Integral University, Lucknow
Integral Institute of Agricultural Science and Technology
Evaluation Scheme of Undergraduate program
B. Sc. (Hons.) Agriculture
w.e.f. Session 2020-21

Semester - V

Course Code	Subject	Periods Per h/week/sem			Evaluation Scheme Theory Mid sem			Evaluation Scheme Practical Examination					End sem Theory Exam	Subject total	Credit	Total Credit Points
								Sessional			End sem exam	Sub Total (sessional + exam)				
		L	T	P	CT	TA	Total	CT	TA	Total	Total					
AG320	Principles of Integrated Pest and Disease Management	2	0	2	10	10	20	5	5	10	20	50	50	100	2:1	3
AG321	Manures, Fertilizers and Soil Fertility Management	2	0	2	10	10	20	5	5	10	20	50	50	100	2:1	3
AG322	Pests of Crops and Stored Grain and their Management	2	0	2	10	10	20	5	5	10	20	50	50	100	2:1	3
AG323	Diseases of Field and Horticultural Crops and their Management -I	2	0	2	10	10	20	5	5	10	20	50	50	100	2:1	3
AG324	Crop Improvement-I *(Kharif Crops)*	1	0	2	10	10	20	5	5	10	20	50	50	100	1:1	2
BM367	Entrepreneurship Development and Business Communication	1	0	2	10	10	20	5	5	10	20	50	50	100	1:1	2
AG325	Geoinformatics and Nano-technology and Precision Farming	1	0	2	10	10	20	5	5	10	20	50	50	100	1:1	2
AG326	Practical Crop Production – I (*Kharif* crops)	0	0	4	-	-	-	5	5	10	90	10	-	100	0:2	2
AG327	Intellectual Property Rights	1	0	0	10	10	20	-	-	-	-	20	80	100	1:0	1
	Elective Course															3
	Total														21+3	24

B. Sc. (Hons.) Agriculture
SEMESTER-V
Syllabus: Principles of Integrated Pest and Disease Management
Paper Code: AG320
w.e.f. Session 2020-21

Theory **3(2+1)**

Unit 1.

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.

Unit 2.

Methods of detection and diagnosis of insect pest and diseases. 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 3.

Ecological management of crop environment. Introduction to conventional pesticides for the insect pests and disease management. Survey surveillance and forecasting of Insect pest and diseases.

Unit 4.

Development and validation of IPM module. 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.

Practical

Methods of diagnosis and detection of various insect pests, and plant diseases, Methods of insect pests and plant disease measurement, Assessment of crop yield losses, calculations based on economics of IPM,Identification of biocontrol agents, different predators and natural enemies. Mass multiplication of *Trichoderma, Pseudomona*s, *Trichogramma*, NPV etc. Identification and nature of damage of important insect pests and diseases and their management. Crop (agroecosystem) dynamics of a selected insect pest and diseases. Plan & assess preventive strategies (IPM module) and decision making. crop monitoring attacked by insect, pest and diseases . Awareness campaign at farmers fields.

Suggested Readings:

- Handbook of Entomology by T V Prasad 2016. Kindle Edition.
- Dhaliwal GS & Arora R. 1996. *Principles of Insect Pest Management.*National Agriculture
- Technology Information Centre.The Insects: Structure and Function. Chapman, R.F. 1981. Edward Arnold (Publishers) Ltd, London
- General Entomology. Mani, M.S. Oxford and IBH Publishing Co. Pvt Ltd., New Delhi
- Agrios, GN. 2010. *Plant Pathology*. Acad. Press.
- Entomology and pest management. III Edition. Pedigo, L.P. 1999. Prentice Hall, New Jersey, USA.
- Get latest entomology books online through : https://www.questia.com/library/science-and-technology/life-sciences-and-agriculture/entomology

B. Sc. (Hons.) Agriculture
SEMESTER-V
Syllabus: Manures, Fertilizers and Soil Fertility Management
Paper Code: AG321
w.e.f. Session 2020-21

Theory **3(2+1)**

Unit 1.

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

Unit 2.

Integrated nutrient management. 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.

Unit 3.

History of soil fertility and plant nutrition. criteria of essentiality. 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 4.

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.

Practical

Introduction of analytical instruments and their principles, calibration and applications, Colorimetry and flame photometry. Estimation of soil organic carbon, Estimation of alkaline hydrolysable N in soils. Estimation of soil extractable P in soils. Estimation of exchangeable K; Ca and Mg in soils . Estimation of soil extractable S in soils.. Estimation of DTPA extractable Zn in soils. Estimation of N in plants. Estimation of P in plants. Estimation of K in plants. Estimation of S in plants.

Suggested Readings:

- *Nature and properties of soils*. Brady Nyle C and Ray R Well, 2014. Pearson Education Inc., New Delhi
- Indian Society of Soil Science. 1998. *Fundamentals of Soil Science*. IARI, New Delhi
- Hillel D. 1982. *Introduction to Soil Physics*. Academic Press, London
- Das DK. 2011. *Introductory Soil Science.* Third Revised Edition, Kalyani Publishers.
- Open Access Books - Soil Science | InTechOpen https://www.intechopen.com/books/subject/soil-science/books/all/1/list

B. Sc. (Hons.) Agriculture
SEMESTER-V
Syllabus: Pests of Crops and Stored Grain and their Management
Paper Code: AG322
w.e.f. Session 2020-21

Theory **3(2+1)**

Unit 1.

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 and scientific name, order, family, host range, distribution, nature of damage and control practice other important arthropod pests of various field crop, vegetable crops.

Unit 2.

Scientific name, order, family, host range, distribution, biology and bionomics, nature of damage, and management of major pests and 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 3.

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.

Unit 4.

Storage structure and methods of grain storage and fundamental principles of grain store management.

Practical

Identification of different types of damage. Identification and study of life cycle and seasonal history of various insect pests attacking crops and their produce: (a) Field Crops; (b) Vegetable Crops; (c) Fruit Crops; (d) Plantation, gardens, Narcotics, spices & condiments. Identification of insect pests and Mites associated with stored grain. Determination of insect infestation by different methods. Assessment of losses due to insects. Calculations on the doses of insecticides application technique. Fumigation of grain store / godown. Identification of rodents and rodent control operations in godowns. Identification of birds and bird control operations in godowns. Determination of moisture content of grain. Methods of grain sampling under storage condition. Visit to Indian Storage Management and Research Institute, Hapur and Quality Laboratory, Department of Food., Delhi. Visit to nearest FCI godowns.

Suggested Readings:

- Agricultural Pests of South Asia and Their Management. Atwal, A.S. and Dhaliwal, G.S. Kalyani Publishers, New Delhi.
- Biology of Insects. Saxena, S.C. 1992. Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi
- An introduction to Entomology, Srivastava, P.D. and R.P.Singh. 1997. Concept publishing Company, New Delhi.
- Introduction to General and Applied Entomology. Awasthi, V.B. Scientific Publishers, Jodhpur.
- Get latest entomology books online through : https://www.questia.com/library/science-and-technology/life-sciences-and-agriculture/entomology

B. Sc. (Hons.) Agriculture
SEMESTER-V
Syllabus: Diseases of Field and Horticultural Crops and their Management -I
Paper Code: AG323
w.e.f. Session 2020-21

Theory **3(2+1)**

Unit 1.

Symptoms, etiology, disease cycle and management of major diseases of Field Crops: Rice: blast, brown spot, bacterial blight, sheath blight, false smut, khaira and tungro; Maize: stalk rots, downy mildew, leaf spots

Unit 2.

Symptoms, etiology, disease cycle and management of major diseases of Sorghum: smuts, grain mold and anthracnose, Bajra :downy mildew and ergot; Groundnut: early and late leaf spots, wilt 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

Unit 3.

Castor: Phytophthora blight; Tobacco: black shank, black root rot and mosaic. 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; Cruciferous vegetables: Alternaria leaf spot and black rot; Brinjal: Phomopsis blight and fruit rot and Sclerotinia blight; **Unit 4.**

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; Coconut: wilt and bud rot; Tea: blister blight; Coffee: rust

Practical

Identification and histopathological studies of selected diseases of field and horticultural crops covered in theory. Field visit for the diagnosis of field problems. Collection and preservation of plant diseased specimens for Herbarium; Note: Students should submit 50 pressed and well mounted specimens.

Suggested Readings:

- Fundamentals of Plant Pathology by RS Mehrotra and Ashok Aggarwal, McGraw Hill Education (India) Private Limited, New Delhi
- Agrios, GN. 2010. *Plant Pathology*. Acad. Press.
- Singh RS. 2013. *Introduction to Principles of Plant Pathology.* Oxford and IBH Pub. Co.
- Stakman EC & Harrar JG. 1957. *Principles of Plant Pathology*. Ronald Press, USA.
- *Tarr SAJ*. 1964. *The Principles of Plant Pathology*. McMillan, London.

B. Sc. (Hons.) Agriculture
SEMESTER-V
Syllabus: Crop Improvement-I *(Kharif Crops)*
Paper Code: AG324
w.e.f. Session 2020-21

Theory **2(1+1)**

Unit 1.

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

Unit 2.

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

Unit 3.

Important concepts of breeding self pollinated, cross pollinated and vegetatively propagated crops; 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 4.

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

Practical

Floral biology, emasculation and hybridization techniques in different crop species; viz., Rice, Jute, Maize, Sorghum, Pearl millet, Ragi, Pigeonpea, Urdbean, Mungbean, Soybean, Groundnut, Seasame, Caster, Cotton, Cowpea, Tobacco, Brinjal, Okra and Cucurbitaceous crops. Maintenance breeding of different *kharif* crops. Handling of germplasm and segregating populations by different methods like pedigree, bulk and single seed decent methods; Study of field techniques for seed production and hybrid seeds production in *Kharif* crops; Estimation of heterosis, inbreeding depression and heritability; Layout of field experiments; Study of quality characters, donor parents for different characters; Visit to seed production plots; Visit to AICRP plots of different field crops.

Suggested Readings:

- Modern Techniques of Raising Field Crops by Chhidda Singh, Prem Singh and Rajbir Singh, Oxford and IBH Publishing Co Pvt Ltd
- Reddy SR. *Principles of Agronomy.* Kalyani Publishers.
- Reddy Yellamanda T and Shankar Reddy G H. New Edn. *Principles of Agronomy*. Kalyani Publishers Ludhiana.
- Gupta O P. *Scientific Weed Management in the Tropics and Sub- Tropics*. Today and Tomorrow's Printers and Publishers. New Delhi.
- Yawalkar K S and Agarwal J P. *Manures and Fertilizers*. Agricultural Horticultural Publishing House, Nagpur.
- Balasubrananiyan P & Palaniappan SP. 2015. *Principles and Practices of Agronomy.* Agrobios

B. Sc. (Hons.) Agriculture
SEMESTER-V
Syllabus: Entrepreneurship Development and Business Communication
Paper Code: BM367
w.e.f. Session 2020-21

Theory **2(1+1)**

Unit 1.
Concept of Entrepreneur, Entrepreneurship Development, Characteristics of entrepreneurs; SWOT Analysis & achievement motivation

Unit 2.
Government policy and programs and institutions for entrepreneurship development, Impact of economic reforms on Agribusiness/ Agri-enterprises, Entrepreneurial Development Process;

Unit 3.
Business Leadership Skills; Developing organizational skill (controlling, supervising, problem solving, monitoring & evaluation), Developing Managerial skills, Business Leadership Skills (Communication, direction and motivation Skills), Problem solving skill, Supply chain management and Total quality management, Project Planning Formulation and report preparation

Unit 4.
Financing of enterprise, Opportunities for agri-entrepreneurship and rural enterprise.

Practical
Assessing entrepreneurial traits, problem solving skills, managerial skills and achievement motivation, exercise in creativity, time audit through planning, monitoring and supervision, identification and selection of business idea, preparation of business plan and proposal writing, visit to entrepreneurship development institute and entrepreneurs.

Suggested Readings:

B. Sc. (Hons.) Agriculture
SEMESTER-V
Syllabus: Geoinformatics and Nano-technology and Precision Farming
Paper Code: AG325
w.e.f. Session 2020-21

Theory **2(1+1)**

Unit 1.
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 2.
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 3.
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 4.
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.
Practical
Introduction to GIS software, spatial data creation and editing. Introduction to image processing software. Visual and digital interpretation of remote sensing images. Generation of spectral profiles of different objects. Supervised and unsupervised classification and acreage estimation. Multispectral remote sensing for soil mapping. Creation of thematic layers of soil fertility based on GIS. Creation of productivity and management zones. Fertilizers recommendations based of VRT and STCR techniques. Crop stress (biotic/abiotic) monitoring using geospatial technology. Use of GPS for agricultural survey. Formulation, characterization and applications of nanoparticles in agriculture. Projects formulation and execution related to precision farming.
Suggested Readings:

- David E. Reisner. 2009. *Bionanotechnology: Global Prospects*. CRC Press.
- Gabor L. Hornyak, John J. Moore, Tibbals HF., Joydeep Dutta. 2008. *Fundamentals of*
- *Nanotechnology*. CRC Press.
- Jesus M. de la Fuente, V. Grazu. 2012. *Nanobiotechnology: Inorganic nanoparticles Vs Organic*
- *nanoparticles*. Elsevier.
- Yubing Xie. 2012. *The Nanobiotechnology Handbook*. CRC Press.

B. Sc. (Hons.) Agriculture
SEMESTER-V
Syllabus: Practical Crop Production – I (*Kharif* crops)
Paper Code: AG326
w.e.f. Session 2020-21

Practical **2(0+2)**

Crop planning, raising field crops in multiple cropping systems: Field preparation, seed, treatment, nursery raising, sowing, nutrient, water and weed management and management of insect-pests diseases of crops, harvesting, threshing, drying winnowing, storage and marketing of produce. The emphasis will be given to seed production, mechanization, resource conservation and integrated nutrient, insect-pest and disease management technologies. Preparation of balance sheet including cost of cultivation, net returns per student as well as per team of 8-10 students.

Suggested Readings:

- Acquaah G. 2005. *Principles of Crop Production: Theory, Techniques and Technology.* Prenice Hall.
- Modern Techniques of Raising Field Crops by Chhidda Singh, Prem Singh and Rajbir Singh, Oxford and IBH Publishing Co Pvt Ltd
- Reddy SR. 2011. *Principles of Agronomy.* Kalyani Publishers.
- Chandrasekaran B, Annadural K & Samasundaram E. 2010. *A Text Book of Agronomy.* New Age International (P) Limited Publishers.

B. Sc. (Hons.) Agriculture
SEMESTER-V
Syllabus: Intellectual Property Rights
Paper Code: AG327
w.e.f. Session 2020-21

Theory **1(1+0)**

Unit 1.

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 2.

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 3.

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 breeders rights, Registration of plant varieties under PPV&FR Act 2001, breeders, researcher and farmers rights. Traditional knowledge-meaning and rights of TK holders.

Unit 4.

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:

- Intellectual Property Rights by Neeraj Pandey, Khushdeep Dharni, PHI Learning Pvt. Ltd., 2014
- Intellectual Property Rights In India, by V K Ahuja Lexis Nexis Publishers
- Handbook of Intellectual Property Rights : Concepts and Laws, by Dr. B. Ramaswamy, paper Back