crop_origins_and_evolution
<http://www.encyclopedia.com/sc/107249-agriculture-and-horticulture.htm>

B.Sc. (Hons.) Agriculture (Semester-V)
(Session: 2021-22)

Course Code: BACM-5012

Principles of Integrated Pest and Disease Management

(THEORY)

COURSE OUTCOMES (CO):

After passing this course student will be able to:

CO1: develop an expertise in identification of crop pests, disease causing organisms and losses caused by them.

CO2: analyze varied measures for management of pest and diseases in *khariif* crops.

CO3: develop a plan for ecologically sound pest management tactics.

CO4: justify the short and longer benefits of blended management approach for pests and diseases productivity.

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B.Sc. (Hons.) Agriculture (Semester-V)
(Session: 2021-22)

Course Code: BACM-5012

Principles of Integrated Pest and Disease Management
(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

Categories of insect pests and diseases, IPM: Introduction, history, importance, concepts, principles and tools of IPM. Economic importance of insect pests, diseases and pest risk analysis. Methods of detection and diagnosis of insect pest and diseases.

Unit – II

Calculation and dynamics of economic injury level and importance of Economic threshold level. Methods of control: Host plant resistance, cultural, mechanical, physical, legislative, biological and chemical control.

Unit – III

Introduction to conventional pesticides for the insect pests and disease management. Survey surveillance and forecasting of Insect pest and diseases. Development and validation of IPM module.

Unit – IV

Implementation and impact of IPM (IPM module for Insect pest and disease. Safety issues in pesticide uses. Political, social and legal implication of IPM. Case histories of important IPM programmes. Case histories of important IPM programmes.

B.Sc. (Hons.) Agriculture (Semester-V)
(Session: 2021-22)

Course Code: BACM-5012

Principles of Integrated Pest and Disease Management

(PRACTICAL)

COURSE OUTCOMES (CO):

After passing this course student will be able to:

CO1: identify major insect pests and diseases of different crops.

CO2: estimate plant diseases and yield losses of crops.

CO3: develop strategies and tactics of IPM, pest monitoring and decision making.

CO4: compare the benefits of pest and diseases management with IPM.

B.Sc. (Hons.) Agriculture (Semester-V)
(Session: 2021-22)

Course Code: BACM-5012

Principles of Integrated Pest and Disease Management
(PRACTICAL)

Time: 3 Hrs

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. To identify insect pests of different crops
2. To identify plant diseases of different crops
3. To study Koch's postulates for the confirmation of plant pathogens
4. To study pest surveillance and forecasting of insect pests and plant diseases.
5. Crop monitoring and assessment of crop yield losses.
6. Identification of biocontrol agents, different predators and natural enemies.
7. Mass multiplication of *Trichoderma*, *Pseudomonas*, *Trichogramma*, NPV etc.
8. Identification and nature of damage of important insect pests and diseases and their management.
9. Population dynamics of a selected insect pest and diseases.
10. IPM and decision making.
11. Awareness campaign at farmers fields.

SUGGESTED READINGS

1. Rangaswamy, G and Mahadevan, A. 2001. Diseases of crop plants in India. Prentice Hall of India Pvt Ltd., New Delhi.
2. Dhaliwal G S, Ram Singh & Jindal Vikas 2013. A textbook of integrated pest management. Kalyani Publ, Ludhiana.
3. Dhaliwal G S & Arora Ramesh 2004. Principles of insect pest management by. Kalyani Publ, Ludhiana.
4. Agrios G N 2005. *Plant pathology*. 5th ed. Academic Press, New York. (Indian ed.)
5. Mehrotra, R S and Aggarwal A. 2007. Plant pathology. Tata Mcgraw Hill Publishing Co. Ltd., New Delhi

Selected websites:

<http://vikaspedia.in/agriculture/crop-production/integrated-pest-managment/ipm-for-cereals/ipmstrategies-for-wheat/wheat-pests>

http://agritech.tnau.ac.in/crop_protection/crop_prot_crop_insectpest%20_cereals_paddymain.html

http://agritech.tnau.ac.in/crop_protection/crop_prot_crop_insect_agri_pest.html

http://agritech.tnau.ac.in/crop_protection/crop_prot_crop_insect_horti_pest_spices_plant.html

B.Sc. (Hons.) Agriculture (Semester-V)
(Session: 2021-22)

Course Code: BACM-5013

Manures, Fertilizers and Soil Fertility Management (THEORY)

COURSE OUTCOMES (CO):

After passing this course student will be able to:

CO1: identify soil types and ways to improve soil fertility.

CO2: interpret soil analytical data with a view to assess fertilizer requirements.

CO3: chalk out strategies for using this information to guide farmers for soil *management*.

CO4: work out the details for integrated soil nutrient management optimizing organic, inorganic and biological components.

B.Sc. (Hons.) Agriculture (Semester-V)
(Session: 2021-22)
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Course Code: BACM-5013

Manures, Fertilizers and Soil Fertility Management
(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

Introduction and importance of organic manures, properties and methods of preparation of bulky and concentrated manures. Green/leaf manuring. Fertilizer recommendation approaches. Integrated nutrient management.

Unit – II

Chemical fertilizers: classification, composition and properties of major nitrogenous, phosphatic, potassic fertilizers, secondary & micronutrient fertilizers, Complex fertilizers, nano fertilizers Soil amendments, Fertilizer Storage, Fertilizer Control Order. History of soil fertility and plant nutrition. criteria of essentiality.

Unit – III

Role, deficiency and toxicity symptoms of essential plant nutrients, Mechanisms of nutrient transport to plants, factors affecting nutrient availability to plants. Chemistry of soil nitrogen, phosphorus, potassium, calcium, magnesium, sulphur and micronutrients.

Unit – IV

Soil fertility evaluation, Soil testing. Critical levels of different nutrients in soil. Forms of nutrients in soil, plant analysis, rapid plant tissue tests. Indicator plants. Methods of fertilizer recommendations to crops. Factor influencing nutrient use efficiency (NUE), methods of application under rainfed and irrigated conditions.

B.Sc. (Hons.) Agriculture (Semester-V)
(Session: 2021-22)

Course Code: BACM-5013

Manures, Fertilizers and Soil Fertility Management

(PRACTICAL)

COURSE OUTCOMES (CO):

After passing this course student will be able to:

CO1: interpret soil analytical data with a view to predicting fertilizer requirements.

CO2: demonstrate advanced knowledge of the soil-plant system to improve plant growth and yield.

CO3: interpret soil analytical data with a view to predicting fertilizer requirements.

CO4: work out the details for integrated soil nutrient management optimizing organic, inorganic and biological components.

B.Sc. (Hons.) Agriculture (Semester-V)
(Session: 2021-22)

Course Code: BACM-5013

Manures, Fertilizers and Soil Fertility Management
(PRACTICAL)

Time: 3 Hrs

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 of analytical instruments and their principles.
2. Colorimetry and flame photometry.
3. Determination of soil organic carbon.
4. Estimation of alkaline hydrolysable N in soils.
5. Estimation of soil extractable P in soils.
6. Estimation of exchangeable K, Ca and Mg in soils
7. Estimation of soil extractable S in soils.
8. Estimation of DTPA extractable Zn in soils.
9. Estimation of N in plants.
10. Estimation of P in plants.
11. Determination of K in plants.

SUGGESTED READINGS

1. Rajesh Singh and Singh S S 2014. Soil fertility and nutrient management. Kalyani Publ, Ludhiana.
2. Brady N C & Weil R R 2017. The nature and properties of soils. Pearson Education, India.
3. Biswas T D & Mukherjee S K 2006. Text book of soil science. Tata Mcgraw Hill Publishing Co. Ltd, New Delhi.
4. Rai M M 2002. Principal of soil science. Mac Millan India Ltd, New Delhi.
5. ISSS 2002. Fundamental of soil science. Div. of Soil Science, IARI, New Delhi.

Selected websites:

1. http://agritech.tnau.ac.in/agriculture/agri_nutrientmgt_integrntrientmgt.html
2. agritech.tnau.ac.in/org_farm/orgfarm_manure.html
3. <http://www.agriinfo.in/default.aspx?page=topic&superid=1&topicid=360>
4. <https://www.jove.com/.../soil-nutrient-analysis-nitrogen-phosphorus-and-potassium>
Chemistry of major nutrients
5. http://krishi.bih.nic.in/Acts-Rules/Fert_Order_1985.pdf

B.Sc. (Hons.) Agriculture (Semester-V)
(Session: 2021-22)

Pests of Crops and Stored Grain and Their Management

(THEORY)

COURSE OUTCOMES (CO):

After passing this course student will be able to:

CO1: identify the insect pests on various crops and stored grains

CO2: be judgmental in deciding about proper time of pest management based on bionomics and their nature of damage.

CO3: select appropriate safe pesticide and calculate doses and techniques for pesticides applications.

CO4: devise the pest management techniques in storage of grain and food products.

B.Sc. (Hons.) Agriculture (Semester-V)
(Session: 2021-22)

Course Code: BACM-5014

**Pests of Crops and Stored Grain and Their
Management**

(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

General account on nature and type of damage by different arthropods pests. Scientific name, order, family, host range, distribution, biology and bionomics, nature of damage, and management of major pests of field crops.

Unit – II

Scientific name, order, family, host range, distribution, nature of damage and control practice other important arthropod pests of various vegetable crop, fruit crop, plantation crops, ornamental crops, spices and condiments.

Unit – III

Scientific name, order, family, host range, distribution, nature of damage and control practice other important arthropod pests of fruit crop, plantation crops, ornamental crops, spices and condiments.

Unit – IV

Factors affecting losses of stored grain and role of physical, biological, mechanical and chemical factors in deterioration of grain.

Insect pests, mites, rodents, birds and microorganisms associated with stored grain and their management. Storage structure and methods of grain storage and fundamental principles of grain store management.

B.Sc. (Hons.) Agriculture (Semester-V)
(Session: 2021-22)

Course Code: BACM-5014

Pests of Crops and Stored Grain and Their Management

(PRACTICAL)

COURSE OUTCOMES (CO):

After passing this course student will be able to:

CO1: identify the insect pests on various crops and stored grains.

CO2: select appropriate safe pesticide and calculate doses and techniques for pesticides applications.

CO3: devise pest management strategies for agricultural and horticultural crops.

CO4: devise the pest management techniques in storage of grain and food products.

B.Sc. (Hons.) Agriculture (Semester-V)
(Session: 2021-22)

Course Code: BACM-5014

Pests of Crops and Stored Grain and Their Management

(PRACTICAL)

Time: 3 Hrs

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 Vidyalya, Jalandhar.

LIST OF EXPERIMENTS

- 1 Identification of types of damage caused by insect pests.
- 2 Identification of insect pests of rice and sorghum and their management.
- 3 Identification of insect pests of wheat and maize and their management
- 4 To study the pests of sugarcane and cotton and their management
- 5 To study the pests of pulses and oil seeds crops and their Management
- 6 Estimation of crop losses caused by pests
- 7 Calculations on the doses of insecticides application technique.
- 8 Identification of pests of vegetable crops and their management
- 9 Identification of pests of fruit crops and their management
- 10 Fumigation of grain store / godown.
- 11 Identification of rodents and rodent control operations in godowns.
- 12 Visit to nearest FCI godowns.

SUGGESTED READINGS

1. Atwal A S. and Dhaliwal, G S 2002. Agricultural pests of South Asia and their management. Kalyani Publishers, Ludhiana.
2. Srivastava K P 2004. A text book of applied entomology vol 1 & 2. Kalyani Publishers, Ludhiana.
3. Sehgal P K & Mir M A 2014. A text book of agricultural entomology. Kalyani Publishers, Ludhiana.
4. Dhaliwal G S & Ramesh A 2014. Integrated pest management. Kalyani Publishers, Ludhiana.
5. Awasthi V B 2017. Agricultural insect pests and their control 2nd ed. Scientific Publishers, Jodhpur.

Selected websites:

<http://gardeningolutions.ifas.ufl.edu/care/pests-and-diseases/pests/management/different-pestsdifferent-damage.html>

<http://vikaspedia.in/agriculture/crop-production/integrated-pest-managment/ipm-for-cereals/ipmstrategies-for-wheat/wheat-pests>

http://agritech.tnau.ac.in/crop_protection/crop_prot_crop_insectpest%20_cereals_paddyman.html

http://agritech.tnau.ac.in/crop_protection/crop_prot_crop_insect_agri_pest.html

http://agritech.tnau.ac.in/crop_protection/crop_prot_crop_insect_horti_pest_spices_plant.html

B.Sc. (Hons.) Agriculture (Semester-V)
(Session: 2021-22)

Course Code: BACM-5015

Diseases of Field and Horticultural Crops and Their Management –I

(THEORY)

COURSE OUTCOMES (CO):

After passing this course student will be able to:

CO1: acquire scientific knowledge about diseases and disorders of field & fruit crops.

CO2: apply knowledge to identify and solve problems based on disease symptoms produced during different stages of field & fruit crops plant development.

CO3: gain awareness about disease cycle of various pathogens associated with field & fruit crop disease.

CO4: extend their knowledge over disease associated with tropical and temperate fruit crops.

B.Sc. (Hons.) Agriculture (Semester-V)
(Session: 2021-22)

Course Code: BACM-5015

**Diseases of Field and Horticultural Crops and Their
Management –I**

(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

Symptoms, etiology, disease cycle and management of major diseases of following crops: Field Crops: Rice: blast, brown spot, bacterial blight, sheath blight, false smut, khaira and tungro; Maize: stalk rots, downy mildew, leaf spots; Sorghum: smuts, grain mold and anthracnose, Bajra: downy mildew and ergot; Groundnut: early and late leaf spots, wilt.

Unit – II

Soybean: Rhizoctonia blight, bacterial spot, seed and seedling rot and mosaic; Pigeonpea: Phytophthora blight, wilt and sterility mosaic; Finger millet: Blast and leaf spot; black & green gram. Cercospora leaf spot and anthracnose, web blight and yellow mosaic; Castor: Phytophthora blight; Tobacco: black shank, black root rot and mosaic.

Unit – III

Horticultural Crops: Guava: wilt and anthracnose; Banana: Panama wilt, bacterial wilt, Sigatoka and bunchy top; Papaya: foot rot, leaf curl and mosaic, Pomegranate: bacterial blight; Coconut: wilt and bud rot; Tea: blister blight; Coffee: rust.

Unit – IV

Cruciferous vegetables: Alternaria leaf spot and black rot. Brinjal: Phomopsis blight and fruit rot and Sclerotinia blight; Tomato: damping off, wilt, early and late blight, buck eye rot and leaf curl and mosaic; Okra: Yellow Vein Mosaic; Beans: anthracnose and bacterial blight; Ginger: soft rot; Colocasia: Phytophthora blight.

B.Sc. (Hons.) Agriculture (Semester-V)
(Session: 2021-22)

Course Code: BACM-5015

Diseases of Field and Horticultural Crops and Their Management –I

(PRACTICAL)

COURSE OUTCOMES (CO):

After passing this course student will be able to:

CO1: acquire scientific knowledge about diseases and disorders of field & fruit crops.

CO2: apply knowledge to identify and solve problems based on disease symptoms produced during different stages of field & fruit crops plant development

CO3: gain awareness about disease cycle of various pathogens associated with field & fruit crop disease.

CO4: Gain familiarity with regard to field- and lab-based approaches for the diagnosis of diseases and pathogens in field & fruit crops.

B.Sc. (Hons.) Agriculture (Semester-V)
(Session: 2021-22)

Course Code: BACM-5015

**Diseases of Field and Horticultural Crops and Their
Management –I**

(PRACTICAL)

Time: 3 Hrs

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 Vidyalya, Jalandhar.

LIST OF EXPERIMENTS

- 1 Collection and preservation of plant diseased specimens for Herbarium
- 2 Symptoms, etiology, disease cycle and management of diseases of : Rice
- 3 ----- do ----- Maize
- 4 ----- do ----- Pearl & finger millet
- 5 ----- do ----- Soybean, Groundnut and Castor
- 6 ----- do ----- Black gram and Green gram
- 7 ----- do ----- Papaya and Guava
- 8 ----- do ----- Banana and Mango
- 9 ----- do ----- Tomato, Okra and Brinjal
- 10 ----- do ----- of Cruciferous Crops
- 11 ----- do ----- Ginger and Bean crops
- 12 To visit Field for diagnosis of plant diseases

SUGGESTED READINGS

1. Singh, R S 2006. Diseases of fruit crops. Oxford and IBH Publishing Co. Pvt. Ltd. New Delhi.
2. Singh R S 2007. Plant diseases (8th ed). Oxford and IBH Publishing Co. Pvt. Ltd. New Delhi.
3. Gupta V K & Paul Y S 2008. Diseases of field crops (2nd ed.). Kalyani publishing co. ND.
4. Mehrotra R S & Aggarwal A 2012. Plant pathology (12th ed.). Tata Mcgraw Hill Publishing Co Ltd. ND.
5. Rangaswamy G & Mahadevan A 2012. Diseases of crop plants in India (4th ed.). Prentice Hall of India Pvt Ltd, New Delhi.

Selected websites:

https://www.agro.basf.co.za/agroportal/za/media/basf_ap_training_presentations/BASF_Cereal_Disease_Encyclopedia.pdf

http://agritech.tnau.ac.in/crop_protection/crop_prot_crop_diseases.html Diseases of cereal crops

http://ecourses.iasri.res.in/e-Learningdownload3_new.aspx?Degree_Id=01

http://agritech.tnau.ac.in/crop_protection/crop_prot_crop_diseases_agri.html

http://www.croppro.com.au/crop_disease_manual/ch01s01.php

B.Sc. (Hons.) Agriculture (Semester-V)
(Session: 2021-22)

Course Code: BACM-5016

Post-Harvest Management and Value Addition of Fruits and Vegetables

(THEORY)

COURSE OUTCOMES (CO):

After passing this course student will be able to:

CO1: understand the causes of postharvest loss and changes in fruits and vegetables.

CO2: describe different storage techniques for horticultural produce.

CO3: discuss principle and methods of processing or value addition.

CO4: prepare value added product from fruit and vegetable.

B.Sc. (Hons.) Agriculture (Semester-V)
(Session: 2021-22)

Course Code: BACM-5016

**Post-Harvest Management and Value Addition of
Fruits and Vegetables**

(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.

Unit – I

Importance of post-harvest processing of fruits and vegetables, extent and possible causes of post harvest losses; Pre-harvest factors affecting postharvest quality, maturity, ripening and changes occurring during ripening

Unit – II

Respiration and factors affecting respiration rate; Harvesting and field handling; Storage (ZECC, cold storage, CA, MA, and hypobaric); Value addition concept

Unit – III

Principles and methods of preservation; Intermediate moisture food- Jam, jelly, marmalade, preserve, candy – Concepts and Standards; Fermented and non-fermented beverages.

Unit – IV

Tomato products- Concepts and Standards; Drying/ Dehydration of fruits and vegetables – Concept and methods, osmotic drying. Canning – Concepts and Standards, packaging of products.

B.Sc. (Hons.) Agriculture (Semester-V)
(Session: 2021-22)

Course Code: BACM-5016

Post-Harvest Management and Value Addition of Fruits and Vegetables

(PRACTICAL)

COURSE OUTCOMES (CO):

After passing this course student will be able to:

CO1: understand the causes of postharvest loss and changes in fruits and vegetables.

CO2: describe different storage techniques for horticultural produce.

CO3: discuss principle and methods of processing or value addition.

CO4: prepare value added product from fruit and vegetable.

B.Sc. (Hons.) Agriculture (Semester-V)
(Session: 2021-22)

Course Code: BACM-5016

Post-Harvest Management and Value Addition of Fruits and Vegetables

(PRACTICAL)

Time: 3 Hrs

Marks: 15

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 important tools/equipments/ machines and chemicals required for PHT laboratory
2. Applications of different types of packaging, containers for shelf life extension.
3. Effect of temperature on shelf life and quality of produce(drying and dehydration).
4. Demonstration of chilling and freezing injury in vegetables and fruits.
5. Extraction and preservation of pulps and juices.
6. Preparation of jam, jelly, RTS, nectar, squash,
7. Tomato products, pickles and canned products.
8. Osmotically dried products,
9. Fruit bar and Candy
10. Quality evaluation of products -- physico-chemical and sensory.
11. Visit to processing unit/ industry.

SUGGESTED READINGS

1. Pantastiko E B 1975. Post-harvest Physiology, Handling and Utilization of Tropical and Sub-tropical Fruits and Vegetables, Westport (Connecticut).
2. Pandey P H 2007. Principles and Practices of Post-harvest Technology. Kalyani Publ, N. Delhi.
3. Sharma S K and Nautiyal M C 2009. Post-harvest technology of Horticultural Crops. New India Publishing Agency, Pitampura, New Delhi.
4. Bhutan R C 2012. Fruits and Vegetable Preservation. Biotech Book, N. Delhi.
5. Srilaxmi B 2016. Food Science. New Age International Publ., N. Delhi.

Selected Websites

http://agritech.tnau.ac.in/postharvest/pht_intro.html

<http://eagri.org/eagri50/HORT381/pdf/lec01.pdf>

<http://www.fao.org/docrep/005/y4358e/y4358e05.htm> Post-harvest handling considerations for fresh fruits and vegetables

<https://extension.umn.edu/preserving-and-preparing/making-jams-marmalades-preserves-and-conserves>

<https://content.ces.ncsu.edu/packaging-requirements-for-fresh-fruits-and-vegetables> Packaging of fruit and vegetable.

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

(Session: 2021-22)

Course Code: BACM-5017

Principles of Organic Farming

(THEORY)

COURSE OUTCOMES (CO):

After passing this course student will be able to:

CO1: learn about basic principles of organic farming.

CO2: optimize the soil nutrients utilizing organic and biological means for raising kharif crops.

CO3: precisely understand about qualitative and quantitative input requirements for *Kharif* crop production and ecologically sound.

CO4: learn about various management practices for commercial crop production with more dependence on organic inputs.

B.Sc. (Hons.) Agriculture (Semester-V)
(Session: 2021-22)

Course Code: BACM-5017

Principles of Organic Farming

(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.

Unit – I

Organic farming, principles and its scope in India; Initiatives taken by Government (central/state), NGOs and other organizations for promotion of organic agriculture.

Unit – II

Organic ecosystem and their concepts; Organic nutrient resources and its fortification; Restrictions to nutrient use in organic farming

Unit – III

Choice of crops and varieties in organic farming; Fundamentals of insect, pest, disease and weed management under organic mode of production; Operational structure of NPOP

Unit – IV

Certification process and standards of organic farming; Processing, leveling, economic considerations and viability, marketing and export potential of organic products.

B.Sc. (Hons.) Agriculture (Semester-V)
(Session: 2021-22)

Course Code: BACM-5017

Principles of Organic Farming

(PRACTICAL)

COURSE OUTCOMES (CO):

After passing this course student will be able to:

CO1: identify the key components of organic farming.

CO2: optimize the soil nutrients utilizing organic and biological means for raising kharif crops.

CO3: precisely understand about qualitative and quantitative input requirements for kharif crop production and ecologically sound.

CO4: analyze the information about the Operational structure of NPOP.

B.Sc. (Hons.) Agriculture (Semester-V)
(Session: 2021-22)

Course Code: BACM-5017

Principles of Organic Farming

(PRACTICAL)

Time: 3 Hrs

Marks: 15

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. Visit of organic farms to study the various components and their utilization.
2. Preparation of enrich compost, vermicompost, bio-fertilizers/bio-inoculants and their quality analysis.
3. Indigenous technology knowledge (ITK) for nutrient, insect, pest disease and weed management.
4. Cost of organic production system.
5. Post-harvest management.
6. Quality aspect, grading, packaging and handling.

SUGGESTED READINGS

1. Rai N & Yadav D S 2005. 'Approaches for Organic Farming'. *Advances in Vegetable Production*. Research Book Centre, N. Delhi.
2. Joshi Mukand & Parbhakarashetty 2005. Sustainability through Organic Farming. Kalyani Publ, N. Delhi.
3. Trivedi P C 2011. Organic Farming for Sustainable Agriculture. Aavishkar Publ. Jaipur.
4. Singh S S & Singh Rajesh 2007. Sustainable Agriculture for Secured Survival. Kalyani Publ, N. Delhi.
5. Veeresh G K 2006. Organic Farming. Cambridge University Press India Pvt. Ltd, N. Delhi.

B.Sc. (Hons.) Agriculture (Semester-V)
(Session: 2021-22)

Course Code: BACP-5010

Practical Crop Production – I (*Kharif crops*)

(PRACTICAL)

COURSE OUTCOMES (CO):

After passing this course student will be able to:

CO1: describe intercultural operations of different kharif crops.

CO2: grasp about cultural operations for raising kharif crops.

CO3: demonstrate plant protection measures of different crops.

CO4: calculate economics of different crops for commercial crop production.

B.Sc. (Hons.) Agriculture (Semester-V)
(Session: 2021-22)

Course Code: BACP-5010

Practical Crop Production – I (*Kharif crops*)

(PRACTICAL)

Time: 3 Hrs

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 Crop planning.
- 2 Raising field crops in multiple cropping systems.
- 3 Field preparation, application of manures and fertilizers
- 4 Selection of crop and varieties, seed treatment and sowing of crops
- 5 Observation of germination
- 6 Thinning and gap filling
- 7 Intercultural operations-hoeing and weeding
- 8 Water management- application of irrigation water and demonstrating methods of irrigation
- 9 Top dressing of fertilizer (urea) and insect-pest and disease management technologies
- 10 Harvesting, threshing, winnowing and storage
- 11 Preparation of balance sheet including cost of cultivation, net returns per student as well as per team of 8-10 students.

SUGGESTED READINGS

1. Das N R 2007. Introduction to crops of India. Scientific Publishers, Jodhpur.
2. Yawalkar K S Aggarwal J P & Bokde S 2008. Manures and fertilizers (10th ed.). Agri-horticultural Publishing House, Nagpur.
3. Balasubramaniyam P & Palaniappan, S P 2016. Principles and practices of Agronomy. Agrobios, Jodhpur.
4. Reddy S R 2016. Principles of Agronomy (5th ed.). Kalyani Publishers, Ludhiana.
5. Singh S S & Singh Rajesh 2015. Principles and practices of Agronomy (5th re-set). Kalyani Publishers, Ludhiana.

Selected Websites:

- <http://www.icar.org.in/en/node/9072>
agricoop.nic.in/programmesandschemes/integrated-nutrient-management Integrated nutrient management
<http://www.eolss.net/sample-chapters/c10/E5-15-02-04.pdf>
<http://www.fao.org/docrep/006/Y4360E/y4360e0a.htm> Field preparation.
<http://ppqs.gov.in/PDF/Seed%20Treatment%20Rabi123.htm>

B.Sc. (Hons.) Agriculture (Semester-V)
(Session: 2021-22)

Course Code: BACM-5099

Entrepreneurship Development and Business Communication

(THEORY)

COURSE OUTCOMES (CO):

After passing this course student will be able to:

CO1: understand entrepreneurship and business start-up planning.

CO2: prepare a concept to identify the business skills, potential team members, partners, customers and investors.

CO3: develop a sound knowledge about legal and ethical business.

CO4: analyze basic skills to start their enterprises communicate effectively both orally and in business writings as well deliver effective presentations.

B.Sc. (Hons.) Agriculture (Semester-V)
(Session: 2021-22)

Course Code: BACM-5099

**Entrepreneurship Development and Business
Communication**

(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.

Unit – I

Concept of Entrepreneur, Entrepreneurship Development, Characteristics of entrepreneurs; SWOT Analysis & achievement motivation, Government policy and programs and institutions for entrepreneurship development

Unit – II

Impact of economic reforms on Agribusiness/ Agri-enterprises, Entrepreneurial Development Process; Business Leadership Skills; Developing organizational skill (controlling, supervising, problem solving, monitoring & evaluation).

Unit – III

Developing Managerial skills, Business Leadership Skills (Communication, direction and motivation Skills), Problem solving skill.

Unit – IV

Supply chain management and Total quality management, Project Planning Formulation and report preparation; Financing of enterprise, Opportunities for agri-entrepreneurship and rural enterprise.

B.Sc. (Hons.) Agriculture (Semester-V)
(Session: 2021-22)

Course Code: BACM-5099

Entrepreneurship Development and Business Communication

(PRACTICAL)

COURSE OUTCOMES (CO):

After passing this course student will be able to:

CO1: understand entrepreneurship and business start-up planning.

CO2: prepare a concept to identify the business skills, potential team members, partners, customers and investors.

CO3: develop a sound knowledge about legal and ethical business.

CO4: analyze basic skills to start their enterprises communicate effectively both orally and in business writings as well deliver effective presentations.

B.Sc. (Hons.) Agriculture (Semester-V)
(Session: 2021-22)

Course Code: BACM-5099

**Entrepreneurship Development and Business
Communication**

(PRACTICAL)

Time: 3 Hrs

Marks: 15

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– 2 Assessing entrepreneurial traits, problem solving skills, managerial skills and achievement motivation.
- 3- -4 Exercise in creativity, time audit through planning, monitoring and supervision.
- 5- -6 Identification and selection of business idea.
- 7- -9 Preparation of business plan and proposal writing.
- 10 -11 Visit to entrepreneurship development institute and entrepreneurs.

SUGGESTED READINGS

1. Harold Koontz & Heinz Weihrich 2004. Essentials of management: an international perspective, (2nd ed.) Tata Mc-graw Hill Publishing Pvt Ltd., New Delhi.
2. Mohanty S K 2007. Fundamentals of entrepreneurship. Prentice Hall India Ltd., New Delhi.
3. Poornima Charantimath 2006. Entrepreneurship development: small business enterprise. Pearson Education, New York.
- 4 Jayashree, K, Anil Kumar, Mini K. Abhraham & Poornima S C 2015. Entrepreneurship development. New Age International, New Delhi.
5. Nandan H 2011. Fundamentals of entrepreneurship. Phi Learning Pvt Ltd, India.

Selected websites:

- <http://ecoursesonline.iasri.res.in/mod/page/view.php?id=49544>
https://shodhganga.inflibnet.ac.in/bitstream/10603/103242/11/11_chapter%204.pdf
<https://www.geospatialworld.net/article/impact-of-economic-reforms-on-indian-agricultural-sector-application-of-geomatics>
<https://www.indiatrust.org/docs/22%20INTRODUCTION%20LESSION%20AS%20ENTREPRENEURSHIP.pdf>
https://en.wikipedia.org/wiki/Total_quality_management

B.Sc. (Hons.) Agriculture (Semester-V)
(Session: 2021-22)

Course Code: BACM-5018 (Opt-I)

Mushroom Cultivation

(Theory)

COURSE OUTCOMES (CO):

After passing this course student will be able to:

CO1: will gain necessary competencies for isolating and culturing the different species of edible fungus.

CO2: develop mushroom spawn under lab conditions as pure culture.

CO3: become skillful for mushroom cultivation under natural environmental conditions.

CO4: identify the various pest and disease conditions in mushroom houses.

B.Sc. (Hons.) Agriculture (Semester-V)
(Session: 2021-22)

Course Code: BACM-5018 (Opt-I)

Mushroom Cultivation

(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.

Unit – I

Introduction to mushroom fungi, Identification of edible and poisonous type, edible mushrooms -- *Pleurotus*, *Volvariella* and *Agaricus*, medicinal value of mushrooms, preparation of culture, mother spawn production, multiplication of spawn.

Unit – II

Cultivation Technology of button, oyster, paddy straw; and milky mushrooms harvesting, packing and storage; problems in cultivation --- diseases, pests and nematodes, weed moulds and their management strategies. Economics of cultivation, postharvest technologies.

Unit – III

Equipment and sterilization techniques for culture media, isolation of mother culture, spawn preparation and maintenance of mushroom beds, oyster mushroom, *Volvariella* and *Agaricus*.

Unit – IV

Processing and preservation of mushrooms, economics of spawn and mushroom production and Project cost - analysis for mushroom cultivation

B.Sc. (Hons.) Agriculture (Semester-V)
(Session: 2021-22)

Course Code: BACM-5018 (Opt-I)

Mushroom Cultivation

(PRACTICAL)

COURSE OUTCOMES (CO):

After passing this course student will be able to:

CO1: will gain necessary competencies for isolating and culturing the different species of edible fungus.

CO2: develop mushroom spawn under lab conditions as pure culture.

CO3: become skillful for mushroom cultivation under natural environmental conditions.

CO4: identify the various pest and disease conditions in mushroom houses.

B.Sc. (Hons.) Agriculture (Semester-V)
(Session: 2021-22)

Course Code: BACM-5018 (Opt-I)

MUSHROOM CULTIVATION

(PRACTICAL)

Time: 3 Hrs

Marks: 15

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 common, edible and poisonous mushrooms
2. To study preparation of media for mycelial culture of mushroom.
3. Preparation of mushroom spawn.
4. Compost preparation for button mushroom production.
5. Button mushroom cultivation conditions for small medium and large scale.
6. Harvesting and packaging techniques of mushroom.
7. Pests and diseases of mushrooms.
8. Oyster mushroom cultivation
9. Cultivation technology of paddy straw and milky mushroom
10. Cost benefit ratio of mushroom cultivation and project formulation
11. Visit to mushroom industrial unit

SUGGESTED READINGS

1. Agrimoon Team 2016. Mushroom culture -horticulture ICAR pdf book.
2. Suman B C & Sharma V P 2007. Mushroom cultivation in India. Daya Publishing House, New Delhi.
3. Biswas S, Datta M & Ngachan S V 2012. Mushrooms: A Manual for Cultivation, PHI Learning Pvt. Ltd., New Delhi, India.
4. Manjit Singh, Bhuvnesh Vijay, Shwet Kamal and Wakchaure G C (2011). Mushrooms cultivation, marketing and consumption. Publisher: Directorate of Mushroom Research, Solan, Himachal Pradesh-India.
5. Bahl Neeta 2006. Handbook on Mushrooms, Oxford and IBH Publishing

Selected Websites:

<http://nhb.gov.in/pdf/Cultivation.pdf>

<http://ecoursesonline.iasri.res.in/mod/page/view.php?id=103099>

http://agricoop.nic.in/sites/default/files/ICAR_8.pdf

<http://www.extension.psu.edu/plants/vegetable-fruit/mushrooms/mushroomsubstrate/substrate-preparation-for-white-button-mushrooms>

http://www.agritech.tnau.ac.in/farm_enterprises/Farm%20enterprises_%20Mushroom_Post%20harvest.html

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

(Session: 2021-22)

Course Code: BACM-5018 (Opt-II)

Micro Propagation Technologies

(THEORY)

COURSE OUTCOMES (CO):

After passing this course student will be able to:

CO1: learn about basic principles of crop production practices of *kharif* crops.

CO2: understand about cultural operations for raising *kharif* crops.

CO3: precisely understand about qualitative and quantitative input requirements for *kharif* crop production.

CO4: learn about various management practices for commercial crop production.

B.Sc. (Hons.) Agriculture (Semester-V)
(Session: 2021-22)

Course Code: BACM-5018 (Opt-II)

Micro Propagation Technologies

(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

Introduction, History, Advantages and limitations; Types of cultures (seed, embryo, organ, callus, cell)

Unit – II

Stages of micropropagation, Axillary bud proliferation (Shoot tip and meristem culture, bud culture)

Unit – III

Organogenesis (callus and direct organ formation), Somatic embryogenesis, cell suspension cultures

Unit – IV

Production of secondary metabolites, Somaclonal variation, Cryopreservation

B.Sc. (Hons.) Agriculture (Semester-V)
(Session: 2021-22)

Course Code: BACM-5018 (Opt-II)

Micro Propagation Technologies

(PRACTICAL)

COURSE OUTCOMES (CO):

After passing this course student will be able to:

CO1: demonstrate the knowledge of the tissue culture maintenance *techniques*.

CO2: use lab equipment and develop expertise in culture media preparation sterilization and raising callus from organ explants.

CO3: successfully maintain cultures with good viability, minimal contamination and appropriate documentation.

CO4: recognize and troubleshoot problems common to routine cell culture.

B.Sc. (Hons.) Agriculture (Semester-V)
(Session: 2021-22)

Course Code: BACM-5018 (Opt-II)

Micro Propagation Technologies

(PRACTICAL)

Time: 3 Hrs

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 and use of equipments in tissue culture Laboratory.
2. Composition. and preparation of Nutrition media
3. Sterilization techniques for media, containers and small instruments.
4. Sterilization techniques for explants.
5. Preparation of stocks and working solution.
6. Preparation of selective medium.
7. Culturing of explants: Seeds, shoot tip and single node.
8. Callus induction.
9. Induction of somatic embryos regeneration of whole plants from different explants.
10. Hardening procedures.

SUGGESTED READINGS

1. Chawala H S 2000. Introduction to Plant Biotechnology. Oxford & IBH, New Delhi
2. Gupta, P. K. 2008. Elements of Biotechnology. Rastogi Publications, Meerut
3. Shekhawat M. S. 2011. Plant Biotechnology: In vitro Principles, Techniques and Applications. MJP Publishers, Chennai
4. Mascarenhas A. F. 2008. Hand Book of Plant Tissue Culture. ICAR, New Delhi
5. Singh B D 2005. Biotechnology, Expanding Horizons. Kalyani Publishers, Ludhiana.

Selected Websites

http://agritech.tnau.ac.in/bio-tech/biotech_tc_notes.html

<https://en.wikipedia.org/wiki/Micropropagation>

https://www.researchgate.net/publication/236028153_Advanced_technology_in_micropropagation_of_some_important_plants

https://www-pub.iaea.org/MTCD/publications/PDF/te_1384_web.pdf

<https://www.isaaa.org/resources/publications/pocketk/14/default.asp>

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

(Session: 2021-22)

Course Code: BACL- 6011

PRINCIPLES OF FOOD SCIENCE AND NUTRITION

(THEORY)

COURSE OUTCOMES (CO):

After passing this course student will be able to:

CO1: understand about various food groups, balanced diet, principles of meal planning and relationship between food, nutrition and health.

CO2: understand and interpret about digestion, absorption and function of various nutrients and their sources.

CO3: have a working knowledge about avoiding food spoilage and wastage.

CO4: learn about food preservation methods.

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

(Session: 2021-22)

Course Code: BACL- 6011

PRINCIPLES OF FOOD SCIENCE AND NUTRITION

(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

Concepts of Food Science (definitions, measurements, density, phase change, pH, osmosis, surface tension, colloidal systems etc.); Food composition and chemistry (water, carbohydrates, proteins, fats, vitamins, minerals, flavours, colours, miscellaneous bioactives, important reactions)

Unit – II

Food microbiology (bacteria, yeast, moulds, spoilage of fresh & processed foods, Production of fermented foods)

Unit – III

Principles and methods of food processing and preservation (use of heat, low temperature, chemicals, radiation, drying etc.); Food and nutrition, Malnutrition (over and under nutrition), nutritional disorders

Unit – IV

Energy metabolism (carbohydrate, fat, proteins); Balanced/ modified diets, Menu planning, New trends in food science and nutrition.

SUGGESTED READINGS

1. Shakuntala M and Shadaksharaswamy (2010). Food facts and principles. New Age International.
2. Srilaxmi B (2015). Nutrition Science. New Age International.
3. Potter Norman N (2012). Food Science. CBS Publishers & Distributors Pvt. Ltd.
4. P H Pandey (2007). Principles & Practices of Post-Harvest Technology. Kalyani Publishers, ND.

SUGGESTED WEBSITES

Web sites: <http://www.agrimoon.com/>
<http://www.agriinfo.in/eagri.org>
<http://www.agriglance.com/>
<http://agritech.tnau.ac.in/>

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

(Session: 2021-22)

Course Code: BACL- 6012

INTELLECTUAL PROPERTY RIGHTS

(THEORY)

COURSE OUTCOMES (CO):

After passing this course student will be able to:

CO1: understand about basic concepts of Intellectual Property Rights (IPR).

CO2: learn about legislations covering IPR in India.

CO3: learn about UPOV for protection of plant varieties and PPV and FR Act in India.

CO4: discuss the relevance and futuristic need for IPR.

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

((Session: 2021-22))

Course Code: BACL- 6012

INTELLECTUAL PROPERTY RIGHTS

(THEORY)

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 and meaning of intellectual property, brief introduction to GATT, WTO, TRIPs and WIPO, Treaties for IPR protection: Madrid protocol, Berne Convention, Budapest treaty, etc. Types of Intellectual Property and legislations covering IPR in India:-Patents, Copyrights, Trademark, Industrial design, Geographical indications, Integrated circuits, Trade secrets.

Unit – II

Patents Act 1970 and Patent system in India, patentability, process and product patent, filing of patent, patent specification, patent claims, Patent opposition and revocation, infringement, compulsory licensing, Patent Cooperation Treaty, Patent search and patent database.

Unit – III

Origin and history including a brief introduction to UPOV for protection of plant varieties, Protection of plant varieties under UPOV and PPV&FR Act of India, Plant breeder's rights, Registration of plant varieties under PPV&FR Act 2001, breeders, researcher and farmers rights. Traditional knowledge-meaning and rights of TK holders.

Unit – IV

Convention on Biological Diversity, International treaty on plant genetic resources for food and agriculture (ITPGRFA). Indian Biological Diversity Act, 2002 and its salient features, access and benefit sharing.

SUGGESTED READINGS

1. Bhandari M K (2011). Central law publication's law relating to Intellectual Property Rights Central Law Publication.
2. Lokganathan E T (2015). Intellectual property rights (IPRS). New Century Publications.
3. Pathak Manju (2014). Introduction to intellectual property rights. NIPA

SUGGESTED WEBSITES

Web sites: <http://www.agrimoon.com/>

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

<http://www.agriglance.com/>

<http://agritech.tnau.ac.in/>

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

(Session: 2021-22)

Course Code: BACM- 6013

CROP IMPROVEMENT-II (*RABI CROPS*)

(THEORY)

COURSE OUTCOMES (CO):

After passing this course student will be able to:

CO1: understand the diversity pattern in flowers of rabi crop

CO2: apply knowledge for varietal development in crops

CO3: grasp and interpret about various breeding technique for crop improvement

CO4: learn and apply practical skills in plant breeding

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

(Session: 2021-22)

Course Code: BACM- 6013

CROP IMPROVEMENT-II (*RABI CROPS*)

(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.

Unit – I

Centers of origin, distribution of species, wild relatives in different cereals; pulses; oilseeds; fodder crops and cash crops; vegetable and horticultural crops

Unit – II

Plant genetic resources, its utilization and conservation; study of genetics of qualitative and quantitative characters

Unit – III

Major breeding objectives and procedures including conventional and modern innovative approaches for development of hybrids and varieties for yield, adaptability, stability, abiotic and biotic stress tolerance and quality (physical, chemical, nutritional)

Unit – IV

Hybrid seed production technology of rabi crops. Ideotype concept and climate resilient crop varieties for future.

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

(Session: 2021-22)

Course Code: BACM- 6013

CROP IMPROVEMENT-II (*RABI CROPS*)

(PRACTICAL)

COURSE OUTCOMES (CO):

After passing this course student will be able to:

CO1: differentiate and understanding the biodiversity pattern in rabi crops.

CO2: develop and equip students with various breeding technique for crop improvement.

CO3: discuss briefly about different techniques involved in varietal development in crops.

CO4: apply knowledge and practical skills in plant breeding.

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

(Session: 2021-22)

Course Code: BACM- 6013

CROP IMPROVEMENT-II (*RABI CROPS*)

(PRACTICAL)

Time: 3 Hrs

Marks: 15

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 study the flower structure and reproductive parts in crops
2. Emasculation and hybridization techniques in Wheat, Oat, Barley.
3. To study the floral biology, emasculation and hybridization techniques in Chickpea, Lentil and Field pea.
4. To study the floral biology, emasculation and hybridization techniques in Rapeseed Mustard and Sunflower.
5. To study the floral biology, emasculation and hybridization techniques in Potato, Berseem, Sugarcane.
6. To study the floral biology, emasculation and hybridization techniques in different crop species namely Tomato, Chilli, Onion.
7. To handle the germplasm and segregating populations by pedigree, bulk and single seed decent methods.
8. To Study of field techniques for seed production and hybrid seeds production in Rabi crops.
9. To estimate the heterosis, inbreeding depression and heritability.
10. To study Layout of field experiments.
11. To study of quality characters, study of donor parents for different characters.
12. To visit to seed production plots.

SUGGESTED READINGS

1. G.S. Chahal and S.S. Gosal (2001). Principles and Procedure of Plant Breeding: Biotechnological and Conventional Approaches. Alpha Science International Ltd.
2. Hari Har Ram (2014). Crop Breeding and Biotechnology. Kalyani Publication, ND.
3. Singh D and Singh N (2014). Breeding crop plants for stress resistance. Kalyani Publishers, ND.
4. Robert W. Allard, Robert Wayne Allard (1999). Principles of Plant Breeding. Wiley Publications.
5. Kumar N (2016). Breeding of horticultural crops. NIPA.

SUGGESTED WEBSITES

Web sites: <http://www.agrimoon.com/>

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

<http://www.agriglance.com/>

<http://agritech.tnau.ac.in/>

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

(Session: 2021-22)

Course Code: BACM- 6014

MANAGEMENT OF BENEFICIAL INSECTS

(THEORY)

COURSE OUTCOMES (CO):

After passing this course student will be able to:

CO1: Extend the knowledge on scope, importance and uses of beneficial insects.

CO2: Learn the management methods in bee keeping, silk worm rearing.

CO3: Learn the skills of bee keeping, silk worm rearing and lac production and Processing.

CO4: Discuss the mass multiplication and field release of bio-agents.

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

(Session: 2021-22)

Course Code: BACM- 6014

MANAGEMENT OF BENEFICIAL INSECTS

(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.

Unit – I

Importance of beneficial Insects, Beekeeping and pollinators, bee biology, commercial methods of rearing, equipment used, seasonal management, bee enemies and disease. Bee pasturage, bee foraging and communication. Insect pests and diseases of honey bee. Role of pollinators in cross pollinated plants.

Unit – II

Types of silkworm, voltinism and biology of silkworm. Mulberry cultivation, mulberry varieties and methods of harvesting and preservation of leaves. Rearing, mounting and harvesting of cocoons. Pest and diseases of silkworm, management, rearing appliances of mulberry silkworm and methods of disinfection.

Unit – III

Species of lac insect, morphology, biology, host plant, lac production – seed lac, button lac, shellac, lac- products. Identification of major parasitoids and predators commonly being used in biological control.

Unit – IV

Insect orders bearing predators and parasitoids used in pest control and their mass multiplication techniques. Important species of pollinator, weed killers and scavengers with their importance.

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

(Session: 2021-22)

Course Code: BACM- 6014

MANAGEMENT OF BENEFICIAL INSECTS

(PRACTICAL)

COURSE OUTCOMES (CO):

After passing this course student will be able to:

CO1: identify and realize the scope, importance and uses of beneficial insects.

CO2: learn the management methods in bee keeping, silk worm rearing.

CO3: learn the skills of bee keeping, silk worm rearing and lac production and Processing.

CO4: learn the skill of mass multiplication and field release of bio-agents.

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

(Session: 2021-22)

Course Code: BACM- 6014

MANAGEMENT OF BENEFICIAL INSECTS

(PRACTICAL)

Time: 3 Hrs

Marks: 15

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. Honey bee species and castes of bees.
2. Beekeeping appliances and seasonal management.
3. Bee enemies and disease.
4. Bee pasturage, bee foraging and communication.
5. Types of silkworm, voltinism and biology of silkworm.
6. Mulberry cultivation, mulberry varieties and methods of harvesting and preservation of leaves.
7. Species of lac insect, host plant identification.
8. Identification of other important pollinators, weed killers and scavengers.
9. Identification and techniques for mass multiplication of natural enemies.
10. Mass multiplication techniques of *Trichogramma* sp. and *Chrysoperla carnea*
11. Visit to research and training institutions devoted to beekeeping, sericulture, lac culture and natural enemies.

SUGGESTED READINGS

1. Abrol D P (2013). Beekeeping. Scientific Publishers.
2. Sathe T V (2014). Fundamentals of beekeeping. Daya Publishing House.
3. Prasad T V (2012). Handbook of entomology. New Vishal Publications.
4. Ganga G and Chetty J S (2017). Introduction to sericulture. Oxford and IBH.
5. Singh Tribhuwan and Saratchan (2017). Principles and techniques of silkworm seed production. Discovery Publishing Pvt. Ltd.

SUGGESTED WEBSITES

Web sites: <http://www.agrimoon.com/>

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

<http://www.agriglance.com/>

<http://agritech.tnau.ac.in/>

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

(Session: 2021-22)

Course Code: BACM- 6015

**RAINFED AGRICULTURE AND WATERSHED
MANAGEMENT
(THEORY)**

COURSE OUTCOMES (CO):

After passing this course student will be able to:

CO1: grasp the fundamentals principles of rainfed agriculture and their application in agriculture.

CO2: learn about watershed management.

CO3: gain in depth knowledge about drought, crop adaptation and contingent crop planning for crops.

CO4: have understanding about soil and climate conditions and soil conservation.

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

(Session: 2021-22)

Course Code: BACM- 6015

**RAINFED AGRICULTURE AND WATERSHED
MANAGEMENT
(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.

Unit – I

Rainfed agriculture: Introduction, types, History of rainfed agriculture and watershed in India; Problems and prospects of rainfed agriculture in India; Soil and climatic conditions prevalent in rainfed areas.

Unit – II

Soil and water conservation techniques, Drought: types, effect of water deficit on physiological characteristics of the plants, Crop adaptation and mitigation to drought.

Unit – III

Water harvesting: importance, its techniques, Efficient utilization of water through soil and crop management practices, Management of crops in rainfed areas

Unit – IV

Contingent crop planning for aberrant weather conditions, Concept, objective, principles and components of watershed management, factors affecting watershed management.

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

(Session: 2021-22)

Course Code: BACM- 6015

**RAINFED AGRICULTURE AND WATERSHED
MANAGEMENT
(PRACTICAL)**

COURSE OUTCOMES (CO):

After passing this course student will be able to:

CO1: understand rainfed agriculture and their application in agriculture.

CO2: learn about watershed management and meteorological observations.

CO3: learn the skill of assessing drought and crop adaptation and to develop contingent crop planning.

CO4: have understanding about water harvesting structures and visit various sites.

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

(Session: 2021-22)

Course Code: BACM- 6015

RAINFED AGRICULTURE AND WATERSHED MANAGEMENT

(PRACTICAL)

Time: 3 Hrs

Marks: 15

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 Vidyalya, Jalandhar.

LIST OF EXPERIMENTS

1. Studies on climate classification.
2. Studies on rainfall pattern in rainfed areas of the country and pattern of onset and withdrawal of monsoons.
3. Studies on cropping pattern of different rainfed areas in the country and demarcation of rainfed area on map of India.
4. Interpretation of meteorological data and scheduling of supplemental irrigation on the basis of evapo-transpiration demand of crops.
5. Critical analysis of rainfall and possible drought period in the country, effective rainfall and its calculation.
6. Studies on cultural practices for mitigating moisture stress.
7. Characterization and delineation of model watershed.
8. Field demonstration on soil & moisture conservation measures.
9. Field demonstration on construction of water harvesting structures.
10. Visit to rainfed research station/watershed.

SUGGESTED READINGS

1. Das M M and Saika M I (2013). Watershed Management. PHI learning.
2. Tripathi R P and Singh H P (2008). Soil erosion and conservation. New age international.
3. Murthy V V N and Jha M K (2016). Land and water management engineering. Kalyani Publishers, ND.
4. Das Ghanshyam (2016). Hydrology and Soil Conservation Engineering Including Watershed Management. PHI learning.
5. Jayanthi C and Kalpana R (2016). Dryland agriculture. Kalyani Publishers.

SUGGESTED WEBSITES

Web sites: <http://www.agrimoon.com/>

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

<http://www.agriglance.com/>

<http://agritech.tnau.ac.in/>

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

(Session: 2021-22)

Course Code: BACM- 6016

**PROTECTED CULTIVATION AND SECONDARY
AGRICULTURE
(THEORY)**

COURSE OUTCOMES (CO):

After passing this course student will be able to:

CO1: grasp the fundamental knowledge and learn the scope of protected cultivation.

CO2: describe the components of protected structures.

CO3: understand and plan the crop raising under green houses.

CO4: practice raising crops under protected condition.

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

(Session: 2021-22)

Course Code: BACM- 6016

**PROTECTED CULTIVATION AND SECONDARY
AGRICULTURE
(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.

Unit – I

Green house technology: Introduction, Types of Green Houses; Plant response to Green house environment, Planning and design of greenhouses, Design criteria of green house for cooling and heating purposes.

Unit – II

Green house equipments, materials of construction for traditional and low cost green houses. Irrigation systems used in greenhouses, typical applications, passive solar green house, hot air green house heating systems, green house drying. Cost estimation and economic analysis.

Unit – III

Important Engineering properties such as physical, thermal and aero & hydrodynamic properties of cereals, pulses and oilseed, their application in PHT equipment design and operation.

Unit – IV

Drying and dehydration; moisture measurement, EMC, drying theory, various drying method, commercial grain dryer (deep bed dryer, flat bed dryer, tray dryer, fluidized bed dryer, recirculatory dryer and solar dryer). Material handling equipment; conveyer and elevators, their principle, working and selection.

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

(Session: 2021-22)

Course Code: BACM- 6016

**PROTECTED CULTIVATION AND SECONDARY
AGRICULTURE
(PRACTICAL)**

COURSE OUTCOMES (CO):

After passing this course student will be able to:

CO1: grasp the fundamental knowledge and learn the scope of protected cultivation.

CO2: describe the components of protected structures.

CO3: understand and plan the crop raising under green houses.

CO4: practice raising crops under protected condition.

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

(Session: 2021-22)

Course Code: BACM- 6016

PROTECTED CULTIVATION AND SECONDARY AGRICULTURE

(PRACTICAL)

Time: 3 Hrs

Marks: 15

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 Vidyalya, Jalandhar.

LIST OF EXPERIMENTS

1. Study of different type of green houses based on shape.
2. Determine the rate of air exchange in an active summer winter cooling system.
3. Determination of drying rate of agricultural products inside green house.
4. Study of green house equipments.
5. Visit to various Post Harvest Laboratories.
6. Determination of Moisture content of various grains by oven drying & infrared moisture methods.
7. Determination of engineering properties (shape and size, bulk density and porosity of biomaterials).
8. Determination of Moisture content of various grains by moisture meter.
9. Field visit to seed processing plant.

SUGGESTED READINGS

1. Singh B (2014). Advances in protected cultivation. NIPA.
2. Jag Paul K (2002). Crop production technology for cold arid region. Kalyani Publishers, ND.
3. Prasad S and Kumar U (2016). Greenhouse management for horticulture crops. Agrobios.
4. Tiwari G N (2012). Greenhouse technology for controlled environment. Narosa Publications.
5. Singh C and Singh P (2018). Modern techniques of raising field crops. CBS publishing.
6. Saha, Arun Kumar and Saha Anu (2018). Textbook of soil physics. Kalyani Publishers, ND.

SUGGESTED WEBSITES

Web sites: <http://www.agrimoon.com/>

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

<http://www.agriglance.com/>

<http://agritech.tnau.ac.in/>

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

(Session: 2021-22)

Course Code: BACM- 6017

**DISEASES OF FIELD & HORTICULTURAL CROPS &
THEIR MANAGEMENT-II**

(THEORY)

COURSE OUTCOMES (CO):

After passing this course student will be able to:

CO1: understand in depth about diseases of horticultural and fruit crops in Rabi season and epidemiological favorable factors for disease development.

CO2: understand the life cycle and perpetuation of field crop diseases.

CO3: learn about disease associated with tropical and temperate fruit crops.

CO4: develop basic skill in disease diagnosis and identification.

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

(Session: 2021-22)

Course Code: BACM- 6017

**DISEASES OF FIELD & HORTICULTURAL CROPS &
THEIR MANAGEMENT-II**
(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

Symptoms, etiology, disease cycle and management of following diseases: Field Crops: Wheat: rusts, loose smut, karnal bunt, powdery mildew, alternaria blight, and ear cockle; Sugarcane: red rot, smut, wilt, grassy shoot, ratoon stunting and Pokkah Boeng; Sunflower: Sclerotinia stem rot and Alternaria blight.

Unit – II

Mustard: Alternaria blight, white rust, downy mildew and Sclerotinia stem rot; Gram: wilt, grey mould and Ascochyta blight; Lentil: rust and wilt; Cotton: anthracnose, vascular wilt, and black arm; Pea: downy mildew, powdery mildew and rust.

Unit – III

Horticultural Crops: Mango: anthracnose, malformation, bacterial blight and powdery mildew; Citrus: canker and gummosis; Grape vine: downy mildew, Powdery mildew and anthracnose; Apple: scab, powdery mildew, fire blight and crown gall; Peach: leaf curl. Strawberry: leaf spot Potato: early and late blight, black scurf, leaf roll, and mosaic.

Unit – IV

Cucurbits: downy mildew, powdery mildew, wilt; Onion and garlic: purple blotch, and Stemphylium blight; Chillies: anthracnose and fruit rot, wilt and leaf curl; Turmeric: leaf spot Coriander: stem gall Marigold: Botrytis blight; Rose: dieback, powdery mildew and black leaf spot.

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

(Session: 2021-22)

Course Code: BACM- 6017

**DISEASES OF FIELD & HORTICULTURAL CROPS &
THEIR MANAGEMENT-II**

(PRACTICAL)

COURSE OUTCOMES (CO):

After passing this course student will be able to:

CO1: understand in depth about diseases of horticultural and fruit crops in Rabi season and epidemiological favorable factors for disease development.

CO2: understand the life cycle and perpetuation of field crop diseases.

CO3: learn about disease associated with tropical and temperate fruit crops.

CO4: develop basic skill in disease diagnosis and identification.

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

(Session: 2020-21)

Course Code: BACM- 6017

DISEASES OF FIELD & HORTICULTURAL CROPS & THEIR MANAGEMENT-II

(PRACTICAL)

Time: 3 Hrs

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. To collect and preserve diseased samples for herbarium.
2. To study symptoms, etiology, disease cycle and management of diseases of wheat.
3. To study symptoms, etiology, disease cycle and management of diseases of sugarcane.
4. To study symptoms, etiology, disease cycle and management of diseases of sunflower.
5. To study symptoms, etiology, disease cycle and management of diseases of mustard.
6. To study symptoms, etiology, disease cycle and management of diseases of gram and Lentil.
7. To study symptoms, etiology, disease cycle and management of diseases of cotton and Coffee.
8. To study symptoms, etiology, disease cycle and management of diseases of apple and Strawberry.
9. To study the symptoms, etiology and management of diseases of potato and cucurbits.
10. To study the symptoms, etiology and management of diseases of onion, garlic and chilli.
11. To study the symptoms, etiology and management of diseases of marigold and rose.

SUGGESTED READINGS

1. Singh S K and Singh D K (2007). Pest and soil management of horticultural crops. ATPA.
2. Sharma R C and Sharma J N (2011). Integrated plant disease management. Scientific Publishers.
3. Biswas S K and Kumar S A (2016). Diseases of pulse crops and their sustainable management. Biotech.
4. Gupta V K and Paul Y S (2017). Diseases of vegetable crops. Kalyani Publishers, ND.
5. Singh, R S (2018) Plant Diseases. Oxford and IBH Co. New Delhi.

SUGGESTED WEBSITES

Web sites: <http://www.agrimoon.com/>

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

<http://www.agriglance.com/>

<http://agritech.tnau.ac.in/>

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

(Session: 2021-22)

Course Code: BACM- 6018

**FARM MANAGEMENT, PRODUCTION AND
RESOURCE ECONOMICS
(THEORY)**

COURSE OUTCOMES (CO):

After passing this course student will be able to:

CO1: understand the basic and advanced farm management practices.

CO2: apply the production function in decision-making for raising crop on a farm.

CO3: prepare of farm records and accounts.

CO4: identify risks and uncertainty in agricultural production.

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

(Session: 2021-22)

Course Code: BACM- 6018

**FARM MANAGEMENT, PRODUCTION AND
RESOURCE ECONOMICS
(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.

Unit – I

Meaning and concept of farm management, objectives and relationship with other sciences. Meaning and definition of farms, its types and characteristics, factor determining types and size of farms. Principles of farm management: concept of production function and its type, use of production function in decision-making on a farm, factor-product, factor-factor and product-product relationship, law of equi-marginal/or principles of opportunity cost and law of comparative advantage.

Unit – II

Meaning and concept of cost, types of costs and their interrelationship, importance of cost in managing farm business and estimation of gross farm income, net farm income, family labour income and farm business income. Farm business analysis: meaning and concept of farm income and profitability, technical and economic efficiency measures in crop and livestock enterprises. Importance of farm records and accounts in managing a farm, various types of farm records needed to maintain on farm, farm inventory, balance sheet, profit and loss accounts.

Unit – III

Meaning and importance of farm planning and budgeting, partial and complete budgeting, steps in farm planning and budgeting-linear programming, appraisal of farm resources, selection of crops and livestock's enterprises. Concept of risk and uncertainty occurs in agriculture production, nature and sources of risks and its management strategies, Crop/livestock/machinery insurance – weather based crop insurance, features, determinants of compensation.

Unit – IV

Concepts of resource economics, differences between NRE and agricultural economics, unique properties of natural resources. Positive and negative externalities in agriculture, Inefficiency and welfare loss, solutions, Important issues in economics and management of common property resources of land, water, pasture and forest resources etc.

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

(Session: 2021-22)

Course Code: BACM- 6018

**FARM MANAGEMENT, PRODUCTION AND
RESOURCE ECONOMICS**

(PRACTICAL)

COURSE OUTCOMES (CO):

After passing this course student will be able to:

CO1: understand the basic and advanced farm management practices

CO2: apply the production function in decision-making for raising crop on a farm

CO3: prepare of farm records and accounts

CO4: identify risks and uncertainty in agricultural production

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

(Session: 2021-22)

Course Code: BACM- 6018

FARM MANAGEMENT, PRODUCTION AND RESOURCE ECONOMICS

(PRACTICAL)

Time: 3 Hrs

Marks: 15

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 farm layout.
2. Determination of cost of fencing of a farm.
3. Computation of depreciation cost of farm assets.
4. Application of equi-marginal returns/opportunity cost principle in allocation of farm resources.
5. Determination of most profitable level of inputs use in a farm production process.
6. Determination of least cost combination of inputs.
7. Selection of most profitable enterprise combination.
8. Application of cost principles including CACP concepts in the estimation of cost of crop and livestock enterprises.
9. Preparation of farm plan and budget, farm records and accounts and profit & loss accounts.
10. Collection and analysis of data on various resources in India.

SUGGESTED READINGS

1. Reddy S and Subba Devi Bhava (2012). Agricultural Economics. Oxford & IBH Publishing Co. Pvt. Ltd.
2. Dhondyal S P (2014). Production economics and farm management Aman Publishing House, New Delhi.
3. Subba Reddy S, Raghu Ram, Neelakanta P, Sastry T V and Bhavani Devi (2011). Agricultural Economics, Oxford and IBH Publishing Co. Private Limited, New Delhi.
4. Heady Earl O and Herald R. Farm Management Economics. Prentice Hall, New Delhi.

SUGGESTED WEBSITES

Web sites: <http://www.agrimoon.com/>

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

<http://www.agriglance.com/>

<http://agritech.tnau.ac.in/>

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

((Session: 2021-22)

Course Code: BACM- 6019

**GEOINFORMATICS, NANO-TECHNOLOGY AND
PRECISION FARMING
(THEORY)**

COURSE OUTCOMES (CO):

After passing this course student will be able to:

CO1: describe the basic concepts of remote sensing and geoinformatics.

CO2: learn about tools and techniques of geoinformatics used in precision farming.

CO3: learn about tools and techniques of nanotechnology in relation to agriculture.

CO4: learn about tools and techniques of image interpretation.

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

(Session: 2021-22)

Course Code: BACM- 6019

**GEOINFORMATICS, NANO-TECHNOLOGY AND
PRECISION FARMING**

(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.

Unit – I

Precision agriculture: concepts and techniques; their issues and concerns for Indian agriculture; Geo-informatics- definition, concepts, tool and techniques; their use in Precision Agriculture.

Unit – II

Crop discrimination and Yield monitoring, soil mapping; fertilizer recommendation using geospatial technologies; Spatial data and their management in GIS; Remote sensing concepts and application in agriculture; Image processing and interpretation

Unit – III

Global positioning system (GPS), components and its functions; Introduction to crop Simulation Models and their uses for optimization of Agricultural Inputs; STCR approach for precision agriculture

Unit – IV

Nanotechnology, definition, concepts and techniques, brief introduction about nanoscale effects, nano-particles, nano-pesticides, nano-fertilizers, nano-sensors, Use of nanotechnology in seed, water, fertilizer, plant protection for scaling-up farm productivity

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

(Session: 2021-22)

Course Code: BACM- 6019

**GEOINFORMATICS, NANO-TECHNOLOGY AND
PRECISION FARMING
(PRACTICAL)**

COURSE OUTCOMES (CO):

After passing this course student will be able to:

CO1: describe the basic concepts of remote sensing and geoinformatics.

CO2: learn about tools and techniques of geoinformatics used in precision farming.

CO3: learn about tools and techniques of nanotechnology in relation to agriculture.

CO4: learn about tools and techniques of image interpretation.

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

(Session: 2021-22)

Course Code: BACM- 6019

GEOINFORMATICS, NANO-TECHNOLOGY AND PRECISION FARMING

(PRACTICAL)

Time: 3 Hrs

Marks: 15

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 Vidyalya, Jalandhar.

LIST OF EXPERIMENTS

1. Introduction to GIS software.
2. Introduction to spatial data creation and editing.
3. Introduction to image processing software.
4. Visual and digital interpretation of remote sensing images.
5. Supervised and unsupervised classification and acreage estimation.
6. Multispectral remote sensing for soil mapping.
7. Creation of thematic layers of soil fertility based on GIS.
8. Fertilizers recommendations based of VRT and STCR techniques.
9. Crop stress (biotic/abiotic) monitoring using geospatial technology.
10. Formulation, characterization and applications of nanoparticles in agriculture.
11. Projects formulation and execution related to precision farming.

SUGGESTED READINGS

1. Heege Hermann J. (2013). Precision in crop farming. Springer.
2. Sahu D D and Solanki R M (2018). Remote sensing techniques in agriculture. Agrobios
3. Basudeb Bhatta (2011). Remote sensing and GIS. Oxford University Press.
4. Vyas P R (2015) Remote sensing and geographical information system. Rawat Publications.
5. George Joseph (2015) Fundamentals of remote sensing, Oxford Universities Press.

SUGGESTED WEBSITES

Web sites: <http://www.agrimoon.com/>

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

<http://www.agriglance.com/>

<http://agritech.tnau.ac.in/>

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

(Session: 2021-22)

Course Code: BACM- 6020 (Opt-I)

WEED MANAGEMENT

(THEORY)

COURSE OUTCOMES (CO):

After passing this course student will be able to:

CO1: identify and classify different weeds.

CO2: evaluate the different weed management practices in holistic manner.

CO3: apply different types of herbicides in appropriate manner.

CO4: identify the impact of allelopathy and its role in weed management.

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

(Session: 2021-22)

Course Code: BACM- 6020 (Opt-I)

WEED MANAGEMENT

(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

Introduction to weeds: introduction to weeds, characteristics of weeds their harmful and beneficial effects on agricultural ecosystems, classification of weeds

Unit – II

Weed reproduction and dissemination of weeds Introduction to herbicides and mode of action: herbicide classification, Introduction to mode of action of herbicides and selectivity. Herbicide formulation: herbicide formulation and their use, concept of adjuvant, surfactant,

Unit – III

Concept of herbicide mixture and utility in agriculture, different methods of herbicide applications. Principles of weed management: different methods of weed management, allelopathy and its application for weed management, bio-herbicides and their application in agriculture.

Unit – IV

Herbicide compatibility and Resistance: herbicide compatibility with agro-chemicals and their application. Integration of herbicides with non- chemical methods of weed management. Herbicide Resistance and its management

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

(Session: 2021-22)

Course Code: BACM- 6020 (Opt-I)

WEED MANAGEMENT

(PRACTICAL)

COURSE OUTCOMES (CO):

After passing this course student will be able to:

CO1: identify and classify different weeds.

CO2: evaluate the different weed management practices in holistic manner.

CO3: apply different types of herbicides in appropriate manner.

CO4: identify the impact of allelopathy and its role in weed management.

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

(Session: 2021-22)

Course Code: BACM- 6020 (Opt-I)

WEED MANAGEMENT

(PRACTICAL)

Time: 3 Hrs

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. To identify weeds of field crops and uncultivated areas.
2. To collect and preserve weeds for herbarium, biology of different weeds and long-term study of weed flora shifts.
3. To study the reproductive potential of annual and perennial weeds, weed control efficiency and weed index.
4. To study the methods of recording weed intensity in weed control experiments.
5. How to work out weed Index, weed control efficiency in weed control experiments.
6. To study the herbicide formulations.
7. To calculate commercial dose of herbicides for controlling weeds from field crop and in aquatic situations.
8. To study the herbicide requirements for important field crops, study of losses/damage due to crop weeds competition.
9. To study the calibration of knapsack sprayer and to demonstrate the performance of different types of nozzles and Herbicide resistance.
10. To learn identification of herbicides and proper sprayer technology.
11. To study the methods of herbicide applications and resistance in weeds to herbicides.

SUGGESTED READINGS

1. Walia U S (2018). Weed Management. Kalyani Publishers.
2. Walia U S (2017). Weed identification and medicinal use. Scientific Publishers
3. Gupta P (2007). Weed management principles and practices. Agrobios
4. Gupta O P (2018). Weed Management. Agrobios
5. Maalouf Eiohze (2017). Handbook of weed science. Agri-Horti Press

SUGGESTED WEBSITES

Web sites: <http://www.agrimoon.com/>

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

<http://www.agriglance.com/>

<http://agritech.tnau.ac.in/>

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

(Session: 2021-22)

Course Code: BACM- 6020 (Opt-II)

FOOD SAFETY AND STANDARDS

(THEORY)

COURSE OUTCOMES (CO):

After passing this course student will be able to:

CO1: identify the importance of food safety, hygiene and associated risks.

CO2: evaluate the different food safety management tools in holistic manner.

CO3: apply for food quality management principles and regulation in appropriate manner.

CO4: identify the impact of microbial contaminants for food and water.

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

((Session: 2021-22))

Course Code: BACM- 6020 (Opt-II)

FOOD SAFETY AND STANDARDS

(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

Food Safety – Definition, Importance, Scope and Factors affecting; Food Safety. Hazards and Risks; Types of hazards - Biological, Chemical, Physical hazards. Management of hazards - Need. Control parameters -. Temperature control.

Unit – II

Food storage Product design. Hygiene and Sanitation in Food Service Establishments- Introduction. , Sources of contamination and their control. Waste Disposal. Pest and Rodent Control. Personnel Hygiene. Food Safety Measures. Food Safety Management Tools- Basic concepts. PRPs, GHPs, GMPs, SSOPs etc. HACCP. ISO series safety

Unit – III

Total Quality Management (TQM) - concept and need for quality, components of TQM, Kaizen. Risk Analysis. Accreditation and Auditing, Water Analysis, Surface Sanitation and Personal Hygiene to food.

Unit – IV

Food laws and Standards- Indian Food Regulatory Regime, FSSA. Global Scenario CAC. Other laws and standards related. Recent concerns- New and Emerging Pathogens. Packaging, Product labeling and Nutritional labeling. Genetically modified foods\ transgenics. Organic foods. Newer approaches to food safety. Recent Outbreaks. Indian and International Standards for food products.

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

(Session: 2021-22)

Course Code: BACM- 6020 (Opt-II)

FOOD SAFETY AND STANDARDS

(PRACTICAL)

COURSE OUTCOMES (CO):

After passing this course student will be able to:

CO1: identify the importance of food safety, hygiene and associated risks.

CO2: evaluate the different food safety management tools in holistic manner.

CO3: apply for food quality management principles and regulation in appropriate manner.

CO4: identify the impact of microbial contaminants for food and water.

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

(Session: 2021-22)

Course Code: BACM- 6020 (Opt-II)

FOOD SAFETY AND STANDARDS

(PRACTICAL)

Time: 3 Hrs

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. To analyze the physico-chemical quality of water.
2. To prepare different types of media.
3. To perform the bacteriological examination of water by total plate count.
4. To perform the coliform count in water.
5. To assess surface sanitation by swab/rinse method.
6. To assess the personal hygiene.
7. To detect the presence of ergot in food grains.
8. To determine the presence of alkaloids in food sample.
9. To visit food unit/kitchen for evaluating pre-requisite programmes.
10. To implement HACCP and evaluation of CCPs and OPRPs from flow diagram of process.
11. To prepare documents for HACCP implementation.
12. To prepare HACCP chart for food unit.

SUGGESTED READINGS

1. Singh S P and Julie Funk (2015). Food Safety, Quality Assurance and Global Trade: Concerns and Strategies, CBS Publishers & Distributors Pvt. Ltd.
2. Ali Inteaz (2012). Food Quality Assurance: Principles and Practices, CRC Press

SUGGESTED WEBSITES

Web sites: <http://www.agrimoon.com/>

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

<http://www.agriglance.com/>

<http://agritech.tnau.ac.in/>

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

(Session: 2021-22)

Course Code: BACM- 6020 (Opt-III)

HI-TECH HORTICULTURE

(THEORY)

COURSE OUTCOMES (CO):

After passing this course student will be able to:

CO1: describe micro-propagation and protected cultivation of horticultural crops.

CO2: understand hi-tech nursery management practices.

CO3: apply the concept of precision farming in horticulture.

CO4: learn and plan hi-tech harvest technology.

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

((Session: 2021-22))

Course Code: BACM- 6020 (Opt-III)

HI-TECH 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

Introduction & importance; Nursery management and mechanization; micro propagation of horticultural crops; Modern field preparation and planting methods

Unit-II

Protected cultivation: advantages, controlled conditions, method and techniques, Micro irrigation systems and its components; EC, pH based fertilizer scheduling, canopy management, high density orcharding

Unit-III

Components of precision farming: Remote sensing, Geographical Information System (GIS), Differential Geo-positioning System (DGPS)

Unit-IV

Variable Rate applicator (VRA), application of precision farming in horticultural crops (fruits, vegetables and ornamental crops); mechanized harvesting of produce.

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

(Session: 2021-22)

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Course Code: BACM- 6020 (Opt-III)

HI-TECH HORTICULTURE

(PRACTICAL)

COURSE OUTCOMES (CO):

After passing this course student will be able to:

CO1: describe micro-propagation and protected cultivation of horticultural crops.

CO2: understand hi-tech nursery management practices.

CO3: apply the concept of precision farming in horticulture.

CO4: learn and plan hi-tech harvest technology.

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

(Session: 2021-22)

Course Code: BACM- 6020 (Opt-III)

HI-TECH HORTICULTURE

(PRACTICAL)

Time: 3 Hrs

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. To study different types of polyhouses and shade net houses.
2. Nursery management and various potting systems used in nursery.
3. To study EC and pH-based fertilizer scheduling in fruit crops.
4. To study importance and types of micro-irrigation in nursery.
5. To study improved plantation techniques in horticulture.
6. To study intercropping operations in management of fruit nursery.
7. To study different techniques of canopy management in fruit crops.
8. To visit and observe modern technologies used in hi-tech orchard/nursery.
9. To study application of Geographical Information System (GIS) in precision horticulture.
10. To study hi-tech postharvest and marketing technology for horticultural products.

SUGGESTED READINGS

1. Prasad S, Singh D and Bharadwaj R L (2011). Hi-Tech Horticulture. Agrobios (India).

SUGGESTED WEBSITES

Web sites: <http://www.agrimoon.com/>

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

<http://www.agriglance.com/>

<http://agritech.tnau.ac.in/>

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

(Session: 2021-22))

Course Code: BACP- 6010

PRACTICAL CROP PRODUCTION-II (*RABI CROPS*)

(PRACTICAL)

COURSE OUTCOMES (CO):

After passing this course student will be able to:

CO1: learn skill of scientific management of different crops.

CO2: practice various intercultural operations for crop raising.

CO3: practice plant protection operations needed for crop raising.

CO4: observe post-harvest operations and work out economic benefits of crop raising.

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

(Session: 2021-22)

Course Code: BACP- 6010

PRACTICAL CROP PRODUCTION-II (*RABI CROPS*)

(PRACTICAL)

Time: 3 Hrs

Total Marks: 50

Practical: 40

C.A.:10

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. Crop planning and field preparation.
2. Raising field crops in multiple cropping systems.
3. Seed treatment methods.
4. Raising nursery and different sowing methods.
5. Nutrient and water management of different *rabi* crops.
6. Weed management of *rabi* crops.
7. Harvesting, threshing, drying, winnowing, storage of farm.
8. Marketing of produce.
9. Major insect-pest of *rabi* crops and their management.
10. Major diseases of *rabi* crops and their management.
11. Preparation of balance sheet.
12. Analysis of cost of cultivation of *rabi* crops.

SUGGESTED READINGS

1. Acquah George (2011). Principles of crop production: Theory, techniques and technology. PHI Learning.
2. Gururajan B and Balasubramanian (2018). Recent strategies on crop production. Kalyani Publishers.
3. Sharma Jag Paul (2017). Organic crop production Vol – 2. Kalyani Publishers
4. Reddy S R (2017) Agronomy of field crops. Kalyani Publishers
5. Das N R (2013) Introduction to crops of India, Scientific Publishers

SUGGESTED WEBSITES

Web sites: <http://www.agrimoon.com/>

<http://www.agriinfo.in/> [eagri.org](http://www.eagri.org)

<http://www.agrilance.com/>

<http://agritech.tnau.ac.in/>

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

(Session: 2021-22)

Course Code: BACM- 7010

**PRODUCTION TECHNOLOGY FOR BIOAGENTS AND
BIOFERTILIZER**

(PRACTICAL)

COURSE OUTCOMES (CO):

After passing this course student will be able to:

CO1: describe various bioagents used for crop pest and disease control.

CO2: understand mass multiplication technology of bioagents.

CO3: apply the bioagents for the management of pests agriculture or horticulture.

CO4: learn and plan for enhancing shelf life and marketing.

References: Experiments In Microbiology, Plant Pathology And Biotechnonology
By K.R.Aneja, New Age International Publishers

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

((Session: 2021-22))

Course Code: BACP- 70

PRODUCTION TECHNOLOGY FOR BIOAGENTS AND BIOFERTILIZER

(PRACTICAL)

Time: 3 Hrs

Marks: 250

Instructions for Practical Examiner: End term evaluation will be jointly done 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

Introduction to bioagents and biofertilizers

- categorization of various bioagents and biofertilizer used in agri/ horticultural crops.
- acquainting with farm records and book keeping

Production requirements

- to study equipments used in production of bioagents and biofertilizers
- to study preparation of different culture media for the isolation of biocontrol agents
- to study the collection of rhizospheric soil samples from different regions

Isolation of biocontrol agents

- isolation and purification of biocontrol agents
- isolation and purification of *Azospirillum*
- isolation and purification of *Azotobacter*
- isolation and purification of *Rhizobium*
- to study the In vitro dual culture assay

Production of biocontrol agents and biofertilizers

- evaluation of different substrates for the multiplication of *Trichoderma* spp
- mass production of *Trichoderma* spp
- evaluation of different substrates for the multiplication of *Pseudomonas fluorescens*
- mass production of *Pseudomonas fluorescens*

Application of biocontrol agents

- seed priming with bioagents
- effect of bioagents under natural condition
- Cost–Benefit analysis for biological control

Report writing

- report writing
- report submission and examination.

SUGGESTED READINGS

Experiments In Microbiology, Plant Pathology And Biotechnonology By K.R.Aneja, New Age International Publishers

SUGGSTED WEBSITES

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<http://www.agriglance.com/>

<http://agritech.tnau.ac.in/>

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

(Session: 2021-22)

Course Code: BACP- 70

MUSHROOM CULTIVATION TECHNOLOGY

(PRACTICAL)

COURSE OUTCOMES (CO):

After passing this course student will be able to:

CO1: identify different types of edible and medicinal mushrooms

CO2: develop the mushroom spawn.

CO3: grow mushrooms under natural and controlled environmental conditions .

CO4: manage pests and diseass of mushrooms

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

(Session: 2021-22)

Course Code: BACP-

MUSHROOM CULTIVATION TECHNOLOGY

(PRACTICAL)

Time: 3 Hrs

Marks: 250

Instructions for Practical Examiner: End term evaluation will be jointly done 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

Morphological study of mushrooms and basic equipments used in mushroom laboratory

- Familiarization about morphology and classification of mushrooms.
- Identification of common, edible and poisonous mushrooms
- Mushroomfarm structure and familiarization with equipments used in mushroom industry.

Preparation of culture media and isolation of mushroom

- Isolation and pure culture technique of edible mushrooms
- Tissue culture technique for of mushroom cultures

Preparation of spawn, substrate and cultivation of mushrooms

- Production technique of mushroom spawn and spawning methods.
- Production of compost for mushroom cultivation under natural conditions.
- Cultivation of oyster mushroom
- Cultivation of paddy straw mushroom
- Cultivation of milky mushroom
- Cultivation of white button mushroom

Mushroom harvesting, processing and value addition

- To study harvesting, packaging, processing and value addition of mushrooms

Diseases and insect pest problem in mushroom cultivation

- Important insect pests and diseases of mushroom and their management
- Calculation of biological efficiency and cost benefit ratio

Report writing and submission

- Project evaluation

Text Books: 1. Mushroom Cultivation By J. N. Kapoor, Indian Council Of Agriculture Research

2. Handbook On Mushrooms By Nita Bahl, Oxford & Ibh

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

(Session: 2021-22)

Course Code: BACP-

SOIL, PLANT, WATER AND SEED TESTING

(PRACTICAL)

COURSE OUTCOMES (CO):

After passing this course student will be able to:

CO1: understand the basic properties of soil and estimate the soil available nutrients.

CO2: understand hi-tech nursery management practices.

CO3: apply the knowledge of soil amendment requirements.

CO4: estimate the quantity and quality of water by testing and crop need

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

(Session: 2021-22)

Course Code: BACP-

SOIL, PLANT, WATER AND SEED TESTING

(PRACTICAL)

Time: 3 Hrs

Marks: 250

Instructions for Practical Examiner: End term evaluation will be jointly done 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

Soil testing- basic properties

- Determination of soil pH, EC and soil texture
- Determination of soil organic matter

Available nutrients

- Determination of soil available nitrogen
- Determination of soil available phosphorus
- Determination of soil available potassium

Soil amendment requirements

- Determination of lime requirement of acid soils
- Determination of gypsum requirement of alkali soils
- Soil testing using soil-test-kit
- Preparation of soil sample test report

Plant sample testing

- Determination of total nitrogen in plant materials
- Determination of total phosphorus in plant materials
- Determination of total potassium from plant materials
- Preparation of plant sample test report

Water sample testing

- Determination of carbonates, bicarbonates in water
- Determination of calcium, magnesium in water sample
- Determination of sodium in water sample
- Preparation of water sample test report

Seed quality monitoring

- Seed quality monitoring
- Seed health monitoring

References: 1. Manual of Soil, Plant, Water Analysis By D. Singh(2015), Westville Publishing House

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

(Session: 2021-22)

Course Code: BACP-

COMMERCIAL BEEKEEPING

(PRACTICAL)

COURSE OUTCOMES (CO):

After passing this course student will be able to:

CO1: practice apiary management and its economics.

CO2: survey of available flora for bee keeping and pollination benefits.

CO3: harness different bee products and manage bee diseases.

CO4: help in transfer of apiculture awareness knowledge to farmers.

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

(Session: 2021-22)

Course Code: BACP-

COMMERCIAL BEEKEEPING

(PRACTICAL)

Time: 3 Hrs

Marks: 250

Instructions for Practical Examiner: End term evaluation will be jointly done 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

Introduction

- Species of honeybees wild and suitable for apiculture..
- Importance of bees to the human beings and bee products
- Apiary appliances and their utility

Morphology of bees

- To study the morphology and anatomy of the bees
- Familiarizing with bee biology

Seasonal Management of bees

- Handling of honey bees in the apiary
- Management of bees in spring season
- Management of bees in summer season
- Familiarization with the process of honey extraction
- Management of bees in rainy season
- Management of bees in autumn season and protection in winter
- To study cost benefit ratio of maintaining an apiary
- Preparation of sugar syrups and candy for feeding the bees in stress conditions
- Preparation process of pollen substitute and pollen supplement
- To study the bee pasture in and around the apiary
- To study methods for artificial honeybee queen rearing

Diseases and pests of bees

- Diseases of bees and their management
- Pests and disorders of honeybees and their management.
- To prepare report on ELP-commercial apiculture.

Text Books: 1. Beekeeping A Comprehensive Guide To Bees And Beekeeping By D.P. Abrol, Scientific Publishers

References: 1. The Practical Bee Guide - A Manual Of Modern Beekeeping By J. G. Digges, Read Brooks

B.Sc. (Hons.) Agriculture (Semester-Vii)

(Session: 2021-22)

Course Code: BACP-

FLORICULTURE AND LANDSCAPE ARCHITECTURE

(PRACTICAL)

COURSE OUTCOMES (CO):

After passing this course student will be able to:

CO1: plan area specific floriculture and landscaping practices.

CO2: develop skill of ornamental horticulture for commercial cultivation of flower crops.

.

CO3: evaluate benefit: cost analysis of ornamental gardening.

CO4: learn and plan fresh and dry flowers for decorationn.

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

(Session: 2021-22)

Course Code: BACP-

FLORICULTURE AND LANDSCAPE ARCHITECTURE

(PRACTICAL)

Time: 3 Hrs

Marks: 250

Instructions for Practical Examiner: End term evaluation will be jointly done 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

Introduction to commercial horticulture

- To develop project plan and design for ornamental horticulture.

Commercial production of ornamental crops

- Soil and water analysis and prepare land for commercial cultivation of ornamental crops.
- Nursery production of ornamental crops.
- Production of plantlets and transplantation of seedlings for commercial cultivation of flowers.
- Plant protection measures for commercial cultivation of ornamental crops.
- Harvesting, packaging, marketing and quality control of ornamental crops.
- Production of potted plants, management and maintenance, sale and marketing.

Flower arrangement

- To practice fresh flower arrangement and marketing .
- To practice dry flower arrangement and marketing .

Landscape development

- Multiply the ornamental plants for landscaping.
- Develop plan for landscaping around specific area.
- To study different practices related to landscape architecture.

Protected cultivation of flower crops

- To practice ornamental crop cultivation under polyhouse.
- Input supply and crop management under protected cultivation of ornamental crops.
- Plant protection measures for commercially grown ornamental crops under protected cultivation.
- Commercial cultivation of ornamental crops under protected condition.

Project evaluation

- To study benefit: cost analysis of ornamental horticulture practices.
- Report writing and submission

References: 1. Fundamentals of Ornamental Horticulture And Landscape Gardening by Tiwari, A.K., New India Publication Agency

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

(Session: 2021-22)

Course Code: BACP-

ORGANIC PRODUCTION TECHNOLOGY

(PRACTICAL)

COURSE OUTCOMES (CO):

After passing this course student will be able to:

- CO1:** understand the basic requirement of organic farming.
- CO2:** experiment with different crops under organic farming practices.
- CO3:** apply the concept of precision farming with INM and IPM.
- CO4:** categorize the different types of organic manures and fertilizers.

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

(Session: 2021-22)

Course Code: BACP-

ORGANIC PRODUCTION TECHNOLOGY

(PRACTICAL)

Time: 3 Hrs

Marks: 250

Instructions for Practical Examiner: End term evaluation will be jointly done 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

Introduction to organic farming

- Familiarization with fundamentals of organic farming
- Record maintenance and book keeping

Farm resources, requirements of composting and identification of market channels

- To prepare farm inventory of resources and identification of constraints and potentials
- To do market survey for estimation of demand, sources of supply and identification of market channels and the estimation marketing costs and margins

Planning and preparation of organic manure and soil amendments

- Preparation of organic liquid manures
- Soil improvement by organic amendments

Crop establishment and different management practices

- To prepare layout and establish different crops in main field
- To ensure integrated diseases and pest management practices
- To apply integrated weed management practices

Harvesting and quality control

- To harvest crop as per nature (single harvesting/ multiple harvesting)
- Quality parameter of harvested produce
- Organic certification process, labeling and accreditation
- To understand marketing and export process

Economic analysis

- Investment capital requirements and operational costs
- Balance sheet income and cash flow statements

Project evaluation

- To prepare report of project for final submission

References: 1. The Complete Book On Organic Farming And Production of Organic Compost By NPCS Board Of Consultants & Engineers, Asia Pacific Business Press Inc.

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

(Session: 2021-22)

Course Code: BACP-

FOOD PROCESSING

(PRACTICAL)

COURSE OUTCOMES (CO):

After passing this course student will be able to:

CO1: understand the importance of food processing.

CO2: collect protocols and preliminary data required for food processing.

CO3: apply the apply the knowledge for economic benifit.

CO4: develop the process/product design.

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

(Session: 2021-22)

Course Code: BACP-

FOOD PROCESSING

(PRACTICAL)

Time: 3 Hrs

Marks: 250

Instructions for Practical Examiner: End term evaluation will be jointly done 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

- To perform the market survey for food commodities
- To develop the bakery products using different cereal flours
- To develop dehydrated fruits and vegetables based products
- To develop fruits and vegetables based preserves
- To develop fruit and vegetable based beverages
- To develop cereal based extruded products
- To develop dairy based traditional Indian products
- To develop sugar based confections
- To determine the moisture content of raw materials and finished products
- To determine the protein content of raw material and finished product
- To determine the fat content of raw material and finished product
- To determine the ash content of raw material and finished product
- To determine the carbohydrate content of raw material and finished product
- To perform shelf life testing of finished product
- To perform consumer preference and marketing of product
- Visit to processed food industry

References: 1. Fruit And Vegetable Preservation Principles And Practices By R.P Srivastava And Sanjeev Kumar, Cbs Publishers & Distributors Pvt. Ltd.

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

(Session: 2021-22)

Course Code: BACP-

Rural Agricultural Work Experience and Agro-Industrial Attachment (RAWE & AIA)

Sr. No.	Course	Training Components	Number of weeks	M.Marks
1.	RAWE-1	General Orientation & On campus Training by different faculties	3	75
2.	RAWE-2	Plant Clinic	3	75
3.	RAWE-3	Village Attachment	8	200
4.	AIA-4	Agro-Industrial Attachment-I	3	75
5.	AIA-5	Agro-Industrial Attachment-II	3	75
		Total	20	500

RAWE-1: General Orientation: The students will attend compulsory GoC (General Orientation Course) to be conducted by various faculties. (Agronomy, Soil Science, Horticulture, Entomology, Plant Pathology and Extension Education)

RAWE-2: Plant clinic (3 weeks) Plant clinic will be established in the farm/department & subject experts will be asked to coordinate the training.

RAWE-413: Village Attachment Training Programmes (8 weeks):

Students will adopt one village and two teachers will assist them in the liaison process with village Sarpanch . Students will study the following interventions in the respective villages allotted to them.

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

(Session: 2021-22)

Course Code: BACP-

1. Orientation & Survey of the village to study the social-economic profile
– 1 week
2. Agronomic intervention - 1 week
3. Plant Protection Intervention - 1 week
4. Soil Improvement - 1
5. Fruit & Vegetable Production Intervention - 1 week
6. Food Processing and storage intervention - 1 week
7. Extension & Transfer of Technology - 1 week
8. Annual Production Intervention - 1 week

The students will record their observation based on daily field observation recorded in note books and weekly diaries maintained by them to prepare the final report based on these observations.

AIA-1: Agro-Industrial Attachment-I (3 weeks)
AIA-2; Agro-Industrial Attachment-II (3 weeks)

Agro-Industrial Attachment (6 weeks): The students would be attached with two varied Agro- Industries, one at a time for a period of six weeks (3+3) to get an experience of the industrial environment and working. Students shall be placed in Agro and cottage industries (List attached*)

Activities during agro industrial attachment programmes.

- ☐ Acquaintance with industry and staff.
- ☐ Study of structure, functioning, objective and mandates of the industry.
- ☐ Study of various processing units and hands-on trainings under supervision of industry staff.
- ☐ Ethics of the industry.
- ☐ Employment generated by the industry.
- ☐ Contribution of the industry promoting environment.
- ☐ Learning business network including outlets of the industry.
- ☐ Skill development in all crucial tasks of the industry.
- ☐ Documentation of the activities and task performed by the students.
- ☐ Performance evaluation, appraisal and ranking of students.

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

(Session: 2021-22) Course Code: BACP-

*A student will opt for any two course codes under Agro-Industrial Attachment (AIA-414 & AIA-415) out of the following:				
Sr. No.	Course Title	Course Code	No. of weeks	Modules
1	Agro-industrial	Agron.	3	(i) Seed Industries (ii) Herbicides Formulators
2	Agro-industrial Attachment	Entomology	3	(i) Commercial Honey Production, Hive and Apicultural Equipment and Honey Processing Manufacturing Units: Honey Trading, Processing, Packaging, Exporting and Marketing Units.
3	Agro-industrial Attachment	Ent.Plant. Pathology	3	(i) Pesticide and Biopesticide Industries (ii) Biocontrol Agents Production Units
4	Agro-industrial Attachment	Ext. Edu	3	(i) NGOs and SHGs in Agriculture (ii) Extension Services of CAO, Deputy Director(Horticulture), Soil Conservation, PAMETI, ATMA, Markfed, DRDA, etc.
5	Agro-industrial Attachment	Flori	3	(i) Commercial Flower Nurseries (ii) Flower Marketing Firms (iii) Flower Seed Production and
6	Agro-industrial Attachment	Forest	3	(i) Forest Based Industry (ii) High- tech Nursery (Tree Planting)
7	Agro-industrial	Horticulture	3	(i) Commercial Fruit Nurseries
8	Agro-industrial	PBG	3	Commercial Hybrid Seed Production Units
9	Agro-industrial Attachment	Soil	3	(i) Fertilizer Industries (ii) Vermicompost Units
10.	Agro-industrial Attachment	Vegetable	3	(i) Commercial Vegetable Nurseries (ii) Farms of Progressive Vegetable
11.	Agro-industrial	Agri. Eco.	3	(i) Agricultural Finance Institutions, Commercial Banks, Cooperative Banks,

Evaluation Criterion:

- RAWE-1: General Orientation: An objective type/subjective type exam of 75 marks will be conducted at the end of the semester for evaluation of this component.
- RAWE-2: Plant Clinic (3 weeks)

Assessment Parameters	Evaluators	Max. Marks (75)
□ Discipline (Conduct & Regularity)	Group Incharge	5
□ Problem observation, Inference and Prescription Writing	Group Incharge	20
□ Sample collection & Preservation	Group Incharge/Clinic Curator	20
□ Report Writing Skill	Departmental Committee	15
□ Open Presentation	Departmental Committee /External Examier	15

- RAWE-3: Village Attachment (8 weeks)

Assessment Parameters	Evaluators	Max. Marks (200)
Regularity	Group Incharge	20
Discipline/Conduct	Group Incharge	20
Social interaction with farmers	Group Incharge	20
Innovative ideas to disseminative information	Group Incharge	30
Skill in data recording	Departmental Committee	30
Report Writing Skill	Departmental Committee	40
Open Presentation	Departmental Committee /External Examier	40

□

AIA-4: Agro-Industrial Attachment (3 weeks)

□ AIA-415; Agro-Industrial Attachment (3 weeks)

Assessment Parameters	Evaluators	Max. Marks (75)
□ Discipline, Regularity	Industry officials	10
□ Weekly Assessment	Industry officials	10
□ Report Writing Skills	Departmental committee	30
□ Final Presentation/Viva Voce	Departmental committee and External Evaluator	25

Internship guidelines in the eventualities of COVID pandemic

Keeping in view COVID pandemic and flare-up during the second wave, the circumstances demand that traditional on-site internship may be difficult to accommodate, hence an alternative provision for internship which may be conducted Virtually or remotely under the guidance of internal faculty member is being proposed for approval as recommended by the B.O.S. members.

The student will receive regular mentoring through weekly in-person meeting by video conferencing. The discipline related supervisor can plan a well coordinated meaning for the internship which will be monitored by the Head of the Department.

The student will choose a remote project-based work and submit a project report at the end of semester for evaluation by a Departmental committee who shall evaluate conforming to the approved criterion.

At the beginning of the Semester the registered students shall be assigned mentors. The mentor shall provide guidance to the student and assign project or work responsibilities through Google / Zoom meet and provide mentoring for the project assigned. The project should meet the goals of internship or should be related to Community development and conveniently done at the place of students stay/ home.

Alternative approach may also be provided to the student to obtain academic credits through MOOC courses by registering on any of the national or International platform. However, the course should be related to the knowledge enhancement related to the the field of Agriculture/ Horticulture/ Forestry/ Food Technology/ Rural Development and require a minimum input of 20 hours and student has to obtain the certificate of having cleared the course and also submit a final project report, present a wrapup of the course justifying objective and face viva by the Departmental committee on Google / Zoom meet.

Should a student like to participate in person at the internship then he shall have to adhere to the COVID 19 directives for guidelines as may be applicable. However, the in -person Internship choice will be at the students own risk for which undertaking duly signed by the parents need to be submitted.

Major areas for online Internship Programme

The main objectives of the training are:

- To promote professional skills and knowledge through industry experience.
- To build confidence and ability to work in project mode.

Major areas for training

- Bio Agents & Bio Pesticides Production Unit
- Bio Fertilizers Production Modules
- Commercial Agriculture
- Commercial Horticulture
- Commercial production of biofertilizers
- Designing and Development of Instructional Media Products
- Development of Quality Planting Materials in Forestry
- Establishment of food processing unit and production of value added products of selected fruit & vegetable crops
- Food processing and product development
- Fruit and Vegetable processing
- Hi-Tech Horticulture
- Mushroom cultivation and spawn production
- Nursery Production and Management and Protected Cultivation of High Value Flower and Vegetable Crops
- Nursery Production and Protected Cultivation of Chrysanthemum
- Organic farming (Vermicomposting/Bio-fertilizer) products unit
- Precision Farming of Floriculture and Exotic Vegetables
- Processing and preservation of fruits and vegetables
- Processing Fruits and Vegetables for value addition
- Processing of fruits & Vegetables for value addition
- Product design Digital Embroidered Home Furnishings
- Protected cultivation of high value horticultural crops
- Protected Cultivation of High Value Vegetable and Flower Crops in Hills
- Seed production and processing unit
- Seed Production and Technology

The List Of Sites About Good courses online

[:https://onlinecoursesschools.com/ecourses-online-iasri](https://onlinecoursesschools.com/ecourses-online-iasri)

<https://onlinecoursesschools.com/ecourses-online-iasri>

<http://ecoursesonline.iasri.res.in/course/index.php?categoryid=26>

<https://dmrsolan.icar.gov.in/>

<https://ieeexplore.ieee.org/document/7100423>

<https://onlinecoursesschools.com/ecourses-online-iasri>