

Chaudhary Bansi Lal University Bhiwani (Haryana)

Scheme & Syllabus of B. Sc. (Hons.) Agriculture (Semester I & II) w.e.f. 2023



**Chaudhary Bansi Lal University,
Bhiwani(Haryana)**

Ch. Bansi Lal University, Bhiwani

Scheme & Syllabi of B.Sc. (Hons.) Agriculture 4 years

SUMMARY

Programme: B.Sc. (Hons.) Agriculture

Duration: 4 Years

Medium: English

Minimum Required Attendance: 75% Total

Credits (1 and 2nd semester): 43

Assessment/Evaluation:

Course	Internal Assessment Marks	End Semester Examination	Total
Theory Course (02 Credit)	20	80	100
Theory Course (01 Credit)	10	40	50
Practical	10	40	50

Internal/Evaluation:

Minor Test (02 Credit Theory Course)	Attendance	Assignment	Total
10	05	05	20

Minor Test (01 Credit Theory Course)	Attendance	Assignment	Total
05	2.5	2.5	10

Practical Course	Attendance	Lab Performance	Total
	5	5	10



B.Sc. (Hons) Agriculture Syllabus Batch 2023 Onwards

Duration of Examination:

Theory Course	Major Test (End Semester Examination)	Internal (Minor Test)
2 Credit	3 hours	1 hours
1 Credit	2 hours	45 minutes

Note:

1. To qualify the course, a student is required to secure a minimum of 40% marks in aggregate including the Major Test (End Semester Examination) and Internal Assessment. A candidate who secures less than 40% of marks in a course shall be deemed to have failed in that course. The student should have obtained at least 40% marks in aggregate to qualify the semester.

2. The students should be involved in extracurricular activities through Hobbies Clubs (CGPA)

Such as Poetry, Science Club, Kitchen Gardening, Painting, IT, Best out of Waste, Dance and Drama etc. and will be awarded a letter grade at the completion of B.Sc. (Hons.) Agriculture. The marks, or CGPA above said the course will be included in the scheme as per the guidelines of the university from time to time.

QUESTION PAPER STRUCTURE:

Two Credit Theory Course:

- There will be two parts (A and B) of question paper. There will be objective questions of 30 marks in Part A. All objective questions are compulsory. Part B will be a Subjective Paper of 50 Marks. There will be 8 questions in the Subjective Paper and students will have to attempt any five questions (10 marks each).

One Credit Theory Course:

- There will be two parts (A and B) of question paper. There will be objective questions of 15 marks in Part A. All objective questions are compulsory. Part B will be a Subjective Paper of 25 Marks. There will be 8 questions in the Subjective Paper and students will have to attempt any five questions (05 marks each).



B.Sc. (Hons) Agriculture Syllabus Batch 2023 Onwards

Semester – First

Total Credits – 20
Total workload - 24

Course Code	Course Type	Course Title	Credits	Workload		Marks Distribution		Total
				T	P	Internal	External	
23 BSAG-101	CC	Introductory Agro-meteorology and Climate change (Theory)	2	2	0	20	80	100
		Introductory Agro-meteorology and Climate change (Practical)	1	0	2	10	40	50
23 BSAG-102	CC	Fundamentals of Soil Science (Theory)	2	2	0	20	80	100
		Fundamentals of Soil Science (Practical)	1	0	2	10	40	50
23 BSAG-103	CC	Introduction to Forestry (Theory)	2	2	0	20	80	100
		Introduction to Forestry (Practical)	1	0	2	10	40	50
23 BSAG-104	CC	Fundamentals of Agronomy (Theory)	2	2	0	20	80	100
		Fundamentals of Agronomy (Practical)	1	0	2	10	40	50
23 BSAG-105	CC	Agricultural Heritage	1	1	0	10	40	50
23 BSAG-106	CC	Rural Sociology & Educational Psychology	2	2	0	20	80	100
23 BSAG-107	OP	Introductory Biology*	2	2	0	20	80	100
		Elementary Mathematics**						
23 BSAG-108	EI	Human Values and Ethics	1	1	0	10	40	50
23 BSAG-109	SEC	Comprehension & Communication Skills in English	1	1	0	10	40	50
NCCCESE-111	HC	Hobby Courses	1	0	1			100
Total			20	15	09	190	760	1050

***Remedial course for students who had studied non-medical in 10+2**

**** Remedial course for students who had studied medical in 10+2**

CC: Core Courses, OP: Optional Papers, SEC: Skill Enhancement Course, AEC: Ability Enhancement Course, EI: Ethics and Integrity, HC: Hobby Course



B.Sc. (Hons) Agriculture Syllabus Batch 2023 Onwards
Semester – Second

Total Credits – 23
Total workload - 30

Course Code	Course Type	Course Title	Credits	Load Allocation		Marks Distribution		Total
				L	P	Internal	External	
23BSAG-201	CC	Fundamentals of Genetics (Theory)	2	2	0	20	80	100
		Fundamentals of Genetics (Practical)	1	0	2	10	40	50
23BSAG-202	CC	Agricultural Microbiology (Theory)	2	2	0	20	80	100
		Agricultural Microbiology (Practical)	1	0	2	10	40	50
23BSAG-203	CC	Soil and Water Conservation Engineering (Theory)	2	2	0	20	80	100
		Soil and Water Conservation Engineering (Practical)	1	0	2	10	40	50
23BSAG-204	CC	Fundamentals of Crop Physiology (Theory)	2	2	0	20	80	100
		Fundamentals of Crop Physiology (Practical)	1	0	2	10	40	50
23BSAG-205	CC	Fundamentals of Agricultural Economics (Theory)	2	2	0	20	80	100
23BSAG-206	CC	Fundamentals of Agricultural Extension Education (Theory)	1	2	0	20	80	100
23BSAG-207	CC	Fundamentals of Plant Pathology (Theory)	2	2	0	20	80	100
		Fundamentals of Plant Pathology (Practical)	1	0	2	10	40	50
23 BSAG-108	CC	Fundamentals of Entomology(Theory)	2	2	0	20	80	100
		Fundamentals of Entomology(Practical)	1	0	2	10	40	50
23 BSAG-109	SEC	Statistical Methods	2	2	0	20	80	100
Total			23	18	12	240	960	1200

CC: Core Courses, OP: Optional Papers, SEC: Skill Enhancement Course, AEC: Ability Enhancement Course, EI: Ethics and Integrity, HC: Hobby Course

B.Sc. (Hons) Agriculture Syllabus Batch 2023 Onwards

Program Outcomes

- PO1:- Having an ability to apply mathematics and science in agricultural applications
- PO2:- Having a clear understanding of the subject related concepts and of contemporary issues
- PO3:- Having an ability to design a component or a product applying all the relevant standards and with realistic constraints
- PO4:- Having an ability to design and conduct experiments, as well as to analyze and interpret data
- PO5:- Having an ability to use techniques, skills and modern engineering tools necessary for agricultural practices
- PO6:- Having problem solving ability- solving farmers problems
- PO7:- Having adaptive thinking and adaptability
- PO8:- Having a clear understanding of professional and ethical responsibility
- PO9:- Having cross cultural competency exhibited by working in teams
- PO10:- Having a good working knowledge of communicating in English
- PO11:- Having a good cognitive load management skills
- PO12:-Having interest in lifelong learning

Program Specific Outcomes

- Applying the knowledge of crop cultivation, crop improvement, soil and crop management for sustainable organic agricultural production and development.
- Analysing and identifying complex agricultural problems and formulating ethical solutions using principles of agricultural science, engineering, and business.
- Developing innovative processes, products, and technologies to meet the challenges in agriculture and farming practices.



B.Sc. (Hons) Agriculture Syllabus Batch 2023 Onwards

23 BSAG-101 Introductory Agro-meteorology and Climate Change (Theory)

Course Credit: 02

Internal Marks – 20

End Semester Examination Marks - 80

Examination Note:

There will be two parts (A and B) of question paper. There will be objective questions of 30 marks in Part A. All objective questions are compulsory. Part B will be a Subjective Paper of 50 Marks. There will be 8 questions in the Subjective Paper and students will have to attempt any five questions (10 marks each).

Course Outcomes

- CO1:- To appreciate the importance of weather variables in agriculture
- CO2:- To comprehend the role solar radiation in crop growth
- CO3:- To analyze various forms of precipitation
- CO4:- To interpret the role of weather hazards and climate change in crop growth
- CO5:- To understand the correlation between weather and agriculture
- CO6:- To measure weather parameters essential for crop growth

Course Syllabi

Earth atmosphere- its composition, extent and structure, atmospheric weather variables, atmospheric pressure, its variation with height, wind, types of wind, daily and seasonal variation of wind speed, cyclone, anticyclone, land breeze and sea breeze; nature and properties of solar radiation, solar constant, depletion of solar radiation, short wave, long wave and thermal radiation, net radiation, albedo; atmospheric temperature, temperature inversion, lapse rate, daily and seasonal variations of temperature, vertical profile of temperature, energy balance of earth; atmospheric humidity, concept of saturation, vapor pressure, process of condensation, formation of dew, fog, mist, frost, cloud; precipitation, process of precipitation, types of precipitation such as rain, snow, sleet, and hail, cloud formation and classification; artificial rainmaking; monsoon- mechanism and importance in Indian agriculture, weather hazards- drought, floods, frost, tropical cyclones and extreme weather conditions such as heat-wave and cold-wave; agriculture and weather relations; modifications of crop microclimate, weather forecasting-types of weather forecast and their uses; climate change, causes of climate change and its impact on regional and national agriculture.

Suggested Readings :



B.Sc. (Hons) Agriculture Syllabus Batch 2023 Onwards

1. Kakde, J.R. (1985). Agricultural Climatology. Metropolitan Book Co. New Delhi.
2. Mavi, H.S. (2003). Introduction of Agrometeorology, Oxford and IBH Publishing Company Pvt. Limited, New Delhi.
3. Prasada Rao, G.S.L.H.V. (2003). Agricultural Meteorology. Oxford and IBH Publishing Company Pvt. Limited, New Delhi.

23 BSAG-101 Introductory Agro-meteorology and Climate Change (Practical)

Course Credit: 01

Internal Marks – 10

External Examination – 40

(Lab Records: 10, Lab Exercise: 20, Viva: 10)

Course Outline

Visit of agro-meteorological observatory, site selection of observatory, exposure of instruments and weather data recording; measurement of total, shortwave and longwave radiation, and its estimation using Planck's intensity law; measurement of albedo and sunshine duration, computation of radiation intensity using BSS; measurement of maximum and minimum air temperatures, its tabulation, trend and variation analysis; measurement of soil temperature and computation of soil heat flux, determination of vapor pressure and relative humidity; determination of dew point temperature, measurement of atmospheric pressure and analysis of atmospheric conditions; measurement of wind speed and wind direction, preparation of windrose; measurement, tabulation and analysis of rain; measurement of open pan evaporation and evapotranspiration.



B.Sc. (Hons) Agriculture Syllabus Batch 2023 Onwards

23 BSAG-102 Fundamentals of Soil Science (Theory)

Course Credit: 02

Internal Marks:20

End Semester Examination Marks: 80

Examination Note:

There will be two parts (A and B) of question paper. There will be objective questions of 30 marks in Part A. All objective questions are compulsory. Part B will be a Subjective Paper of 50 Marks. There will be 8 questions in the Subjective Paper and students will have to attempt any five questions (10 marks each).

Course Outcomes

CO1:- To acquire knowledge on the importance of soil to agriculture

CO2:- Value the physical properties of soil

CO3:- Classify soil type, soil texture and soil structure required for an agricultural field

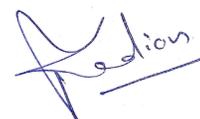
CO4:- To analyze soil, water and nutrients related to crop growth

CO5:- State techniques to mitigate soil pollution

CO6:- To identify soil related problems in agricultural fields and provide suitable solutions

Course Syllabi

Soil as a medium of growth, Pedological and edaphological concepts of soil, Soil genesis, soil forming rocks and minerals; weathering, processes and factors of soil formation, Soil Profile, components of soil, Soil physical properties: soil-texture, structure, density and porosity, soil colour, consistence and plasticity; elementary knowledge of soil taxonomy, classification, soils of India; Soil water retention, movement and availability; soil air, composition, gaseous exchange, problem and plant growth, Soil temperature: source, amount and flow of heat in soil; effect on plant growth, Soil reaction- pH, soil acidity and alkalinity, buffering, effect of pH on nutrient availability; soil colloids- inorganic and organic; silicate clays: constitution and properties; sources of charge; ion exchange, cation exchange capacity, base saturation, soil organic matter: composition, properties and its influence on soil properties; humic substances - nature and properties; soil organisms: macro and micro-organisms, their beneficial and harmful effects; Soil pollution - behaviour of pesticides and inorganic contaminants, prevention and mitigation of soil pollution.



B.Sc. (Hons) Agriculture Syllabus Batch 2023 Onwards

Suggested Readings:

1. Brady, N.C. and Weil, R.R. (2013). The Nature and Properties of Soils, Thirteen Edition, Printice-Hall of India Private Limited, New Delhi.
2. Goswami, N.N., Rattan, R.K., Dev, G., Narayanasamy, G., Das, D.K., Sanyal, S.K., Pal, D.K. and Rao, D.L.N. (Eds.) (2009). Fundamentals of Soil Science Indian Society of Soil Science.
3. Lal, R. and Shukla, M.K. (2004). Principles of Soil Physics, Marcel Dekker, Madison Avenue, New York.

23 BSAG-102 Fundamentals of Soil Science (Practical)

Course Credit: 01

Internal Marks – 10

External Examination – 40

(Lab Records: 10, Lab Exercise: 20, Viva: 10)

Course Outline

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



B.Sc. (Hons) Agriculture Syllabus Batch 2023 Onwards

23 BSAG-103 Introduction to Forestry (Theory)

Course Credit: 02

Internal Marks:20

End Semester Examination Marks: 80

Examination Note:

There will be two parts (A and B) of question paper. There will be objective questions of 30 marks in Part A. All objective questions are compulsory. Part B will be a Subjective Paper of 50 Marks. There will be 8 questions in the Subjective Paper and students will have to attempt any five questions (10 marks each).

Course Outcomes

CO1:- To recognize the importance of forestry

CO2:- Explain and appreciate the techniques involved in forest regeneration

CO3:- Describe mensuration techniques to quantify forests data

CO4:- Plan to regenerate a forest

CO5:- To prepare an agroforestry system to support human sustenance

Course Syllabi

Introduction – definitions of basic terms related to forestry, objectives of silviculture, forest classification, salient features of Indian Forest Policies. Forest regeneration, Natural regeneration - natural regeneration from seed and vegetative parts, coppicing, pollarding, root suckers. Artificial regeneration – objectives, choice between natural and artificial regeneration, essential preliminary considerations, Crown classification, tending operations – weeding, cleaning, thinning – mechanical, ordinary, crown and advance thinning. Forest mensuration – objectives, diameter measurement, instruments used in diameter measurement; measurement of volume of felled and standing trees, age determination of trees. Agroforestry – definitions, importance, criteria of selection of trees in agroforestry, different agroforestry systems prevalent in the country, shifting cultivation, taungya, alley cropping, wind breaks and shelter belts, home gardens, Cultivation practices of two important fast growing tree species of the region, Rejuvenation of forest trees.

Suggested Readings:

1. Chaturvedi, A.N. and Khanna, L.S. (1994). Forest Mensuration. International Book Distributor, Dehradun.
2. Dwivedi, A.P. (1992). Agroforestry- Principles and Practices. Oxford IBH Co. Pvt. Ltd. New Delhi.



B.Sc. (Hons) Agriculture Syllabus Batch 2023 Onwards

3. Dwivedi, A.P. (1993). Forestry in India. Surya Publications, Dehradun.
4. Nair, P.K.R., Rai, M.R. and Buck, L.E. (2004). New Vistas in Agroforestry. Kluwer.
5. Thampan, P.K. (1993). Trees and Tree Farming. Peekay Tree Crops Development Foundation.

23 BSAG-103 Introduction to Forestry (Practical)

Course Credit: 01

Internal Marks – 10

External Examination – 40

(Lab Records: 10, Lab Exercise: 20, Viva: 10)

Course Outline

Identification of tree-species. Diameter measurements using calipers and tape, diameter measurements of forked, buttressed, fluted and leaning trees. Height measurement of standing trees by shadow method, single pole method and hypsometer. Volume measurement of logs using various formulae, age determination of trees, Nursery lay out, seed sowing, vegetative propagation techniques. Forest plantations and their management. Visits of nearby forest based industries.



B.Sc. (Hons) Agriculture Syllabus Batch 2023 Onwards

23 BSAG-104 Fundamentals of Agronomy (Theory)

Course Credit: 02

Internal Marks:20

End Semester Examination Marks: 80

Examination Note:

There will be two parts (A and B) of question paper. There will be objective questions of 30 marks in Part A. All objective questions are compulsory. Part B will be a Subjective Paper of 50 Marks. There will be 8 questions in the Subjective Paper and students will have to attempt any five questions (10 marks each).

Course Outcomes

CO1:- To express knowledge gained on the principles of agronomy

CO2:- To recognize the various nutrients and their effects on plant health

CO3:- Plan irrigation measures for plant growth and development

CO4:- To manage weeds in a field

CO5:- Plan for sustainable agricultural production

Course Syllabi

Agronomy and its scope, seeds and sowing, tillage and tilth, crop density and geometry, crop nutrition, manures and fertilizers, nutrient use efficiency. Water resources, soil-plant-water relationship, crop water requirement, water use efficiency, irrigation- scheduling criteria and methods, quality of irrigation water and its measurement. Weeds-importance, classification, crop-weed competition, concepts of weed management;principles and methods, allelopathy. Growth and development of crops, factors affecting growth and development, plant ideotypes, crop rotation and its principles, adaptation and distribution of crops, harvesting and threshing of crops.

Suggested Readings:

1. Panda, S.C. (2003). Cropping and Farming Systems. Agrobios Publications.
2. Panda, S.C. (2003). Principles and Practices of Water Management. Agrobios Publications.
3. Principles of Agronomy, Kalyani Publications, New Delhi.
4. Singh, S.S. (2006). Principles and Practices of Agronomy. Kalyani Publications, New Delhi.
5. Yawalkar, K.S., Agrawal, J.P. and Bokde, S. (2000). Manures and Fertilizers. Agri-Horti Publications.

B.Sc. (Hons) Agriculture Syllabus Batch 2023 Onwards

23 BSAG-104 Fundamentals of Agronomy (Practical)

Course Credit: 01

Internal Marks – 10

External Examination – 40

(Lab Records: 10, Lab Exercise: 20, Viva: 10)

Course Outline

Identification of crops, seeds, fertilizers, pesticides and tillage implements, study of agro-climatic zones of India, Identification of weeds in crops, Methods of herbicide and fertilizer application, Study of yield attributing characters and yield estimation, Seed germination and viability test, Numerical exercises on fertilizer requirement, plant population, herbicides and water requirement, Use of tillage implements-reversible plough, one way plough, harrow, leveler, seed drill, Study of soil moisture measuring devices, Measurement of field capacity, bulk density and infiltration rate, Measurement of irrigation water.



B.Sc. (Hons) Agriculture Syllabus Batch 2023 Onwards

23 BSAG-105 Agricultural Heritage

Course Credit: 01

Internal Marks: 10

End Semester Examination Marks: 40

Examination Note:

There will be two parts (A and B) of question paper. There will be objective questions of 15 marks in Part A. All objective questions are compulsory. Part B will be a Subjective Paper of 25 Marks. There will be 8 questions in the Subjective Paper and students will have to attempt any five questions (05 marks each).

Course Outcomes

CO1:- Appreciate agriculture practiced throughout the world

CO2:- Understand the rich agricultural heritage of India

CO3:- Integrate judicious traditional agricultural practices with modern methods

CO4:- Plan on using agricultural resources

Course Syllabi

Introduction of Indian agricultural heritage; Ancient agricultural practices, Relevance of heritageto present day agriculture; Past and present status of agriculture and farmers in society. Journey of Indian agriculture and its development from past to modern era; Plant production and protection through indigenous traditional knowledge. Crop voyage in India and world; Agriculture scope; Importance of agriculture andagricultural resources available in India; National agriculture setup in India. Current scenario of Indian agriculture; Indian agricultural concerns and future prospects.

Suggested Readings:

1. Nene, Y.L. and Choudhary, S.L. (2002). Agricultural heritage of India. Asian Agri-History foundation, Secundrabad.
2. Randhawa, M.S., 1980-86. A histroy of Agriculture in India. Vol. I, II, III and IV. of Agricultural Research, New Delhi. Indian council
3. Raychaudhuri, S.P. (1964). Agriculture in ancient India. Indian council of Agricultural Research, New Delhi.
4. Sadhale Nalini (Tr) (1996). Surapala's Vrikshayurveda (The science of plant life). Asian. History Bulletin No. 1. Asian-Agri-History foundation, Secundrabad.

B.Sc. (Hons) Agriculture Syllabus Batch 2023 Onwards
23 BSAG-106 Rural Sociology & Educational Psychology

Course Credit: 02

Internal Marks:20

End Semester Examination Marks: 80

Examination Note:

There will be two parts (A and B) of question paper. There will be objective questions of 30 marks in Part A. All objective questions are compulsory. Part B will be a Subjective Paper of 50 Marks. There will be 8 questions in the Subjective Paper and students will have to attempt any five questions (10 marks each).

Course Outcomes

CO1:- To Classify rural social groups of India

CO2:- To describe social values

CO3:- Plan social change using agricultural based development programs

CO4:- Assess farmers based on personality determinants

CO5:- Plan to bring in a behavioural change

Course Syllabi

Sociology and Rural sociology: Definition and scope, its significance in agriculture extension, Social Ecology, Rural society, Social Groups, Social Stratification. Culture concept, Social Institution, Social Change and Development. Educational psychology; Meaning and its importance in agriculture extension. Behavior; Cognitive, affective. Psychomotor domain, Personality, Learning, Motivation, Theories of Motivation, Intelligence.

Suggested Readings :

1. Sagar M. and Sarju N., Rural Sociology and Educational Psychology
2. D.K. Meena, S. Sharma and D. Sharma., Introduction to Rural Sociology and Educational Psychology



B.Sc. (Hons) Agriculture Syllabus Batch 2023 Onwards
23 BSAG-107 Introductory Biology

Course Credit: 02

Internal Marks:20

End Semester Examination Marks: 80

Examination Note:

There will be two parts (A and B) of question paper. There will be objective questions of 30 marks in Part A. All objective questions are compulsory. Part B will be a Subjective Paper of 50 Marks. There will be 8 questions in the Subjective Paper and students will have to attempt any five questions (10 marks each).

Course Outcomes

CO1:- Compare living organisms

CO2:- Classify and name living beings

CO3:- Describe cell and its division

CO4:- Interpret flowering plants and state the role of animals in agriculture

CO5:- Describe plant organs and gain interest in learning biological science

Course Syllabi

Introduction to the living world, Diversity and characteristics of life, origin of life, Evolution and Eugenics. Binomial nomenclature and classification, Rules for Binomial nomenclature, Taxonomic Ranks. Cell, Difference between plant and animal cell, cell organelles viz; Cell membrane, Mitochondria, Chloroplast, Nucleus. Cell division- stages of Cell cycle, Mitosis, Meiosis. Morphology of flowering plants- morphology of root, shoot and leaves. Fruit, Seed and seed germination, Plant systematic- viz; Brassicaceae, Fabaceae and Poaceae- floral description (Floral formula and floral diagram). Role of animals in agriculture.

Suggested Readings :

1. Willey editorial., Fundamental of Biology, textbook and practice book
2. Bidlade J. and Jnsky S., Introductory Plant Biology
3. B.P. pandey, A text book of Botany



B.Sc. (Hons) Agriculture Syllabus Batch 2023 Onwards
23 BSAG-107 Elementary Mathematics

Course Credit: 02

Internal Marks: 20

End Semester Examination Marks: 80

Examination Note:

There will be two parts (A and B) of question paper. There will be objective questions of 30 marks in Part A. All objective questions are compulsory. Part B will be a Subjective Paper of 50 Marks. There will be 8 questions in the Subjective Paper and students will have to attempt any five questions (10 marks each).

Course Outcomes

CO1:- Device formulas for straight lines

CO2:- Comprehend the use of Slope-Intercept

CO3:- To apply the knowledge gained in designing fields

CO4:- To acquire interest to utilize calculus in agriculture

CO5:- To integrate product of functions and define matrices and determinants

Course Syllabi

Straight lines: Distance formula, section formula (internal and external division), Change of axes (only origin changed), Equation of co-ordinate axes, Equation of lines parallel to axes, Slope- intercept form of equation of line, Slope-point form of equation of line, Two point form of equation of line, Intercept form of equation of line, Normal form of equation of line, General form of equation of line, Point of intersection of two st. lines, Angles between two st. lines, Parallel lines, Perpendicular lines. Differential Calculus: Definition of function, limit and continuity, Simple problems on limit, Simple problems on continuity, Differentiation of x^n , e^x , $\sin x$ & $\cos x$ from first principle. Derivatives of sum, difference, product and quotient of two functions, Integral Calculus: Integration of simple functions. Matrices and Determinants: Definition of Matrices, Addition, Subtraction, Multiplication, Transpose and Inverse up to 3rd order, Properties of determinants up to 3rd order and their evaluation.

Suggested Readings :

1. Narayan S., Mittal P.K., 1953. A Text Books of Matrices. S.Chand Publishing House, NewDelhi.
2. Piskunov N., 1996, Differential and integral calculus, CBS Publishers, India
3. Vasishtha A.R., 2017, Analytical Geometry, Krishana Publication Meerut.



B.Sc. (Hons) Agriculture Syllabus Batch 2023 Onwards

4. Biswas S, Text book of Matrix Algebra
5. George B. Thomas, Jr. Ross L. Finney, Calculus and Analytic Geometry

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B.Sc. (Hons) Agriculture Syllabus Batch 2023 Onwards

23 BSAG-108 Human Value and Ethics

Course Credit: 01

Internal Marks: 10

End Semester Examination Marks: 40

Examination Note:

There will be two parts (A and B) of question paper. There will be objective questions of 15 marks in Part A. All objective questions are compulsory. Part B will be a Subjective Paper of 25 Marks. There will be 8 questions in the Subjective Paper and students will have to attempt any five questions (05 marks each).

Course Outcomes

- CO1:- Understand the significance of value inputs in a classroom and start applying them in their life and profession.
- CO2:- Distinguish between values and skills, happiness and accumulation of physical facilities, the Self and the Body, Intention and Competence of an individual, etc.
- CO3:- Understand the value of harmonious relationship based on trust and respect in their life and profession.
- CO4:- Understand the role of a human being in ensuring harmony in society and nature.
- CO5:- Distinguish between ethical and unethical practices, and start working out the strategy to actualize a harmonious environment wherever they work.

Course Syllabi

Values and Ethics-An Introduction. goal and mission of Life. Vision of Life. Principles and Philosophy. Self Exploration. Self Awareness. Self Satisfaction. Decision Making. Motivation. Sensitivity. Success. Selfless Service, Case Study of Ethical Lives, Positive Spirit, Body, Mind and Soul. Attachment and Detachment. Spirituality Quotient, Examination.

Suggested Readings

1. Gogate, S.B. (2010). Human Values and Professional Ethics Vikas GBTU Students Series.
2. Govindarajan, M.; Natarajan, S. and Senthilkumar, V.S. (2013). Professional Ethics and Human Values. PHI Learning Pvt. Ltd.
3. Tripathi, A. N. (2009). Human Values. New Age International.
4. Subramanian, R. (2013). Professional Ethics. OUP India.
5. Slete, Michael A. (2013). Education and Human Values: Reconciling Talent with an Ethics of Care. Routledge.



B.Sc. (Hons) Agriculture Syllabus Batch 2023 Onwards

23 BSAG-109 Comprehension and Communication Skills in English

Course Credit: 01

Internal Marks: 10

End Semester Examination Marks: 40

Examination Note:

There will be two parts (A and B) of question paper. There will be objective questions of 15 marks in Part A. All objective questions are compulsory. Part B will be a Subjective Paper of 25 Marks. There will be 8 questions in the Subjective Paper and students will have to attempt any five questions (05 marks each).

Course Outcomes

CO1:- To analyze grammatical errors

CO2:- To Identify correct pronunciation

CO3:- Express writing skills

CO4:- Comprehend the course materials of all courses and improve oral communication skills

CO5:- Demonstrate presentation skills

CO6:- Illustrate communication skill

Course Syllabi

"War Minus Shooting- The Sporting Spirit" by George Orwell, "A Dilemma- A Layman looks at Science" by Raymond B. Fosdick., "You and Your English - Spoken English and Broken English" by G.B. Shaw. Reading Comprehension, Vocabulary- Antonym, Synonym, Homophones, Homonyms, Often Confused Words. Exercises to help the students in the enrichment of vocabulary. Functional grammar: Articles, Prepositions, Verb, Subject Verb Agreement, Transformation, Synthesis, Direct and Indirect Narration. Written Skills: Paragraph writing, Précise writing, Report writing and Proposal writing. The Style: Importance of professional writing. Preparation of Curriculum Vitae and Job applications. Synopsis Writing, Interviews: kinds, importance and process.

Suggested Readings :

1. Kaur, J. and Sakhuja, R. (2016). Personality Development and Communication Skills, Galgotia Publishing Company.
2. Rao, V. S. P. (2011). Organizational Behaviour, Himalaya Publishing House.
3. Ray. GL. (2006) Extension Communication and Management, Kalyani Publishers.
4. Sandhu. A.S. (2014). Text Book on Agricultural Communication: Process and Methods, Jam Book Depot.

B.Sc. (Hons) Agriculture Syllabus Batch 2023 Onwards

B.Sc. (Hons) Agriculture Syllabus Batch 2023 Onwards

23 BSAG-201 Fundamentals of Genetics (Theory)

Course Credit: 02

Internal Marks:20

End Semester Examination Marks: 80

Examination Note:

There will be two parts (A and B) of question paper. There will be objective questions of 30 marks in Part A. All objective questions are compulsory. Part B will be a Subjective Paper of 50 Marks. There will be 8 questions in the Subjective Paper and students will have to attempt any five questions (10 marks each).

Course Outcomes

- CO1:- Comprehensive, detailed understanding of the chemical basis of heredity specially in crop plants to improve and develop the new varieties of plants.
- CO2:- Understanding of how genetic concepts affect broad societal issues including health and disease, food and natural resources, environmental sustainability, etc.
- CO3:- The knowledge required to design, execute, and analyze the results of genetic experimentation in plant systems.
- CO4:- Insight into the mathematical, statistical, and computational basis of genetic analyses that use genome-scale data sets in systems biology settings.
- CO5:- Understanding the role of genetic technologies in industries related to biotechnology, pharmaceuticals, energy, and other fields.

Course Syllabi

Pre and Post Mendelian concepts of heredity, Mendelian principles of heredity. Architecture of chromosome; chromonemata, chromosome matrix, chromomeres, centromere, secondary constriction and telomere; special types of chromosomes. Chromosomal theory of inheritance. Cell cycle and cell division- mitosis and meiosis. Probability and Chi-square. Dominance relationships, Epistatic interactions with example. Multiple alleles, pleiotropism and pseudoalleles, Sex determination and sex linkage, sex limited and sex influenced traits, Blood group genetics, Linkage and its estimation, crossing over mechanisms, chromosome mapping. Structural and numerical variations in chromosome and their implications, use of haploids, dihaploids and doubled haploids in Genetics. Mutation, classification, Methods of inducing mutations & CIB technique, mutagenic agents and induction of mutation. Qualitative & Quantitative traits, Polygenes and continuous variations, multiple factor hypothesis, Cytoplasmic inheritance. Genetic disorders. Nature, structure & replication of genetic material. Protein synthesis, Transcription and translational mechanism of genetic material, Gene concept: Gene structure, function and regulation, Lac and Trp operons.

Redion

B.Sc. (Hons) Agriculture Syllabus Batch 2023 Onwards

Suggested Readings :

1. Gardner, E.J. and Snustad. D.P. (2010). Principles of Genetics. John Wiley & Sons.
2. Klug, W.S. and Cummings, M.R. (1986). Concepts of Genetics. Peterson Edu.
3. Russell, P.J. (1986). Genetics. The Benzamin/Cummings Publishing Co.
4. Strickberger, M.W. (1968), Genetics. Prentice Hall.
5. Tamarin, R.H. (1981). Principles of Geneties. Wm. C. Brown Publs.

23 BSAG-201 Fundamentals of Genetics (Practical)

Course Credit: 01

Internal Marks – 10

External Examination – 40

(Lab Records: 10, Lab Exercise: 20, Viva: 10)

Course Outline

Study of microscope. Study of cell structure. Mitosis and Meiosis cell division. Experiments on monohybrid, dihybrid, trihybrid, test cross and back cross, Experiments on epistatic interactions including test cross and back cross, Practice on mitotic and meiotic cell division, Experiments on probability and Chi-square test. Determination of linkage and cross-over analysis (through two point test cross and three point test cross data). Study on sex linked inheritance in Drosophila. Study of models on DNA and RNA structures.



B.Sc. (Hons) Agriculture Syllabus Batch 2023 Onwards
23 BSAG-202 Agricultural Microbiology (Theory)

Course Credit: 02

Internal Marks:20

End Semester Examination Marks: 80

Examination Note:

There will be two parts (A and B) of question paper. There will be objective questions of 30 marks in Part A. All objective questions are compulsory. Part B will be a Subjective Paper of 50 Marks. There will be 8 questions in the Subjective Paper and students will have to attempt any five questions (10 marks each).

Course Outcomes

CO1:- Student will understand the basic microbial structure, function and study the comparative characteristics of prokaryotes and eukaryotes.

CO2:- To know the various Physical and Chemical growth requirements of bacteria

CO3:- Impart knowledge about production of beneficial bacteria.

Course Syllabi

Introduction. Microbial world: Prokaryotic and eukaryotic microbes. Bacteria: cell structure, chemoautotrophy, photo autotrophy, growth. Bacterial genetics: Genetic recombination transformation, conjugation and transduction, plasmids, transposon. Role of microbes in soil fertility and crop production: Carbon, Nitrogen, Phosphorus and Sulphur cycles. Biological nitrogen fixation- symbiotic, associative and asymbiotic. Azolla, blue green algae and mycorrhiza. Rhizosphere and phyllosphere. Microbes in human welfare: silage production, biofertilizers, biopesticides, biofuel production and biodegradation of agro-waste.

Suggested Readings :

1. Fokkema M.J., Microbiology of the Phyllosphere. Cambridge univ. Press
2. Mukerji K.G., Tewari J.P., Arora D.K. and Saxena G., Recent Developments in Biocontrol of Plant Disease



B.Sc. (Hons) Agriculture Syllabus Batch 2023 Onwards

23 BSAG-202 Agricultural Microbiology (Practical)

Course Credit: 01

Internal Marks – 10

External Examination – 40

(Lab Records: 10, Lab Exercise: 20, Viva: 10)

Course Outline

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



B.Sc. (Hons) Agriculture Syllabus Batch 2023 Onwards

23 BSAG-203 Soil and Water Conservation Engineering (Theory)

Course Credit: 02

Internal Marks:20

End Semester Examination Marks: 80

Examination Note:

There will be two parts (A and B) of question paper. There will be objective questions of 30 marks in Part A. All objective questions are compulsory. Part B will be a Subjective Paper of 50 Marks. There will be 8 questions in the Subjective Paper and students will have to attempt any five questions (10 marks each).

Course Outcomes

- CO1:- various causes of soil erosion and forms of water erosion, classification of gully control measures or structures.
- CO2:- Course will give the knowledge of soil loss equation and it can estimate long - term annual soil loss and guide conservationists on proper cropping, management, and conservation practices.
- CO3:- This course will help the students to learn about Contour strip cropping designed to minimize soil erosion and Contour bunds which can save soils from erosion.
- CO4:- By this course student get the knowledge about Grassed waterways designed to move surface water across farmland without causing soil erosion and various water harvesting techniques.
- CO5:- Students will be able to understand the wind erosion, centrifugal pumps and various pressurized irrigation methods. So overall the importance of this technology in farm is given to students by teaching this course.

Course Syllabi

Introduction to Soil and Water Conservation, causes of soil erosion. Definition and agents of soil erosion. Water erosion: Forms of water erosion. Gully classification and control measures. Soil loss estimation by universal Loss Soil Equation. Soil loss measurement techniques. Principles of erosion control: Introduction to contouring, strip cropping. Contour bund. Graded bund and bench terracing. Grassed water ways and their design. Water harvesting and its techniques. Wind erosion: mechanics of wind erosion, types of soil movement. Principles of wind erosion control and its control measures.

Suggested Readings:

1. Soil and water Conservation Research in India by ICAR
2. Arakeri H.R. and Roy D., Principles of Soil Conservation and Water Management
3. A.M. and Ojha T.P., Principles Of Agricultural Engineering by Michael



B.Sc. (Hons) Agriculture Syllabus Batch 2023 Onwards

23 BSAG-203 Soil and Water Conservation Engineering (Practical)

Course Credit: 01

Internal Marks – 10

External Examination – 40

(Lab Records: 10, Lab Exercise: 20, Viva: 10)

Course Outline

General status of soil conservation in India. Calculation of erosion index. Estimation of soil loss. Measurement of soil loss. Preparation of contour maps. Design of grassed water ways. Design of contour bunds. Design of graded bunds. Design of bench terracing system. Problem on wind erosion.



B.Sc. (Hons) Agriculture Syllabus Batch 2023 Onwards

23 BSAG-204 Fundamentals of Crop Physiology (Theory)

Course Credit: 02

Internal Marks:20

End Semester Examination Marks: 80

Examination Note:

There will be two parts (A and B) of question paper. There will be objective questions of 30 marks in Part A. All objective questions are compulsory. Part B will be a Subjective Paper of 50 Marks. There will be 8 questions in the Subjective Paper and students will have to attempt any five questions (10 marks each).

Course Outcomes:

CO1:- Role of crop physiology in crop health.

CO2:- Identification of deficiency symptoms of nutrients.

CO3:- To understand the metabolic and synthetic pathway of biomolecules.

CO4:- To know the difference between C3, C4 and CAM plant.

CO5:- Importance of growth Harmon in Agriculture.

Course Syllabi

Introduction to crop physiology and its importance in Agriculture; Plant cell: an Overview; Diffusion and osmosis; Absorption of water, transpiration and Stomatal Physiology; Mineral nutrition of Plants: Functions and deficiency symptoms of nutrients, nutrient uptake mechanisms; Photosynthesis: Light and Dark reactions, C3, C4 and CAM plants; Respiration: Glycolysis, TCA cycle and electron transport chain; Fat Metabolism: Fatty acid synthesis and Breakdown; Plant growth regulators: Physiological roles and agricultural uses, Physiological aspects of growth and development of major crops: Growth analysis, Role of Physiological growth parameters in crop productivity.

Suggested Readings :

1. Gupta U.S. Crop Physiology. Oxford & IBH
2. Perrarakli., Handbook of Plant and Crop Physiology
3. Evans L.T., Progress in Crop Physiology



B.Sc. (Hons) Agriculture Syllabus Batch 2023 Onwards
23 BSAG-204 Fundamentals of Crop Physiology (Practical)

Course Credit: 01

Internal Marks – 10

External Examination – 40

(Lab Records: 10, Lab Exercise: 20, Viva: 10)

Course Outline

Study of plant cells, structure and distribution of stomata, imbibitions, osmosis, plasmolysis, measurement of root pressure, rate of transpiration, Separation of photosynthetic pigments through paper chromatography, Rate of transpiration, photosynthesis, respiration, tissue test for mineral nutrients, estimation of relative water content, Measurement of photosynthetic CO₂ assimilation by Infra Red Gas Analyser (IRGA).



B.Sc. (Hons) Agriculture Syllabus Batch 2023 Onwards
23 BSAG-205 Fundamentals of Agricultural Economics

Course Credit: 02

Internal Marks:20

End Semester Examination Marks: 80

Examination Note:

There will be two parts (A and B) of question paper. There will be objective questions of 30 marks in Part A. All objective questions are compulsory. Part B will be a Subjective Paper of 50 Marks. There will be 8 questions in the Subjective Paper and students will have to attempt any five questions (10 marks each).

Course Outcomes

- CO1:- Identify elements of business success in agriculture and food-processing as well as elements that determine economic role of agriculture in national economy.
- CO2:- Propose methods of micro- and macroeconomic decision making in agriculture in different agro-ecological and agro-economic circumstances.
- CO3:- Describe and explain models of production, supply and demand of agricultural and food products on national and international markets
- CO4:- Understand the concepts of consumer choice and how it affects the farm / ranch level agriculture firm.

Course Syllabi

Economics: Meaning, scope and subject matter, definitions, activities, approaches to economic analysis; micro and macro economics, positive and normative analysis. Nature of economic theory; rationality assumption, concept of equilibrium, economic laws as generalization of human behaviour. Basic concepts: Goods and services, desire, want, demand, utility, cost and price, wealth, capital, income and welfare. Agricultural economics: meaning, definition, characteristics of agriculture, importance and its role in economic development. Agricultural planning and development in the country. Demand: meaning, law of demand, schedule and demand curve, determinants, utility theory; law of diminishing marginal utility, equi-marginal utility principle. Consumer's equilibrium and derivation of demand curve, concept of consumer surplus. Elasticity of demand: concept and measurement of price elasticity, income elasticity and cross elasticity. Production: process, creation of utility, factors of production, input output relationship. Laws of returns: Law of variable proportions and law of returns to scale. *Cost*: concepts, short run and long run cost curves. Supply: Stock v/s supply, law of supply, schedule, supply curve, determinants of supply, elasticity of supply. Market structure: meaning and types of market, basic features of perfectly competitive and imperfect markets. Price determination under perfect competition; short run and long run equilibrium of firm and

B.Sc. (Hons) Agriculture Syllabus Batch 2023 Onwards

industry, shut down and break even points. Distribution theory: meaning, factor market and pricing of factors of production. Concepts of rent, wage, interest and profit.

Suggested Readings :

1. Dewett, K.K. (2013). Modern Economic Theory, Sultan Chand Publishers, New Delhi 110001.
2. Lekhi, R.K. and Singh, J. (2015). Agricultural Economics: An Indian Perspective, Tenth Revised Edition, Kalyani Publishers, New Delhi-110002.
3. Singh, C.B. and Singh, R. K. (2001). A Textbook of Agricultural Economics, University Science Press, Laxmi Publications Pvt. Ltd. New Delhi-110002.
4. Subha Raddy, S., Raghu Ram, P., Neelkanta Sastry, T.V. and Bhavani Devi, I. (2004).

B.Sc. (Hons) Agriculture Syllabus Batch 2023 Onwards

23 BSAG-206 Fundamentals of Agricultural Extension Education

Course Credit: 02

Internal Marks:20

End Semester Examination Marks: 80

Examination Note:

There will be two parts (A and B) of question paper. There will be objective questions of 30 marks in Part A. All objective questions are compulsory. Part B will be a Subjective Paper of 50 Marks. There will be 8 questions in the Subjective Paper and students will have to attempt any five questions (10 marks each).

Course Outcomes

- CO1:- Education, extension programme planning, meaning, process, principles and steps in programme development.
- CO2:- To understand the extension systems in India: Extension efforts in Pre-independence era
- CO3:- To understand the new trends in agriculture extension, privatization extension.
- CO4:- Monitoring and evaluation – concept and definition, monitoring, and evaluation of extension programmes, transfer of technology- concept and models

Course Syllabi

Education: Meaning, definition & types; extension education- meaning, definition, scope and process; objectives and principles of extension education; extension programme planning- meaning, Process, Principles and Steps in Programme Development. Extension systems in India: extension efforts in pre-independence era (Sriniketan, Marthandam, Firka Development Scheme, Gurgaon Experiment, etc.) and post-independence era (Etawah Pilot Project, Nilokheri Experiment, etc.); various extension/ agriculture development programmes launched by ICAR/Govt. of India (IADP, IAAP, HYVP, KVK, IVLP, ORP, ND, NATP, NAIP, etc.). New trends in agriculture extension: privatization extension, cyber extension/ e-extension, market-led extension, farmer-led extension, expert systems, etc. Rural Development: concept, meaning, definition; various rural development programmes launched by Govt. of India. Community Dev.-meaning, definition, concept & principles, Philosophy of C.D. Rural Leadership: concept and definition, types of leaders in rural context; extension administration: meaning and concept, principles and functions. Monitoring and evaluation: concept and definition, monitoring and evaluation of extension programmes; transfer of technology: concept and models, capacity building of extension personnel; extension teaching methods:

B.Sc. (Hons) Agriculture Syllabus Batch 2023 Onwards

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

Suggested Readings :

1. Jalihal, K.A. and Veerabhadraiah, V. (2007). Fundamentals of Extension Education and Management in Extension, Concept Publications.
2. Khan, P.M. and Somani, L.L. (2009). Fundamentals of Extension Education, Agrotech Publishing Academy, Udaipur.
3. Mondal, Sagar (2015). Agricultural Extension, Kalyani Publishers.
4. Ray, G.L. (2006). Extension Communication and Management, Kalyani Publishers.
5. Van Den Ban, A.W. and Hawkins, H.S. (1998). Agricultural Extension, 2th Ed. CBS.

B.Sc. (Hons) Agriculture Syllabus Batch 2023 Onwards
23BSAG-207 Fundamentals of Plant Pathology (Theory)

Course Credit: 02

Internal Marks:20

End Semester Examination Marks: 80

Examination Note:

There will be two parts (A and B) of question paper. There will be objective questions of 30 marks in Part A. All objective questions are compulsory. Part B will be a Subjective Paper of 50 Marks. There will be 8 questions in the Subjective Paper and students will have to attempt any five questions (10 marks each).

Course outcomes

- CO1:- Student will acquaint about concepts of plant pathogens, major disease causing organisms and their etiology.
- CO2:- To provide specific knowledge about host pathogen interactions.
- CO3:- Recognition of plant disease is the first step in doing something about them.
- CO4:- To give specific knowledge about environment and disease development.

Course Syllabi

Introduction: Importance of plant diseases, scope and objectives of Plant Pathology. History of Plant Pathology with special reference to Indian work. Terms and concepts in Plant Pathology. Pathogenesis. Causes/factors affecting disease development: disease triangle and tetrahedron and classification of plant diseases. Important plant pathogenic organisms, different groups: fungi, bacteria, fastidious vesicular bacteria, phytoplasmas, spiroplasmas, viruses, viroids, algae, protozoa, phanerogamic parasites and nematodes with examples of diseases caused by them. Diseases and symptoms due to abiotic causes. *Fungi*: general characters, definition of fungus, somatic structures, types of fungal thalli, fungal tissues, modifications of thallus, reproduction (asexual and sexual). Nomenclature, Binomial system of nomenclature, rules of nomenclature, classification of fungi. Key to divisions, sub-divisions, orders and classes. *Bacteria and mollicutes*: general morphological characters. Basic methods of classification and reproduction. *Viruses*: nature, structure, replication and transmission. Study of phanerogamic plant parasites. *Nematodes*: General morphology and reproduction, classification, symptoms and nature of damage caused by plant nematodes (*Heterodera*, *Meloidogyne*, *Anguina*, *Radopholus* etc.). Growth and reproduction of plant pathogens. Liberation / dispersal and survival of plant pathogens. Types of parasitism and variability in plant pathogens. Pathogenesis. Role of enzymes, toxins and growth regulators in disease development. Defense mechanism in plants. Epidemiology: Factors affecting disease development.

B.Sc. (Hons) Agriculture Syllabus Batch 2023 Onwards

Suggested Readings:

1. Agrios, G.N. (2005). Plant Pathology, Acad. Press, New York.
2. Mehrotra, R.S. and Aneja, K.R. (1990). An Introductory Mycology, Wiley Eastern, New Delhi.
3. Singh, R.S. (1982). Plant Pathogens (Fungi and Viruses). Oxford & IBH Publication, New Delhi.
4. Singh, R.S. (1984). Introduction to the Principles of Plant Pathology, (4th edition) Oxford & IBH Publication Co, New Delhi.
5. Verma, J.P. (1992). The Bacteria, IInd Edition, New Delhi, Pub. House.

23BSAG-207 Fundamentals of Plant Pathology (Practical)

Course Credit: 01

Internal Marks – 10

External Examination – 40

(Lab Records: 10, Lab Exercise: 20, Viva: 10)

Course Outline

Acquaintance with various laboratory equipments and microscopy. Collection and preservation of disease specimen. Preparation of media, isolation and Koch's postulates. General study of different structures of fungi. Study of symptoms of various plant diseases. Study of representative fungal genera. Staining and identification of plant pathogenic bacteria. Transmission of plant viruses. Study of phanerogamic plant parasites. Study of morphological features and identification of plant parasitic nematodes. Sampling and extraction of nematodes from soil and plant material, preparation of nematode mounting.

B.Sc. (Hons) Agriculture Syllabus Batch 2023 Onwards

23BSAG-208 Fundamentals of Entomology (Theory)

Course Credit: 02

Internal Marks:20

End Semester Examination Marks: 80

Examination Note:

There will be two parts (A and B) of question paper. There will be objective questions of 30 marks in Part A. All objective questions are compulsory. Part B will be a Subjective Paper of 50 Marks. There will be 8 questions in the Subjective Paper and students will have to attempt any five questions (10 marks each).

Course Outcomes

- CO1:- To be able to identify morphological characteristics, feeding habit and habitat of agriculturally important insect-pest.
- CO2: To be able to apply concepts and analytical approaches in evolutionary biology, genetics and other areas of insect biology of the student's choice.
- CO3: To be able to categorize insects based on basic ecological, behavioural, morphological, physiological, or developmental attributes.
- CO4: To be able to examine insects deeply within a biological level of analysis and make strategies for successful pest management strategy.
- CO5: To be able to understand about different families and orders of class Insecta which cause economic losses for human beings.

Course Syllabi

History of Entomology in India. Major points related to dominance of Insecta in Animal kingdom. Classification of phylum Arthropoda upto classes. Relationship of class Insecta with other classes of Arthropoda. Morphology: Structure and functions of insect cuticle and molting. Body segmentation. Structure of Head, thorax and abdomen. Structure and modifications of insect antennae, mouth parts, legs, Wing venation, modifications and wing coupling apparatus. Structure of male and female genital organ. Metamorphosis and diapause in insects. Types of larvae and pupae. Structure and functions of digestive, circulatory, excretory, respiratory, nervous, secretary (Endocrine) and reproductive system, in insects. Types of reproduction in insects. Major sensory organs like simple and compound eyes, chemoreceptor. Insect Ecology: Introduction, Environment and its components. Effect of abiotic factors– temperature, moisture, humidity, rainfall, light, atmospheric pressure and air currents. Effect of biotic factors – food competition, natural and environmental resistance. Systematics: Taxonomy – importance, history and development and binomial nomenclature. Definitions of Biotype, Sub- species, Species, Genus, Family and Order. Classification of

B.Sc. (Hons) Agriculture Syllabus Batch 2023 Onwards

class Insecta upto Orders, basic groups of present day insects with special emphasis to orders and families of Agricultural importance like Orthoptera: Acrididae, Tettigonidae, Gryllidae, Gryllotalpidae; Dictyoptera: Mantidae, Blattidae; Odonata; Isoptera: Termitidae; Thysanoptera: Thripidae; Hemiptera: Pentatomidae, Coreidae, Cimicidae, Pyrrhocoridae, Lygaeidae, Cicadellidae, Delphacidae, Aphididae, Coccidae, Lophophidae, Aleurodidae, Pseudococcidae; Neuroptera: Chrysopidae; Lepidoptera: Pieridae, Papilionidae, Noctuidae, Sphingidae, Pyralidae, Gelechiidae, Arctiidae, Saturnidae, Bombycidae; Coleoptera: Coccinellidae, Chrysomelidae, Cerambycidae, Curculionidae, Bruchidae, Scarabaeidae; Hymenoptera: Tenthredinidae, Apidae. Trichogrammatidae, Ichneumonidae, Braconidae, Chalcididae; Diptera: Cecidomyiidae, Tachinidae, Agromyziidae, Culicidae, Muscidae, Tephritidae.

Suggested Readings:

1. Borror and DeLong's (2005). Introduction to the Study of Insects. 7th Edition. Norman F. Johnson, Charles A. Triplehorn. Thomson Brooks/Cole Publishing Co. Singapore.
2. Chapiman, R.F. (1982). The Insects: Structure and Function. Cambridge Univ. Press.
3. David, B.V. and Ananthkrishnan, T.N. (2003). General and Applied Entomology. IInd Edition. Tata McGraw Hill. Bangalore.
4. Evans, J.W. (2004). Outlines of Agricultural Entomology. Asiatic Publ. New Delhi.

B.Sc. (Hons) Agriculture Syllabus Batch 2023 Onwards

23BSAG-208 Fundamentals of Entomology (Practical)

Course Credit: 01

Internal Marks – 10

External Examination – 40

(Lab Records: 10, Lab Exercise: 20, Viva: 10)

Course Outline

Methods of collection and preservation of insects including immature stages; External features of Grasshopper/Blister beetle; Types of insect antennae, mouthparts and legs; Wing venation, types of wings and wing coupling apparatus. Types of insect larvae and pupae; Dissection of digestive system in insects (Grasshopper); Dissection of male and female reproductive systems in insects (Grasshopper); Study of characters of orders Orthoptera, Dictyoptera, Odonata, Isoptera, Thysanoptera, Hemiptera, Lepidoptera, Neuroptera, Coleoptera, Hymenoptera, Diptera and their families of agricultural importance.

B.Sc. (Hons) Agriculture Syllabus Batch 2023 Onwards

23BSAG-209 Statistical Methods

Course Credit: 02

Internal Marks:20

End Semester Examination Marks: 80

Course Outcomes

CO1:-Acquaintance with some basic concepts in statistics.

CO2:-Making familiar with some elementary statistical methods of analysis of data viz. Measures of Central Tendency, Dispersion, Moments, Skewness, and Kurtosis and to interpret them.

CO3:- Analysis of data pertaining to attributes and to interpret the results.

Course Syllabi

Introduction to Statistics and its Applications in Agriculture, Graphical Representation of Data, Measures of Central Tendency & Dispersion, Definition of Probability, Addition and Multiplication Theorem (without proof). Simple Problems Based on Probability. Binomial & Poisson Distributions, Definition of Correlation, Scatter Diagram. Karl Pearson's Coefficient of Correlation. Linear Regression Equations. Introduction to Tests of Significance, One sample & two sample test t for Means, Chi-Square Test of Independence of Attributes in 2 × 2 Contingency Table. Introduction to Analysis of Variance, Analysis of One Way Classification. Introduction to Sampling Methods, Sampling versus Complete Enumeration, Simple Random Sampling with and without replacement, Use of Random Number Tables for selection of Simple Random Sample.

Suggested Readings :

1. Chandel.R.S., Statistical methods for agricultural workers
2. Kothari C.R. and Garg G., Research Methodology

