B.Sc. Agriculture IV- Semester

IV-Semester		
1.	**Crop Production Technology –II (*Rabi* Crops)**	**2(1+1)**
2.	**Production Technology for Ornamental Crops, MAP and Landscaping**	**2(1+1)**
3.	**Fundamentals of Agricultural Extension Education**	**2(1+1)**
4.	**Livestock and Poultry Management**	**4 (3+1)**
5.	**Pests of Crops and Stored Grain and their Management**	**3 (2+1)**
6.	**Production Technology for Vegetables and Spices**	**2 (1+1)**
7.	**Farming System & Sustainable Agriculture**	**1(1+0)**
8.	**Agricultural Finance and Cooperation**	**3 (2+1)**
9.	**Introductory Agro-meteorology & Climate Change**	**2(1+1)**
10.	**Elective Course**	**3 credit**
Total		**21(12+8) + 3cr.**

Crop Production Technology-II (Rabi crops) **Credit hours: 2(1+1)**

Theory:

Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of Rabi crops; cereals –wheat and barley, pulses-chickpea, lentil, peas, oilseeds-rapeseed, mustard and sunflower; sugar crops-sugarcane; other crops- potato, Forage crops-berseem, lucerne and oat.

Practical:

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.

References:

- Singh, Chhidda; Singh P. and Singh, R. (2003). Modern Techniques of Raising Field Crops, Oxford & IBH, Publishing Co., New Delhi.
- Singh, S.S. (1998), Crop Management: Under irrigated and rainfed conditions.
- Singh, S.S. (1993), Principles and Practices of Agronomy, Kalyani Publishers, New Delhi.
- Reddy,T.Y. and Reddi, G.H.S. (1993). Principles of Agronomy, Kalyani Publishers, New Delhi.
- Thakur, C. (1979). Crop Production, Vol. I & II. Metropolitan Book Pvt. Ltd., New Delhi.
- Ahlawat, I.P.S. , Sharma, O.P. & Saini., G.S. (1998). Scientific Crop Production in India. Aman Publishing, House, Madhu Market, Budhana gate, Meerut.
- Rathore, P.S. (1999-2000). Techniques and Management of Field Crop Production. Agrobios (India), Jodhpur.
- Rathore, P.S. and Sharma, S.K. (2003). Scientific Pulse Production. Yash Publishing House, Bikaner.
- Reddy, S.R. (2004). Agronomy of Field Crops. Kalyani Publishers, New Delhi.

Production Technology for Ornamental Crops, MAPs and Landscaping Credit hours: 2(1+1)

Theory :

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

Practicals:

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.

References:

- Arora, J.S. Introductory Ornamental Horticulture. Kalyani Publisher, Ludhiana.

Fundamentals of Agricultural Extension Education **Credit hours: 3(2+1)**

Theory :

Education: 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. Community Dev.-meaning, definition, concept & principles, Physiology 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: communication: Agriculture journalism.

Practicals:

To get acquainted with university extension system. Group discussion- exercise; handling and use of audio visual equipments and digital camera and LCD projector; preparation and use of AV aids, preparation of extension literature – leaflet, booklet, folder, pamphlet news stories and success stories; Presentation skills exercise; micro teaching exercise; visit to NGO and learning from their experience in rural development; understanding PRA techniques and their application in village development planning; exposure to mass media:

References:

- Rogers, E.M. and Shoemaker, F.F. (1971). Communication of Innovations–A Cross cultural Approach, The Free Press, New York.
- Sandhu, A.S. (1993). Text book on Agricultural Communication: Process & Method, Oxford & IBH Publishing Co. Pvt. Ltd. New Delhi.
- Reddy, A.A. (1993). Extension Education, Shri Laxmi Press, Baptala.

Livestock Poultry Management	**Credit hours: 4 (3+1)**

Theory:

Role of livestock in the national economy. Reproduction in farm animals and poultry. Housing principles, space requirements for different species of livestock and poultry. Management of calves, growing heifers and milch animals. Management of sheep, goat and swine. Incubation, hatching and brooding. Management of growers and layers.

Important Indian and exotic breeds of cattle, buffalo, sheep, goat, swine and poultry. Improvement of farm animals and poultry.

Digestion in livestock and poultry. Classification of feedstuffs. Proximate principles of feed. Nutrients and their functions. Feed ingredients for ration for livestock and poultry. Feed supplements and feed additives. Feeding of livestock and poultry.

Introduction of livestock and poultry diseases. Prevention (including vaccination schedule) and control of important diseases of livestock and poultry.

Practical:

External body parts of cattle, buffalo, sheep, goat, swine and poultry. Handling and restraining of livestock. Identification methods of farm animals and poultry. Visit to IDF and IPF to study breeds of livestock and poultry and daily routine farm operations and farm records. Judging of cattle, buffalo and poultry. Culling of livestock and poultry. Planning and layout of housing for different types of livestock. Computation of rations for livestock. Formulation of concentrate mixtures. Clean milk production, milking methods. Hatchery operations, incubation and hatching equipments. Management of chicks, growers and layers. Debeaking, dusting and vaccination. Economics of cattle, buffalo, sheep, goat, swine and poultry production

References:

- Banerjee, G. C. 2011. A Text Book of Animal Husbandry VIII ed. Oxford and IBH Publications. New Delhi.
- ICAR. 2011. Hand Book of Animal Husbandry published by DIPA, ICAR, New Delhi.
- Ranjan, SK.1994 Animal Nutrition and Feeding Practices. Vikash Publications. New Delhi.
- Sukumar,De. 2000. Outlines of dairy technology. Oxford University Press, New Delhi.
- Singh, R A 1985. Poultry Prodution. Kalyani Publications. New Delhi.

Pests of Crops and Stored Grains and their Management **Credit hours: 3(2+1)**

Theory :

General account on nature and type of damage by different arthropods pests. Scientific name, order, family, host range, distribution, biology and bionomics, nature of damage, and management of major pests and scientific name, order, family, host range, distribution, nature of damage and control practice other important arthropod pests of various field crop, vegetable crop, fruit crop, plantation crops, ornamental crops, narcotics, spices and condiments. Factors affecting losses of stored grain and role of physical, biological, mechanical and chemical factors in deterioration of grain. Insect pests, mites, rodents, birds and microorganisms associated with stored grain and their management. Storage structure and methods of grain storage and fundamental principles of grain store management.

Practicals :

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

References:

- Barnes, Edwin, H. (1981). The birds of India: A guide to Indian Ornithology, Cosmo publication, New Delhi.
- Bhargava, M.C. and Kumawat, K.C. (2010). Pests of stored grains and their management, New India Publishing Agency, New Delhi.
- Iswar Prakash, (1992). Rodents in Indian Agriculture, Vol.-1. Scientific Publishers, Jodhpur.
- Pradhan, S. 1968. Insect Pests of Crops, National Book Trust, New Delhi.
- Khare, B.P. (1994). Stored Grain Pests and Their Management, Kalyani Publishers, New Delhi.

Production Technology for Vegetable and Spices **Credit hours: 2(1+1)**

Theory

Importance of vegetables & spices in human nutrition and national economy, brief about origin, area, production, improved varieties and cultivation practices such as time of sowing, sowing, transplanting techniques, planting distance, fertilizer requirements, irrigation, weed management, harvesting, storage, physiological disorders, disease and pest control and seed production of important vegetable and spices.

Practical

Identification of vegetables & spices crops and their seeds. Nursery raising. Direct seed sowing and transplanting. Study of morphological characters of different vegetables & spices. Fertilizers applications. Raising of nursery of vegetables & spices. Vegetables & spices seed extraction. Harvesting & preparation for market. Economics of vegetables and spices cultivation.

References:

- Thompson, H. C. and Kelly, W.C. Vegetables Crops. Tata McGraw Hill
- Chauhan, D.V.S. Vegetable Production in India. Ram Prasad & sons, Agra
- Bose, T.K. Vegetables. Naya Prokash, Calcutta
- Singh, S.P. Production Technology of Vegetables Crops. Agril. Res. Communication centre, Karnel
- Choudhary, B.Vegetables. NBT, New Delhi
- Gopalaswamiengar, K.S. The Complete Gardening in India.The Hosali Press, Bangalore
- Arora, J.S. Introductory Ornamental Horticulture. Kalyani Publisher, Ludhiana.

Farming System and Sustainable Agriculture	**Credit hours: 1(1+0)**

Theory:

Farming System-scope, importance, and concept, Types and systems of farming system and factors affecting types of farming, Farming system components and their maintenance, 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; 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, 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, Visit of IFS model in different agro-climatic zones of nearby states University/ institutes and farmers field.

References:

- Panda, S.C. (2004). Cropping Systems and Farming Systems, Agrobios (India), Jodhpur.
- Sharma, Arun K. (2002). A Handbook of Organic Farming, Agrobios (India) Ltd., Jodhpur.
- Balasubramaniyan, P. and Palaniappan, S.P. 2004. Principles and Practices of Agronomy, Agrobios,(India), Jodhpur.
- Shukla, Rajeev K. (2004). Sustainable Agriculture, Surbhee Publications, Jaipur.
- Palaniappan, SP. (1985). Cropping Systgems in the Tro;ics : Principles and Management, Wiley Easter,Ltd. And TNAU, Ciombatore.
- Reddy, S.R. (2004). Principles of Agronomy, Kalyani Publishers, Ludhiana.
- Palaniappan, S.P. and Sivraman, K. (1996). Cropping system in Tropics, International Pvt. New-Delhi.
- Dahama, A.K. (1999). Organic Farming, Agro Botanic, Bikaner.
- Sharma, Arun K. (2002). A Handbook of Organic Farming , Agrobios (India) , Jodhpur.
- Gautam , R.C. and Singh, Punjab (1997). Tikau Kheti, Bhartia Krishi Anusandhan Parishad, New-Delhi.
- Sharma, Arun , K. (2005). Gevik Kheti- Sindant, Taknik and Upyogita. Agrobios, Jodhpur.

Agricultural Finance and Co-Operation	**Credit hours: 3(2+1)**

Theory :

Agricultural Finance- meaning, scope and significance, credit needs and its role in Indian agriculture. Agricultural credit: meaning, definition, need, classification. Credit analysis: 4 R's, and 3C's of credits. Sources of agricultural finance: institutional and non-institutional sources, commercial banks, social control and nationalization of commercial banks, Micro financing including KCC. Lead bank scheme, RRBs, Scale of finance and unit cost. An introduction to higher financing institutions – RBI, NABARD, ADB, IMF, world bank, Insurance and Credit Guarantee Corporation of India. Cost of credit. Recent development in agricultural credit. Preparation and analysis of financial statements – Balance Sheet and Income Statement. Basic guidelines for preparation of project reports- Bank norms – SWOT analysis.

Agricultural Cooperation – Meaning, brief history of cooperative development in India, objectives, principles of cooperation, significance of cooperatives in Indian agriculture. Agricultural Cooperation in India- credit, marketing, consumer and multi-purpose cooperatives, farmers' service cooperative societies, processing cooperatives, farming cooperatives, cooperative warehousing; role of ICA, NCUI, NCDC, NAFED.

Practicals:

Determination of most profitable level of capital use. Optimum allocation of limited amount of capital among different enterprise. Analysis of progress and performance of cooperatives using published data. Analysis of progress and performance of commercial banks and RRBs using published data. Visit to a commercial bank, cooperative bank and cooperative society to acquire firsthand knowledge of their management, schemes and procedures. Estimation of credit requirement of farm business – A case study. Preparation and analysis of balance sheet – A case study. Preparation and analysis of income statement – A case study. Appraisal of a loan proposal.

References :

- Reddy, S. and Raghu Ram, P. "Agricultural Finance and Management" Oxford and IBH, New Delhi.
- Singh, J.P. 1990. "Agricultural Finance – Theory and Practice" Ashish Publishing House, New Delhi.
- Pandey, U.K. "An Introduction to Agricultural Finance" Kalyani Publishes, New Delhi.
- Pandey, Mukesh and Tewari, Deepali "Rural and Agriculture Marketing".
- Mamoria, C.B. "Agricultural Problems of India".
- Krishnaswami, O.R. "Fundamental of Cooperation".

Introductory Agrometeorology & Climate Change **Credit hours: 2(1+1)**

Theory:

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, longwave 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, climatic normals for crop and livestock production. Weather forecasting- types of weather forecast and their uses. Climate change, climatic variability, global warming, causes of climate change and its impact on regional and national Agriculture.

Practicals:

Visit of Agrometeorological 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. Computation of PET and AET.

References:

- Sacheti, A.K. (1985). Agricultural Meteorological Instructional Cum Practical Manual (Ed.) NCERT, Publication, New Delhi.
- Mavi, H.S. (1994), Introduction to Agrometeorology, Oxford & IBH Publishing Co., New Delhi.
- Lal, D.S. (2005). Climatology, Sharda Pustak Bhawan, Allahabad.

- Barry, R.G. and Chorley, R.C. (1985). Atmosphere Weather and Climate. English Language Book Soc. Publication.
- Varshneya, M.C. and Balakrishna, Pillai, (2003). Text book of Agricultural Meteorology. ICAR, New-Delhi.
- Sahu, D.D., (2003). Agrometeorology and Remote sensing: Principles and Practices, Agrobios (India) ,Jodhpur.
- Murithy, K, and Radha, V. (1995). Practical Manual on Agricultural Meteorology, Kalyani Publishers, New-Delhi.