SCHEME

The structure of the course will comprise tent-papers in Semester.

SEMESTER-IV			
S. NO.	**SUBJECT TITLE**	**SUBJECT CODE**	**CREDITS**
1.	Crop Production Technology –II (Rabi Crops)	BAGRI20S401	2(1+1)
2.	Production Technology for Ornamental Crops, MAP and Landscaping	BAGRI20S402	2(1+1)
3.	Renewable Energy and Green Technology	BAGRI20S403	2(1+1)
4.	Problematic Soils and their Management	BAGRI20S404	2(2+0))
5.	Production Technology for Fruit and Plantation Crops	BAGRI20S405	2(1+1)
6.	Principles of Seed Technology	BAGRI20S406	3(2+1)
7.	Farming System & Sustainable Agriculture	BAGRI20S407	1(1+0)
8.	Agricultural Marketing Trade & Prices	BAGRI20S408	3(2+1)
9.	Introductory Agro-meteorology & Climate Change	BAGRI20S409	2(1+1)
10.	Weed Management (Elective Course)	BAGRI20S410	3(2+1)
TOTAL			**22(14+8)**

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SCHOOL OF AGRICULTURE

Class			B.Sc. (Hons.) Agriculture	
Year/Semester			2nd Year, IV Semester	
Department			Agriculture	
Paper Name			Crop Production Technology –II (Rabi Crops)	
Subject code			BAGRI20S401	
L	T	P	Credit Total	2(1+1)
1	0	1		

Course Objectives: The course is aimed at

1. Imparting fundamentals of crop production technology of rabi crops.
2. Demonstrating practical applications of crop production.
3. Providing knowledge on the importance and practices followed in growing rabi crops.

Expected Course Outcome: At the end of the course the student should be able to

1. Comprehend the fundamentals of crop production of rabi cereals.
2. Decide on the crops, fertilizers and irrigation measures forcrop production of pulses.
3. Plan for sustainable crop production of oilseed and forage crops.
4. Explain crop production of sugarcane, medicinal and aromatic plants.
5. Correlate parameters involved in crop cultivationand practice rabi crop cultivation.

Unit	Syllabus	Periods
UNIT 1	Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of Rabi crops; wheat and chickpea, mustard, berseem.	3
UNIT 2	Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of Barley, lentil, peas, sugarcane.	3
UNIT 3	Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of Rapeseed, sunflower and oat.	2
UNIT 4	Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of lucerne and Citronella.	3
UNIT 5	Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of Mentha and Lemon grass.	4

Practical (30 Periods)

Sowing methods of wheat and sugarcane, identification of weeds in *rabi*season crops, study of morphological characteristics of *rabi*crops, study of yield contributing characters of *rabi*season crops, yield and juice quality analysis of sugarcane, study of important agronomic experiments of *rabi*crops at experimental farms. Study of *rabi*forage experiments, oil extraction of medicinal crops, visit to research stations of related crops.

Text Books

1. Singh, Chhidda, Singh, Prem and Singh, Rajbir.2003. Modern Techniques of Raising Field Crops, Oxford & IBH Publishing Co., New Delhi.
2. Singh, S.S.1998. Crop Management Under Irrigated and Rainfed Conditions. Kalyani Publishers, New Delhi.
3. Panda, S.C.2012. Modern Concepts and Advance Principles in Crop Production. Agrobios (India), Jodhpur

Reference Books

1. Singh, S.S.and Singh, Rajesh. 2013. Crop Management Under Irrigated and Rainfed Conditions. Kalyani Publishers, New Delhi.
2. Rathore, P.S. 2000. Techniques and Management of Field Crop Production, Agrobios (India), Jodhpur.
3. Prasad, Rajendra. 2002. Text Book of Field Crops Production, ICAR, New Delhi.

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SCHOOL OF AGRICULTURE

Class			B.Sc. (Hons.) Agriculture	
Year/Semester			2nd Year, IV Semester	
Department			Agriculture	
Paper Name			Production Technology for Ornamental Crops, MAPs and Landscaping	
Subject code			BAGRI20S402	
L	T	P	Credit Total	2(1+1)
1	0	1		

Course Objectives: The course is aimed at

1. Explaining the principles of landscaping.
2. Imparting knowledge on the production technology of ornamental and medicinal plants.
3. Demonstrating practical applications of landscaping and producing ornamental and medicinal plants.

Expected Course Outcomes: At the end of the course the student should be able to

1. Appreciate the importance of landscaping and growing of medicinal and aromatic plants.
2. Understand the requirements for landscaping.
3. Plan and practice propagation of cut flowers.
4. Explain the values of cultivating medicinal plants.
5. Design landscapes and practice cultivation of medicinal and aromatic plants.

Unit	Syllabus	Periods
UNIT 1	Importance and scope of ornamental crops, medicinal and aromatic plants and landscaping. Principles of landscaping. Landscape uses of trees, shrubs and climbers.	3
UNIT 2	Production technology of important cut flowers like rose, gerbera, carnation, lilium and orchids under protected conditions and gladiolus, tuberose, chrysanthemum under open conditions.	3
UNIT 3	Package of practices for loose flowers like marigold and jasmine under open conditions.	2
UNIT 4	Production technology of important medicinal plants like ashwagandha, asparagus, aloe, costus, Cinnamomum, periwinkle, isabgol and aromatic plants like mint, lemongrass, citronella, palmarosa, ocimum, rose, geranium, vetiver.	3
UNIT 5	Processing and value addition in ornamental crops and MAPs produce.	4

Practical (30 Periods)

Identification of Ornamental plants. Identification of Medicinal and Aromatic Plants. Nursery bed preparation and seed sowing. Training and pruning of Ornamental plants. Planning and layout of garden. Bed preparation and planting of MAP. Protected structures – care and maintenance. Intercultural operations in flowers and MAP. Harvesting and post harvest handling of cut and loose flowers. Processing of MAP. Visit to commercial flower/MAP unit.

Text Books

1. A.K. Tiwari and R. Kumar Fundamentals of ornamental horticulture and landscape gardening (2012) New India.
2. Arora, J.S. Introductory Ornamental Horticulture (2006) Kalyani Publishers.

3. Atal, E. K. and Kapur, B. Cultivation and Utilization of Medicinal and Aromatic plants (1982) CSIR, New Delhi.

Reference Books

1. Azhar Ali Farooqui and Sreeramu, B.S. Cultivation of medicinal and aromatic plants (2001) United Press Limited.
2. Bimaldas Chowdhury and Balai Lal Jana Flowering Garden trees (2014) Pointer publishers, Jaipur.
3. Bose, T.K. Malti, R.G. Dhua, R.S. & Das, P. Floriculture and Landscaping (2004) Nayaprakash.

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SCHOOL OF AGRICULTURE

Class			B.Sc. (Hons.) Agriculture	
Year/Semester			2nd Year, IV Semester	
Department			Agriculture	
Paper Name			Renewable Energy and Green Technology	
Subject code			BAGRI20S403	
L	T	P	Credit Total	2(1+1)
1	0	1		

Course Objectives: The course is aimed to

1. Discuss the importance of renewable energy and its sources.
2. Demonstrate about different types of biogas plants and its uses.
3. Explain the basics of solar energy, wind energy and their applications.

Expected Course Outcome: Upon completion, students will be able to

1. Summarize the importance of renewable energy and its sources.
2. Compare different biogas plants, its benefits, advantages and cost analysis.
3. Discuss the importance of solar energy and their applications.
4. Explain the need of wind energy and energy components involved and their applications.
5. Interpret merits and demerits of various renewable sources of energy.
6. Design simple projects based on renewable energy systems.

Unit	Syllabus	Periods
UNIT 1	Classification of energy sources, contribution of these of sources in agricultural sector.	2
UNIT 2	Familiarization with biomass utilization for biofuel production and their application, Familiarization with types of biogas plants and gasifiers, biogas, bioalcohol, biodiesel and biooil production and their utilization as bioenergy resource.	4
UNIT 3	Introduction of solar energy, collection and their application.	3
UNIT 4	Familiarization with solar energy gadgets: solar cooker, solar water heater, application of solar energy: solar drying, solar pond, solar distillation, solar photovoltaic system and their application.	4
UNIT 5	Introduction of wind energy and their application.	2

Practical (30 Periods)

Familiarization with renewable energy gadgets. To study biogas plants, To study gasifier, To study the production process of biodiesel, To study briquetting machine, To study the production process of bio-fuels. Familiarization with different solar energy gadgets. To study solar photovoltaic system: solar light, solar pumping, and solar fencing. To study solar cooker, To study solar drying system. To study solar distillation and solar pond.

Text Books

1. G.D. Rai. Non-Conventional Energy Sources, Kh Publishers, New Delhi.
2. N. S. Rathore. A.K. Kurchania, N.L. Panwar. (2007). Non Conventional Energy Sources, Himanshu Publications.

Reference Books

1. N.S. Rathore. A. K. Kurchania, N.L. Panwar. (2007). Renewable Energy, Theory and Practice, Himanshu Publications.

Class			B.Sc. (Hons.) Agriculture	
Year/Semester			2nd Year, IV Semester	
Department			Agriculture	
Paper Name			Problematic Soils and their Management	
Subject code			BAGRI20S404	
L	T	P	Credit Total	2(2+0)
2	0	0		

Course Objectives: The course is aimed at

1. Providing knowledge on soil and water quality for agricultural use.
2. Describing constraints and management of problematic soils.
3. Imparting knowledge on problematic soils through remote sensing and GIS.

Expected Course Outcome: At the end of the course the student should be able to

1. Comprehend the scenario of waste land and problem soils in India.
2. Understand reclamation of problematic soils.
3. Acquire knowledge on water quality.
4. State the role of remote sensing and GIS in diagnosis of problematic soils.
5. Understand the remediation of soils under different agro-ecosystems.
6. Explain management of problematic soils.

Unit	Syllabus	Periods
UNIT 1	Soil quality and health, Distribution of Waste land and problem soils in India. Their categorization based on properties.	6
UNIT 2	Irrigation water – quality and standards, utilization of saline water in agriculture.	6
UNIT 3	Reclamation and management of Saline and sodic soils, Acid soils, Acid Sulphate soils, Eroded and Compacted soils, Flooded soils, Polluted soils.	6
UNIT 4	Remote sensing and GIS in diagnosis and management of problem soils. Problematic soils under different Agro-ecosystems.	6
UNIT 5	Multipurpose tree species, bio remediation through MPTs of soils, land capability and classification, land suitability classification.	6

Text Books

1. Somani, L.L. and Totawat, K.L. (1993). Management of salt affected soils and waters. Agrotech publishing Academy, Udaipur.
2. Agarwal, R.R., Yadav, J.S.P. and Gupta, R.N. (1982). Saline Alkali soils of India, ICAR, New Delhi.

Reference Books

1. Bear FE. 1964. *Chemistry of the Soil*. Oxford & IBH.
2. Jurinak JJ. 1978. *Salt-affected Soils*. Department of Soil Science & Biometeorology. Utah State Univ.
3. USDA Handbook No. 60. 1954. *Diagnosis and improvement of Saline and Alkali Soils*. Oxford & IBH.

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SCHOOL OF AGRICULTURE

Class			B.Sc. (Hons.) Agriculture	
Year/Semester			2nd Year, IV Semester	
Department			Agriculture	
Paper Name			Production Technology for Fruit and Plantation Crops	
Subject code			BAGRI20S405	
L	T	P	Credit Total	2(1+1)
1	0	1		

Course Objectives: The course is aimed at

1. Demonstrating production technology of fruit crops.
2. Explaining the production technology of plantation crops.
3. Imparting practical experience on production technology of fruit and plantation crops.

Expected Course Outcomes: At the end of the course the student should be able to

1. Analyze the scope of cultivating a fruit or plantation crop.
2. Define package of practices followed for tropical fruits.
3. Comprehend technology involved in growing sub-tropical fruits.
4. Define package of practices followed for minor fruits and plantation crops.
5. Develop ones career interest in pomiculture and plantation crops.
6. Design an orchard.

Unit	Syllabus	Periods
UNIT 1	Importance and scope of fruit and plantation crop industry in India; Importance of rootstocks; Production technologies for the cultivation of major fruits-mango, banana,	5
UNIT 2	Production technology for citrus, grape, guava, litchi, papaya.	2
UNIT 3	Production technology for sapota, apple, pear, peach, walnut, almond.	2
UNIT 4	Production technology for minor fruits- date, ber, pineapple, pomegranate, jackfruit, strawberry,	3
UNIT 5	Production technology for plantation crops- coconut, arecanut, cashew, tea, coffee & rubber.	3

Practical (30 Periods)

Seed propagation. Scarification and stratification of seeds. Propagation methods for fruit and plantation crops. Description and identification of fruit. Preparation of plant bio regulators and their uses, Important pests, diseases and physiological disorders of above fruit and plantation crops, Visit to commercial orchards.

Text Books

1. Bal, J.S. Fruit Growing (2010) Kalyani Publishers.
2. Banday F.A. and Sharma M.K. Advances in Temperate Fruit Production (2010) Kalyani Publishers.
3. Bose, T.K., Mitra, S.K. and Sanyal, D. Tropical and Sub-Tropical-Vol-I (2002) Nayaprakash, Kolkata.

Reference Books

1. Chadha, T.R Text Book of Temperate Fruits (2001) ICAR Publication.
2. Chattopadhyay T.K. A text book on Pomology-IV Devoted to Temperate fruits (2009) Kalyani Publishers.
3. Das B.C and Das S.N. Cultivation of Minor Fruits Kalyani Publishers.

SCHOOL OF AGRICULTURE

Class			B.Sc. (Hons.) Agriculture	
Year/Semester			2nd Year, IV Semester	
Department			Agriculture	
Paper Name			Principles of Seed Technology	
Subject code			BAGRI20S406	
L	T	P	Credit Total	3(2+1)
2	0	1		

Course Objectives: The course is aimed at

1. Demonstrating the fundamentals of seed technology.
2. Extending the practical knowledge on seed production.
3. Imparting knowledge on seed certification, processing, storage and marketing.

Expected Course Outcome: At the end of the course the student should be able to

1. Comprehend seed production and seed quality.
2. Demonstrate the concepts of seed certification, Seed Act and seed testing processes.
3. Understand seed processing and seed storage techniques.
4. State the norms of seed marketing in India.
5. Apply practical knowledge gained to commercially produce seeds and practice seed testing.

Unit	Syllabus	Periods
UNIT 1	Difference between seed and grain, Quality seed and its importance in Agriculture, Core Concept of seed quality, Seed technology; definitions, objectives and its role in increasing agricultural production. Seed improvement programmes in India and Madhya Pradesh. Generation system of seed production-Nucleus seed breeder seed, foundation seed, certified seed and truthfully leveled seed.	7
UNIT 2	Reproduction process in crop plants; sexual and asexual reproduction, apomixes. Seed formation and development. Seed replacement and multiplication rates. Seed demand forecasting. Principles of seed production. Maintenance of genetic purity causes of varietal deterioration and its control.	5
UNIT 3	Male sterility- concepts and its use in hybrid seed production; inbred and non-inbred lines. Nucleus and Breeder seed production of newly released and established varieties of self pollinated crops like rice, wheat, soybean, chickpea, pigeon pea, rapeseed, mustard etc. Foundation and Certified seed production of maize hybrids, single and double cross hybrids. Hybrid seed production of rice, sunflower, sorghum and pearl millet using male sterility system. Latest released hybrids, their parentage and characteristics. Foundation and Certified seed production of wheat, rice, soybean, grams, sunflower, pigeon pea, groundnut, castor, cotton etc. Foundation and Certified seed production of some important vegetables like onion, brinjal, chillies, tomato, okra and gourds etc.	8
UNIT 4	Seed Certification- it's concepts, role, goals and procedure. Seed certification agencies. Minimum certification standards for self and	5

	cross pollinated crops. Field and seed inspection, its objectives. Seed Act and Seed Rules; Seed Legislation and Seed Law Enforcement, Seed Control Orders, Seed Policies, Seed Bills, WTO, IPR, PBR in India and recent development in Indian Seed Industry.	
UNIT 5	Seed quality regulations; seed processing-cleaning, grading seed treatment methods, bagging and storage, factors affecting seed quality in storage, storage pests and disease control. Orthodox and recalcitrant seeds. Seed testing- principles and methods of sampling, purity analysis, seed moisture, germination, viability and vigor test. Cultivar purity testing- ODV, electrophoresis and grow-out tests for seed genetic purity, seed health etc. Seed dormancy; types, causes and breaking methods. Seed marketing, organizations, seed pricing, promotion of quality seeds and seed marketing strategies etc.	5

Practical (30 Periods)

Study of reproductive systems in crop plants-floral biology, pollination and fertilization. Classification of seeds based on their usage, preparation of seed album. Study of seed structure in monocots and dicots. Study of seed production in major crops- MS lines, pollen shedders, off-types, emasculation and pollination techniques. Study of seed processing equipments- plan and layout. Study of seed testing equipments, seed testing methods- seed sampling, seed purity test, seed moisture, seed germination tests, seed viability and vigor, seed health tests etc. Seed dormancy breaking methods. Visit to seed production plots, Visit to seed processing plants, public and private seed enterprises.

Text Books

1. Agarwal, R.L.1991.Seed Technology. Oxford & IBH Publishing Co. Delhi.
2. Agarwal, P.K. 1999. Seed Technology. ICAR, New Delhi.
3. Subir Sen and Nabinanda Ghosh.1999. Seed Science and Technology. Kalyani
4. Publishers. New Delhi.
5. Dhirenra Khare and Mohan S. Bhale.2000. Seed Technology. Scientific Publishers (India), Jodhpur.

Reference Books

1. Maloo,S.R., Intodia, S.K. and Pratap Singh.2008. Beej Pradyogiki. Agrotech Publishing Academy.
2. A.K. Joshi and B.D. Singh.2005.Seed Technology. Kalyani Publishers, New Delhi.
3. Arya, P.S. 2001. Vegetable Breeding and Seed Production. Kalyani Pub., Ludhiana.

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SCHOOL OF AGRICULTURE

Class			B.Sc. (Hons.) Agriculture	
Year/Semester			2nd Year, IV Semester	
Department			Agriculture	
Paper Name			Farming System & Sustainable Agriculture	
Subject code			BAGRI20S407	
L	T	P	Credit Total	1(1+0)
1	0	0		

Course Objectives: The course is aimed at

1. Introducing techniques involved in precision agricultural farming.
2. Explaining the role of geographic information system, global positioning system and remote sensing in precision farming.
3. Imparting knowledge on the use of nanotechnology in improving farm productivity.

Expected Course Outcome: At the end of the course the student should be able to

1. Define the role of remote sensing in precision agriculture.
2. Demonstrate the knowledge gained on geographical information system.
3. Comprehend simulation models on precision agriculture.
4. Explain the role of nanotechnology in improving agriculture.
5. Apply geoinformatics and nanotechnology in precision farming projects.

Unit	Syllabus	Periods
UNIT 1	Farming System-scope, importance, and concept, Types and systems of farming system and factors affecting types of farming, Farming system components and their maintenance.	3
UNIT 2	Cropping system and pattern, multiple cropping system, Efficient cropping system and their evaluation, Allied enterprises and their importance, Tools for determining production and efficiencies in cropping and farming system.	3
UNIT 3	Sustainable agriculture-problems and its impact on agriculture, indicators of sustainability, adaptation and mitigation, conservation agriculture strategies in agriculture, HEIA, LEIA and LEISA and its techniques for sustainability, Integrated farming system-historical background, objectives and characteristics, components of IFS and its advantages.	4
UNIT 4	Site specific development of IFS model for different agro-climatic zones, resource use efficiency and optimization techniques, Resource cycling and flow of energy in different farming system, farming system and environment.	3
UNIT 5	Visit of IFS model in different agro-climatic zones of nearby states University/ institutes and farmers field.	2

Text Books

1. Panda, S.C.2004. Cropping Systems and Farming Systems, Agrobios (India), Jodhpur.
2. Panda, S.C.2012. Modern Concepts and Advance Principles in Crop Production. Agrobios (India), Jodhpur.
3. Sharma, Arun K. 2002. A Handbook of Organic Farming, Agrobios (India) Ltd., Jodhpur.

Reference Books

1. Balasubramaniyan, P. and Palaniappan, S.P.2016. Principles and Practices of Agronomy (2nd edition), Agrobios (India), Jodhpur.
2. Shukla, Rajeev K. 2004. Sustainable Agriculture, Surbhee Publications, Jaipur.
3. Palaniappan, S.P.1985. Cropping Systems in the Tropics: Principles and Management, Wiley Easter Ltd. and TNAU, Coimbatore.

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SCHOOL OF AGRICULTURE

Class			B.Sc. (Hons.) Agriculture	
Year/Semester			2nd Year, IV Semester	
Department			Agriculture	
Paper Name			Agricultural Marketing Trade & Prices	
Subject code			BAGRI20S408	
L	T	P	Credit Total	3(2+1)
2	0	1		

Course Objectives: The course is aimed at

1. Explaining the importance of agribusiness and transformation of agriculture into agribusiness
2. Demonstrating the procedures of setting up and management of agro-based industries
3. Outlining the various activities and linkages in agri-value chain management

Expected Course Outcome: At the end of the course the student should be able to

1. Acquire knowledge on transforming agriculture into agribusiness.
2. Comprehend the procedures of setting up of agro-based industries
3. Analyze the various activities and linkages in agri-value chain and the business environment
4. Assess the capital, financial and marketing management of agribusiness
5. Develop skills in project formulation, appraisal and evaluation

Unit	Syllabus	Periods
UNIT 1	Agricultural Marketing: Concepts and definitions of market, marketing, agricultural marketing, market structure, marketing mix and market segmentation, classification and characteristics of agricultural markets; demand, supply and producer's surplus of agri-commodities: nature and determinants of demand and supply of farm products,	8
UNIT 2	producer's surplus – meaning and its types, marketable and marketed surplus, factors affecting marketable surplus of agri-commodities; product life cycle (PLC) and competitive strategies: Meaning and stages in PLC; characteristics of PLC; strategies in different stages of PLC; pricing and promotion strategies: pricing considerations and approaches – cost based and competition based pricing; market promotion – advertising, personal selling, sales promotion and publicity – their meaning and merits & demerits; marketing process and functions:	9
UNIT 3	Marketing process-concentration, dispersion and equalization; exchange functions – buying and selling; physical functions – storage, transport and processing; facilitating functions – packaging, branding, grading, quality control and labeling (Agmark); Market functionaries and marketing channels: Types and importance of agencies involved in agricultural marketing;	3
UNIT 4	meaning and definition of marketing channel; number of channel levels; marketing channels for different farm products; Integration, efficiency, costs and price spread: Meaning, definition and types of market integration; marketing efficiency; marketing costs, margins and price spread; factors affecting cost of marketing; reasons for higher marketing costs of farm commodities; ways of reducing marketing costs; Role of Govt. in agricultural marketing:	5
UNIT 5	Public sector institutions- CWC, SWC, FCI, CACP & DMI – their	5

	objectives and functions; cooperative marketing in India; Risk in marketing: Types of risk in marketing; speculation & hedging; an overview of futures trading; Agricultural prices and policy: Meaning and functions of price; administered prices; need for agricultural price policy; Trade: Concept of International Trade and its need, theories of absolute and comparative advantage. Present status and prospects of international trade in agri-commodities; GATT and WTO; Agreement on Agriculture (AoA) and its implications on Indian agriculture; IPR.	

Practical (30 Periods)

Plotting and study of demand and supply curves and calculation of elastic ties; Study of relationship between market arrivals and prices of some selected commodities; Computation of marketable and marketed surplus of important commodities; Study of price behaviour over time for some selected commodities; Construction of index numbers; Visit to a local market to study various marketing functions performed by different agencies, identification of marketing channels for selected commodity, collection of data regarding marketing costs, margins and price spread and presentation of report in the class; Visit to market institutions – NAFED, SWC, CWC, cooperative marketing society, etc. to study their organization and functioning; Application of principles of comparative advantage of international trade.

Text Books

1. Acharya, S.S. and Agarwal, N.L., 1994, Agricultural Price Analysis and Price Policy, Oxford and IBH Publishing Co. Pvt. Ltd. New Delhi.
2. Acharya, S.S. and Agarwal, N.L., 2004, Agricultural Marketing in India, Oxford and IBH Publishing Co. New Delhi.
3. G. L. Meena, S. S. Burark, D. C. Pant and Rajesh Sharma, 2017. Fundamentals of Agribusiness Management, Agrotech Publishing Academy, Udaipur, ISBN: 978-81-8321-418-6. First edition.

Reference Books

1. Kahlon, A.S. and George, M.V., 1985, Agricultural Marketing and Price Policy, Allied Publication Pvt. Ltd., New Delhi.
2. Kohls, Richard L. and Uhl, Joseph N., 1980, Marketing of Agricultural Products, Macmillan Publishing Co., Inc. New York.
3. Mamoria, C.B and Joshi, R.L., 1971, Principles and Practice of Marketing in India, Kitabmahal, Allahabad.

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Class			B.Sc. (Hons.) Agriculture	
Year/Semester			2nd Year, IV Semester	
Department			Agriculture	
Paper Name			Introductory Agro-meteorology & Climate Change	
Subject code			BAGRI20S409	
L	T	P	Credit Total	2(1+1)
1	0	1		

Course Objectives: The course is aimed to

1. Demonstrate the role of crop models in studying soil, plant and water relationship.
2. Discuss about different types of crop growth models to forecast crop yields.
3. Outline the preparation of agro advisory bulletin based on weather forecast and its use.

Expected Course Outcome: Upon completion students will be able to

1. Illustrate crop model concepts and soil-plant-atmospheric continuum.
2. Summarize the importance of crop growth models to increase crop production.
3. Develop yield models for different crops to predict yield.
4. Comprehend weather forecasting.
5. Explain about various simulation models for preparation of agro advisories.
6. Make use of crop models and statistical approaches to predict yield of crops, forecast pests and diseases and prepare agro-advisories.

Unit	Syllabus	Periods
UNIT 1	Agricultural Meteorology- Introduction, definition of meteorology, scope and practical utility of Agricultural meteorology. Composition and structure of atmosphere and definition of weather and climate, aspects involved in weather and climate, atmospheric temperature, soil temperature, solar radiation, atmospheric pressure, atmospheric humidity, evaporation and transpiration, monsoons, rainfall, clouds, drought, weather disasters and their management atmospheric pollution and role of meteorology.	3
UNIT 2	Basics of weather forecasting. Climate change-causes. Global warming-causes and remote sensing. Effect of climate change on horticulture Past and future changes in greenhouse gases within the atmosphere. Sources and sinks for greenhouse gases. Atmospheric chemistry. Plants sense and respond to changes in CO2 concentration.	4
UNIT 3	Measurement of short-term effects and mechanisms underlying the observed responses in C3 and C4 species. plant development affected by growth in elevated CO2. Physiology of rising CO2 on nitrogen use and soil fertility, its implication for production. Methodology for studying effect of CO2. Change in secondary metabolites and pest disease reaction of plants.	3
UNIT 4	The mechanisms of ozone and UV damage and tolerance in plants. Increased temperature and plants in tropical/sub-tropical climates-effect on growing season, timing of flowering, duration of fruit development and impacts on crop yields and potential species ranges,	3

	interaction of temperature with other abiotic/biotic stress. Mitigation strategies and prospects for genetic manipulation of crops to maximize production in the future atmosphere.	
UNIT 5	Modifying Rubisco, acclimation, metabolism of oxidizing radicals, and sink capacity as potential strategies.	2

Practical (30 Periods)

Site selection for Agromet observatory; Measurement of temperature; Measurement of rainfall; Measurement of evaporation (atmospheric/soil); Measurement of atmospheric pressure; Measurement of sunshine duration and solar radiation; Measurement of wind direction and speed and relative humidity; Study of weather forecasting and synoptic charts. Visit to Meteorological observatory, Visit to IMD meteorological observatory-Lay out plan of standard meteorological observatory. Recording of air and soil temperature. Measurement of radiation and components, Measurement of rainfall-different types of rain gauges, Measurement of wind speed and direction and atmospheric humidity, Recording of evaporation. Synoptic charts and weather reports, symbols, *etc.*

Text Books

1. Sacheti,A.K. 1985. Agricultural Meteorological Instructional Cum Practical Manual (Ed.) NCERT Publication, New Delhi.
2. Lal, D.S. 2005 Climatology, Sharda Pustak Bhawan, Allahabad.
3. Varshneya, M.C. and Balakrishna, Pillai, 2003. Text book of Agricultural Meteorology. ICAR, New-Delhi.
4. Sahu, D.D., 2007. Agrometeorology and Remote sensing: Principles and Practices, Agrobios (India) , Jodhpur.

Reference Books

1. Murithy, K, and Radha, V. 1995. Practical Manual on Agricultural Meteorology, Kalyani Publishers, New-Delhi.
2. Panda, S.C.2012. Modern Concepts and Advance Principles in Crop Production. Agrobios (India), Jodhpur.
3. Balasubramaniyan, P. and Palaniappan, S.P.2016. Principles and Practices of Agronomy, Agrobios (India), Jodhpur.

EKLAVYA UNIVERSITY
ज्ञान प्राप्तये लक्ष्य संधानम्
Estd. by Madhya Pradesh Niji Vishwavidyalaya (Sthapna Avam Sanchalan) Adhyadesh, 2020

SCHOOL OF AGRICULTURE

Class			B.Sc. (Hons.) Agriculture	
Year/Semester			2nd Year, IV Semester	
Department			Agriculture	
Paper Name			Weed Management (Elective Course)	
Subject code			BAGRI20S410	
L	T	P	Credit Total	3(2+1)
2	0	1		

Course Objectives: The course is aimed at

1. Identifying major weeds affecting farming ecosystems.
2. Imparting knowledge on organic and inorganic herbicides.
3. Introducing solutions to manage herbicide resistance.

Expected Course Outcome: At the end of the course the student should be able to

1. Gain knowledge on weeds affecting ecosystems.
2. Explain the mode of action of herbicides.
3. Understand the role of allelochemicals and the applications of bio-herbicides.
4. Analyze herbicide compatibility.
5. Cite ways of overcoming herbicide resistance.
6. Recommend weed management strategies.

Unit	Syllabus	Periods
UNIT 1	Introduction to weeds, characteristics of weeds their harmful and beneficial effects on ecosystem.	3
UNIT 2	Classification, reproduction and dissemination of weeds. Herbicide classification, concept of adjuvant, surfactant, herbicide formulation and their use. Introduction to mode of action of herbicides and selectivity.	5
UNIT 3	Allelopathy and its application for weed management. Bio-herbicides and their application in agriculture.	3
UNIT 4	Concept of herbicide mixture and utility in agriculture. Herbicide compatibility with agro-chemicals and their application.	2
UNIT 5	Integration of herbicides with nonchemical methods of weed management. Herbicide Resistance and its management.	2

Practical (30 Periods)

Techniques of weed preservation. Weed identification and their losses study. Biology of important weeds. Study of herbicide formulations and mixture of herbicide. Herbicide and agrochemicals study. Shift of weed flora study in long term experiments. Study of methods of herbicide application, spraying equipment's. Calculations of herbicide doses and weed control efficiency and weed index.

Text Books

1. Saraswat, V.N., Bhan, V.M. and Yaduraju, N.T. 2003. Weed Management , ICAR, New-Delhi.
2. Gupta, O.P. 2015. Weed Management: Principles and Practices (2nd Ed.), Agribios (India), Jodhpur.

Reference Books

1. Gupta, O.P. 2016. Modern Weed Management , Agribios (India), Jodhpur
2. Das, T.K. 2008. Weed Science : Basics and Applications , Jain Brothers, New-Delhi.