

**BABA FARID COLLEGE, BATHINDA**

**B. Sc. Hons. Agriculture Syllabus as per  
ICAR pattern**

**Program Outcomes Program**

**Specific Outcomes Course**

**Outcomes**

## **PROGRAMME OUTCOMES (POs)**

Students graduating with the B.Sc. Physical Science degree should be able to acquire

**PO-1:** To demonstrate the ability to analyze data and draw appropriate statistical conclusions. To demonstrate the ability to communicate effectively both orally and in writing.

**PO-2:** Understand the impact of the professional agricultural solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**PO-3:** To demonstrate research based knowledge of the legal and ethical environment impacting agriculture organizations and exhibit an understanding and appreciation of the ethical implications of decisions.

**PO-4:** To demonstrate an understanding of and appreciation for the importance of the impact of globalization and diversity in modern agriculture organizations. Understanding of globalization, and NGO working.

**PO-5:** To demonstrate an ability to engage in critical thinking by analyzing situations and constructing and selecting viable solutions to solve problems. Ability to work effectively with others. To develops analytical ability and team work spirit.

**PO-6:** To understand and analyze the current events and issues that are occurring in agriculture and how they affect futuristic agriculture.

**PO-7:** Able to recognize and examine the relationships between inputs and outputs in their agricultural field to make effective and profitable decisions. To understand mechanics of agripreneurship.

**PO-8:** Understand how all aspects of agriculture combine and are used by scientists, marketers, producers and understand how employer characteristics and decision-making at various levels enhance the success of an agricultural enterprise. To understand components of agri business and economics of market.

**PO-9:** Able to demonstrate critical thinking and problem solving skills as they apply to a variety of animal and or plant production systems .To understand problem solving skills in crop production and animal husbandry.

**PO-10:** Knowledge of Weather codes and Symbols, Reading and Recording of weather and climatic data. To get trained for climatologically records, soil data and soil nutrition.

**PO-11:** To develop critical and self-critical opinion and approach aiming at solving the most important practical problems in the field of plant protection by applying gained competencies

and in accordance with high standards of academic integrity (ethics and moral) both in the profession and in society as a whole. To develop competence to work in Government, public and private sectors.

**PO-12:** Demonstrate knowledge and understanding in horticulture section: The breadth and depth of the profession of horticulture. Basic horticulture biology: taxonomy, anatomy, morphology, and physiology. The characteristics of the environment and their influence on plant growth and development. Current applications of horticultural principles and practices: propagation, pest management, production, maintenance, and business practices. Comprehensive knowledge of horticultural production.

**PO-13:** This programme will also help students to enhance their employability for jobs in different sectors.

### **PROGRAMME SPECIFIC OUTCOMES (PSO)**

**PSO1.** Impart knowledge and understanding of fundamental concepts and techniques of maintaining and enhancing soil fertility, diversification, crop production, crop management, crop improvement, biodiversity and sustainability of agriculture worldwide.

**PSO2.** Develop the ability to know farming practices and their scope to improve in the rural areas and the environments.

**PSO3.** An ability to review, analysis, plan, design and implement an end to end agricultural production system including post production activities.

**PSO4.** Apply knowledge of basic science through Agricultural microbiology, Plant biochemistry and Biotechnology.

**PSO5.** Apply knowledge of Agri-business management and finance to develop profitable agricultural system.

## **Course Outcome**

B.Sc. Hons. Agriculture 1<sup>st</sup>Sem

### **HORT-101 FUNDAMENTALS OF HORTICULTURE**

**CO1.** - Students will be able to identify plant vegetative structure

**CO2.-** Students will understand basic principles, processes and plant propagation methods.

**CO3.-** Students will understand how to propagate plant, manage and harvest a variety of plant.

**CO4.-** students will learn how horticulture relates to the economy and environments, both currently and in the future.

### **BIOCHEM-101 FUNDAMENTALS OF PLANT BIOCHEMISTRY AND BIOTECHNOLOGY**

**CO1.** Role of cell organelles and their functions

**CO2.** Functions of biomolecules and their utility in cell

**CO3.** Identify the deficiency symptoms of biomolecules

**CO4.** Synthesis pathways of biomolecules and regulations

**CO5.** Identification of biomolecules in given sample

**CO.6** Application of plant tissue culture in crop improvement

**CO.7** Tackled the problems in conventional breeding

**CO.8** Plant tissue culture is an area of entrepreneurship

### **SOIL-101 FUNDAMENTALS OF SOIL SCIENCE**

**CO1:** To be able about physical and chemical properties of soil and their effect on plant's health.

**CO2:** To aware the students about causes, effects and remedies to prevention and mitigation of soil pollution.

**CO3:** Knowledge about soil forming rocks and minerals, their weathering and soil forming processes and climatic factors affect them.

## **FOR-101 INTRODUCTION TO FORESTRY**

**CO.1.** Students will understand recognize various harvesting, transportation, and processing systems used in the management of forest resources and production of forest products **CO.2.** Students will understand develop and evaluate management plans with multiple objectives and constraints.

**CO.3.** Students will learn how to develop and apply silvicultural prescriptions appropriate to management objectives.

**CO.4.** Students will understand analyze forest inventory information and project future forest, stand, and tree conditions.

## **ENG-101 COMPREHENSION AND COMMUNICATION SKILL IN ENGLISH**

**CO1:** Students will identify and explain their goals to the semester and also identify the needs of communication helps us meet .They will able to understand the common misconceptions about communication and the reasons, people use language.

**CO2:** Students can differentiate the action, interaction and transaction models of communication. They can define the process of both perception and listening .Students can recall the importance of listening effectively and can identify strategies for communicating the cultural awareness.

**CO3:** Students will able to introduce themselves to the class and begin getting to know one another and will apply communication strategies by preparing and participating in class discussion.

**CO4:** Students will prepare and present messages with the intent of persuading an audience. Students will able to analyze basic communication skills, intercultural communication skills, interpersonal communication skills and public- speaking skills.

**CO5:** Students can demonstrate critical and innovative thinking. Display competence in oral, written and visual communication. They can able to use current technology related to the communication field.

## **AGRON-101 FUNDAMENTALS OF AGRONOMY**

**CO.1:** In modern terminology however the word has come to mean and denote a branch of

Science dealing with all aspects of crop cultivation and production.

**CO.2:** A study of agronomy often involves a summoning of resources from related disciplines such as Botany, Soil Science, Irrigation, plant protection, Plant Genetics and Breeding, Agro-meteorology etc.

**CO.3:** In a more fundamental sense it can be categorized as an applied Science, the object of which is crop cultivation and management for the purpose of producing food for humans, feed for animals as well as raw materials for the industry.

**CO.4:** Knowledge about Indian Agriculture and importance, present status, scope and future prospect.

**CO.5** Cropping seasons of India. Soil formation, classification, physical, chemical properties. Identification of important crops and crop seeds.

### **EXT-101 RURAL SOCIOLOGY & EDUCATIONAL PSYCHOLOGY**

**CO1** Understand concept of rural sociology, its importance in agricultural extension, characteristics of Indian rural society.

**CO2** Understand social groups, social stratification, culture, social values, social control and attitudes, leadership and training.

**CO3** Understand concept of educational psychology, intelligence, personality, perceptions, emotions, frustration, motivation, teaching and learning

**CO4** Acquaint with characteristics of rural society, village institutions and social organizations. Select lay leaders and train them.

**CO5** Assess personality types, leadership types and emotions of human beings iv. Create a training situation under village conditions

### **MATH-101 ELEMENTARY MATHEMATICS FOR MEDICAL STUDENTS**

**CO1.** Demonstrate competency in the areas that comprise the core of the mathematics major

**CO2.** Demonstrate the ability to understand and write mathematical proofs

**CO3.** Be able to use appropriate technologies to solve mathematical problems

**CO4.** Be able to construct appropriate mathematical models to solve a variety of practical problems

**CO5.** Obtain a full-time position in a related field or placement

## **BIO-101 INTRODUCTORY BIOLOGY (FOR NON-MEDICAL STUDENTS)**

The student will be able to read, understand, and critically interpret the primary biological literature in his/her area of interest.

**CO1.**The student will be able to design, conduct, analyze, and communicate (in writing and orally) biological research.

**CO2.**The student will recognize and be able to apply basic ethical principles to basic and applied biological/biomedical practice and will understand the role of biological/biomedical science, scientists, and practitioners in society.

**CO3.**The student will be able to explain the process of organic evolution and its underlying principles and mechanisms.

**CO4.**The student will be able to explain the fundamental biological processes of metabolism, homeostasis, reproduction, development, and genetics, and the relationships between form and function of biological structures at the molecular, cellular, organismal, population, and ecosystem levels of the biological hierarchy.

**CO5.**The student will be able to explain the importance of biodiversity at the genetic, organismal, community, and global scales.

## **AGRON-101 AGRICULTURAL HERITAGE**

**CO1.** Student will familiar with Ancient Agricultural Practices & Its relevant to modern agriculture practices.

**CO2** Student will learn about Traditional Technical Knowledge.

**CO3** Student will familiar with Our Journey (Developments) in Agriculture and Vision for the Future.

## **HVE-101 HUMAN VALUE AND ETHICS COURSEOUTCOMES**

At the end of the course, a student will be able to understand –

**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.

### **B.Sc. Hons. Agriculture II<sup>nd</sup>Sem**

#### **GPB-101:FUNDAMENTALS OF GENETICS**

**CO-1:** Comprehensive, detailed understanding of the chemical basis of heredity especially in crop plants to improve and develop the new varieties of plants.

**CO-2:** Understanding of how genetic concepts affect broad societal issues including health and disease, food and natural resources, environmental sustainability, etc.

**CO-3:** The knowledge required to design, execute, and analyze the results of genetic experimentation in plant systems.

**CO-4:** Insight into the mathematical, statistical, and computational basis of genetic analyses that use genome-scale data sets in systems biology settings.

**CO-5:** Understanding the role of genetic technologies in industries related to biotechnology, pharmaceuticals, energy, and other fields.

#### **MICRO-101 AGRICULTURAL MICROBIOLOGY**

**CO-1** Student will understand the basic microbial structure, function and study the comparative characteristics of prokaryotes and eukaryotes.

**CO-2** To know the various Physical and Chemical growth requirements of bacteria

**CO-3** Impart knowledge about production of beneficial bacteria.

#### **AGRI ENG-101: SOIL AND WATER CONSERVATIONENGINEERING**

**CO-1:** Various causes of soil erosion and forms of water erosion, classification of gully control measures or structures.

**CO-2:** 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.

**CO-3:** 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.

**CO-4:** 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.

**CO-5:** 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.

### **BOT-101 FUNDAMENTALS OF CROP PHYSIOLOGY**

**CO-1:** Role of crop physiology in crop health.

**CO-2:** Identification of deficiency symptoms of nutrients.

**CO-3:** To understand the metabolic and synthetic pathway of biomolecules.

**CO-4:** To know the difference between C<sub>3</sub>, C<sub>4</sub> and CAM plant.

**CO-5:** Importance of growth Harmon in Agriculture.

### **ECO-101 FUNDAMENTALS OF AGRICULTURAL ECONOMICS**

**CO-1:** Identify elements of business success in agriculture and food-processing as well as elements that determine economic role of agriculture in nationaleconomy.

**CO-2:** Propose methods of micro- and macroeconomic decision making in agriculture in different agro-ecological and agro-economic circumstances.

**CO-3:** Describe and explain models of production, supply and demand of agricultural and food products on national and international markets

**CO-4 :**Understand the concepts of consumer choice and how it affect the farm / ranch level agriculture firm.

**CO-5:** Understand the macroeconomics aspects of the economy as they affect the agricultural sector.

**CO-6:** Apply economics principles to understand the conduct and performance of the agricultural industry.

### **PATH-101 FUNDAMENTALS OF PLANT PATHOLOGY**

**CO-1** Student will acquaint about concepts of plant pathogens, major disease causing organisms and their etiology

**CO-2** To provide specific knowledge about host pathogen interactions.

**CO-3** Recognition of plant disease is the first step in doing something about them.

**CO-4** To give specific knowledge about environment and disease development

### **ENT-101 FUNDAMENTALS OF ENTOMOLOGY**

**CO-1** To be able to identify morphological characteristics, feeding habit and habitat of agriculturally important insect-pest.

**CO-2:** To be able to apply concepts and analytical approaches in evolutionary biology, genetics and other areas of insect biology of the student's choice.

**CO-3:** To be able to categorize insects based on basic ecological, behavioral, morphological, physiological, or developmental attributes.

**CO-4:** To be able to examine insects deeply within a biological level of analysis and make strategies for successful pest management strategy.

**CO-5:** To be able to understand about different families and orders of class Insect which cause economic losses for human beings.

### **EXT-102 FUNDAMENTALS OF AGRICULTURAL EXTENSION EDUCATION**

**CO-1** Education; Extension Programme planning Meaning, Process, Principles and Steps in Programme Development.

**CO-2** Extension systems in India: Extension efforts in Pre-independence era .

**CO-3** New trends in agriculture extension: privatization extension.

**CO-4** Monitoring and evaluation – concept and definition, monitoring, and evaluation of Extension programmes, Transfer of Technology- Concept and models

### **EXT-103 COMMUNICATION SKILLS AND PERSONALITY DEVELOPMENT**

**CO-1:** Students will analyze basic communication skills.

**CO-2:** Students will analyze intercultural communication skills.

**CO-3:** Students will analyze interpersonal communication skills.

**CO-4:** Students will analyze public speaking communication skills.

### **B.Sc. Hons. Agriculture III<sup>rd</sup>Sem**

#### **AGRON-201 CROP PRODUCTION TECHNOLOGY-I (Kharif Crops)**

- CO1.** Detail Knowledge of Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of Pearl millet and Finger millet
- CO2.** Detail Knowledge of Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of cereal crops
- CO3.** Detail Knowledge of Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of Pulses
- CO4.** Describe the Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of oilseeds
- CO5.** Describe the Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of fiber crops
- CO6.** Describe the Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of forage crops
- CO7.** Detail Knowledge of Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of Cowpea, Cluster bean.

#### **GPB-201 PRINCIPLES OF PLANT BREADING**

- CO1.** Students will be able to demonstrate an understanding of basic plant breeding facts and principles.
- CO2.** Students will be able to identify and distinguish characteristics of self-pollinated, cross-pollinated, often-cross pollinated and vegetative propagated plants.
- CO3.** Students will be able to determine breeding methodology appropriate for plants with different mating systems
- CO4.** Students will be able to understand and apply recent breeding methods of small grain cereal crops in order to improve agronomic traits which are based on genetic gains.

## **ECO-201 AGRICULTURAL FINANCE AND COOPERATION**

- CO1.** Student will Learn sources of Agricultural Micro-Macro financing and credit systems.
- CO2.** Student will Understand History of financing agriculture in India
- CO3.** Student will Learn about Significance and limitations of Crop insurance
- CO4.** Student will Significance of Farming Cooperatives.
- CO5.** Student will acquire Knowledge of successful cooperative systems in India and newly launched crop insurance schemes.
- CO6.** Estimation of Credit requirement of farm business.
- CO7** Preparation and Analysis of project reports and Financial Statements
- CO8** Analysis and performance of commercial banks, cooperative banks to acquire firsthand knowledge of their management, schemes and procedures.

## **AGRINFO 201 AGRI- INFORMATICS**

- CO1** Student will Understand analogy of computer
- CO2** Student become familiar Basic knowledge of MS Office
- CO3** Student will be able to get Some basic knowledge of Internet and WWW
- CO4** Student will learn about Use of IT application and different IT tools in Agriculture
- CO5** Student will learn about Use of Decision support systems, Agriculture Expert System and Soil Information Systems in Agriculture

## **AGRI ENG-201 FARM MACHINERY AND POWER**

- CO1** Students will be able to learn about different sources of farm power, construction and functioning of CI and SI engines, IC engine fuels, Cooling system and types of lubrication
- CO2** Students will be Able to design and test the agricultural machines for tillage, planting/ sowing, threshing and combine harvesting etc.
- CO3** Also equip the students with technical knowledge and skills required for the operation, maintenance and evaluation of Tillage, Sowing and intercultural operational machinery needed for agricultural farms.
- CO4** Students will be Learn selection of farm machinery on the basis of various requirements, their costing and replacement.
- CO5** The student will acquire knowledge regarding working of tractors, different systems and periodic maintenance tractors, tractor driving and computational skills for solving different field problems.

- CO6** To develop skills in the students required to develop and modification of indigenous harvesting machines/methods as per the need of the area and farmers
- CO7** Having fundamental knowledge of theories of agricultural machinery and equipment.
- CO8** Having knowledge and transfer of new technologies in the field of design and construction of agricultural machines and equipment.

### **HORT-201 PRODUCTION TECHNOLOGY FOR VEGETABLE CROPS**

- CO1.** Student will be able to understand the enough information about Importance of vegetables & spices in human nutrition and national economy.
- CO2.** Students are able to know about the origin, area, production, improved varieties and cultivation practices solanceous vegetables (tomato, brinjal, chillies and okra)
- CO3.** Students are able to know about the origin, area, production, improved varieties and cultivation practices Cucurbitaceous vegetables (cucumber, ridge gourd, bottle gourd, bitter gourd and melons)
- CO4.** Students are able to know about the origin, area, production, improved varieties and cultivation practices cole crops like cabbage and cauliflower
- CO5.** Students are able to know about the origin, area, production, improved varieties and cultivation practices Bulb crops, Beans andpeas.
- CO6.** Students are able to know about the origin, area, production, improved varieties and cultivation practices Tuber crops and Rootcrops
- CO7.** Students are able to know about the origin, area, production, improved varieties and cultivation practices leafy vegetables

### **EVS 201 ENVIRONMENTAL STUDIES AND DISASTER MANAGEMENT**

- CO1** Understand the natural environment and its relationships with human activities.
- CO2** Characterize and analyze human impacts on the environment.
- CO3** Integrate facts, concepts, and methods from multiple disciplines and apply to environmental problems.
- CO4** Capacity to integrate knowledge and to analyse, evaluate and manage the different public health aspects of disaster events at a local and global levels.
- CO5** Capacity to obtain, analyze, and communicate information on risks, relief needs and

lessons learned from earlier disasters in order to formulate strategies for mitigation in future scenarios.

### **STAT 201-STATISTICAL METHODS**

- CO1** Student will come to introduce to Statistics and its Applications in Agriculture
- CO2** Student will familiar with Tabular and graphical representation of data based on variables.
- CO3** Student will familiarize for Measurement of central tendency, Dispersion, Different approaches to the theory of probability. Important theorems on probability and their use in solving problem
- CO4** Student will know about Concept of correlation, various correlation coefficients- Pearson's correlation coefficient, Spearman's rank correlation coefficient, partial correlation coefficient and Multiple correlation coefficient.
- CO5** Student will be able to learn about Concept of Principle of least squares for curve fitting and regression lines

### **LPM-201 LIVESTOCK PRODUCTION AND POULTRY MANAGEMENT**

- CO1.** Students will be able to list the diseases of livestock & can aware local people about various preventions of these diseases.
- CO2.** On completion of the course students will be able to learn about the methods of improving yield (or milk production).
- CO3.** Students will be to list the new techniques or new methods for rearing cattles to make their survival better.
- CO4.** Students will be able to describe the different developmental stages of poultry like Incubation, hatching & brooding.
- CO5.** Students will be able to discuss the role of livestock & poultry in increasing national economy.
- CO6.** Students will be able to describe nutritional requirement & formulation of ingredients for the farm animals for their good health & for increasing the yield of products obtained from them.

## **AGRON-202 CROP PRODUCTION TECHNOLOGY – II (RABI CROPS)**

CO 1- To know the Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of rabi crops .

CO 2- Identify weeds in rabi season crops, Pulses-chickpea, lentil, peas; oilseeds-rape seed, mustard and sunflower; sugar crops-sugarcane, Medicinal and aromatic crops-mentha, lemon grass and citronella, Forage crops-berseem, lucerne and oat.

CO 3- Through proper knowledge of irrigation scheduling in rabi crops, additional area can be increased of low water requiring crops.

CO 4- Students will be able to know about the economic importance of medicinal and Aromatic crops in present sphere.

CO 5-It will be helpful to know about basic morphological characteristics of *rabicrops*.

## **HORT-202 PRODUCTION TECHNOLOGY FOR ORNAMENTAL CROPS, MAP AND LANDSCAPING**

CO 1- To evaluate natural herbal products from an economic perspective.

CO 2-To use medicinal and aromatic herbs sustainably.

CO3-To set up business related to medicinal, aromatic and landscaping.

CO4-To develop effective ideas related to collecting, processing and marketing herbal natural sources.

## **AGENGG-202 RENEWABLE ENERGY AND GREEN TECHNOLOGY**

CO1- To understand the role of renewable sources in agriculture sector.

CO2- To understand the bio fuel production and their applications in today's world.

CO3- To understand and utilizing the solar energy in various aspects.

## **SOIL-201 PROBLEMATIC SOILS AND THEIR MANAGEMENT**

CO1- To provide knowledge about waste land and problematic soils in India and management of the soils.

CO2- Knowledge of different reclamation and management practices for the development of the soils.

CO3- To Understand different factors responsible for saline ,sodic and acidic soils and their properties.

## **HORT-203 PRODUCTION TECHNOLOGY FOR FRUIT AND PLANTATION CROPS**

CO1 -To know importance of different fruit crops and plantation crops.

CO2- Students will understand canopy architecture for higher productivity in mango and grapes.

CO3- Students will understand package of practices for the major crops like mango, banana, guava, lemon, pineapple, coffee, coconut and rubber.

CO4- To understanding the concept of high density planting in different fruit crops.

## **GPB-202 PRINCIPLES OF SEED TECHNOLOGY**

CO1- Start a seed production program for fill full the requirement of quality seed in market and increase the income.

CO2- Storage the pure variety seed to avoid the availability crises of pure variety seed due to adverse environmental conditions.

CO3-To supply the disease free seed in the market to get the environment friendly cultivation of crops.

CO4- To increase the farm income by producing high yielding disease free quality seed and decrease the cost of cultivation also.

CO5-Production of hybrid seed of different crops to increase the farm income.

## **AGRON-203 FARMING SYSTEM & SUSTAINABLE AGRICULTURE**

CO1 The student will be able to explain the major aspects of agricultural practices and traditions through time and throughout the world.

CO2 The student will be able to explain in general the relationships among culture, economics, politics, science, and agricultural development.

CO3 A solid understanding of the cross-cultural interactions and exchange that linked the world's people and facilitated agricultural development is also expected.

CO4 The student will study and analyze the refereed-journal articles, texts, and practices

that represent the perspectives of different societies and agricultural traditions.

CO5 To show how agricultural scientists are attempting to minimize agricultural pollution and sustain food production adequate for the world's population.

### **ECO-202 AGRICULTURAL MARKETING, TRADE AND PRICES**

CO 1-Optimization of Resource use and Output Management: An efficient- agricultural marketing system leads to the optimization of resource use and output management. An efficient marketing system can also contribute to an increase in the marketable surplus by scaling down the losses arising out of inefficient processing, storage and transportation. A well designed system of marketing can effectively distribute the available stock of modern inputs, and thereby sustain a faster rate of growth in the agricultural sector.

CO-2: Increase in Farm Income: An efficient marketing system ensures higher levels of Income for the farmers by reducing the number of middlemen or by restricting the commission on marketing services and the malpractices adopted by them in the marketing of farm products.

CO-3: Growth of Agro-based Industries: An improved and efficient system of agricultural Marketing helps in the growth of agrobased industries and stimulates the overall development process of the economy. Many industries depend on agriculture for the supply of raw materials.

CO-4: Adoption and Spread of New Technology: The marketing system helps the farmers in the adoption of new scientific and technical knowledge. New technology requires higher investment and farmers would invest only if they are assured of market clearance.

CO-5: Addition to National Income: Marketing activities add value to the product thereby increasing the nation's gross national product and net national product.

CO-6: Price Signals: An efficient marketing system helps the farmers in planning their production in accordance with the needs of the economy. This work is carried out through price signals.

CO-7: Better Living: The marketing system is essential for the success of the development programmes which are designed to uplift the population as a whole. Any plan of economic

**AGROMET201 INTRODUCTORY AGRO METEOROLGY & CLIMATE CHANGE  
OUTCOME**

CO1: To understand roles of agrometeorology in agriculture and its relation to other areas of agriculture to acquaint with recent developments in agrometeorology with historical development of climate change.

CO2: Agrometeorology or Agricultural meteorology studies meteorological and hydrological factors in relation to agriculture.

CO3: Agrometeorology studies the behavior of the weather elements that have direct relevance to agriculture and their effect on crop production.

CO4: Weather and climate are the factors determining the success or failure of agriculture.

CO5: To develop weather based agro advisories to sustain crop production utilizing various

**HORT-204 HI-TECH. HORTICULTURE**

At the end of course, a student will be able to understand:

CO1- About the importance and management of nursery

CO2- Students will learn about Micropropagation methods that are used for Horticultural crops.

CO3- Know about Modern field preparation and planting methods.

CO4- Students will gain knowledge regarding Protected cultivation (Controlled environment, its methods and techniques).

CO5- Students get familiar with Micro irrigation

CO6- Learn about High density planting (HDP) and canopy management.

CO7- Students will able to understand about Precision farming and its components (Remote sensing and GIS) and its applications in Horticultural crops

CO8- Students learn about that what is DGPS (Differential Geo-positing system) and VRA (Variable Rate applicators)

CO9- Learn about mechanized harvesting of produce.

## **ENT-201: BIO-PESTICIDES & BIO-FERTILIZERS**

CO1- To provide information about potentiality of Bio-pesticides

CO2- To provide information about exposure of Bio-pesticide production technologies.

CO3- o impart knowledge of quality control of crops with application of Bio-pesticides

CO4- To study about structure and characteristic features of bacterial bio fertilizers

CO5- To get knowledge about production technology of biofertilizer

CO6- To understand the impact of biofertilizer application on different crop growth stages

CO7- To get knowledge about use efficiency of bio fertilizers

## **FOOD-TEC201 FOOD SAFETY AND STANDARDS**

CO1-Fundamentals and the concept of Food Safety.

CO2- The causes of implementation of food safety and its importance.

CO3- Know about the basic requirements to ensure the safety of a food product

CO4- Students will gain knowledge regarding Food Safety Management Tools.

CO5- Students get familiar with Total Quality Management (TQM)

CO6- Learn about Food laws and Standards- Indian Food Regulatory Regime.

CO7- Students will able to understand about recent concerns regarding food safety and their management.

CO8- Students learn about Newer approaches to food safety.

## **SEMESTER-V**

### **PATH 302: PRINCIPLES OF INTEGRATED PEST AND DISEASE MANAGEMENT**

**CO1:** Student will come to know about the history, importance, tools, principles of IPM

**CO2:** Through this course, students will analyse the pest risk to crops and effective methods of detection and diagnosis of insect pest and their diseases

**CO3:** Students will get to know about the safety issues while using pesticides

**CO4:** Students will get to know about specific pesticides for specific pest

**CO5:** Students are able to know about the dynamics of economic injury level and compare the economic threshold level. Students are able to understand various cultural, mechanical, physical, biological and chemical control of insect pest

**CO6:** Student will be able to understand Ecological management of crop environment and Conventional pesticides for the insect pests and disease management

**CO7:** Student will come to know about Development and validation of IPM module and their Implementation and impact (IPM module for Insect pest and disease)

**CO8:** Student will also get knowledge about Political, social and legal implication of IPM

### **SOIL 301: MANURES, FERTILIZERS AND SOIL FERTILITY MANAGEMENT**

CO 1: Student will come to know about the importance of different types of Manures

CO 2: The students get knowledge about different kind of fertilizers

CO 3: The students will learn how to maintain the soil health.

CO 4: The students acquire practical knowledge of Essential plant nutrients

CO 5: The students acquire practical knowledge of nutrient analysis soil.

CO 6: The students acquire practical knowledge of methods of fertilizer recommendations to crops

### **AGRB3103C PESTS OF CROPS AND STORED GRAINS AND THEIR MANAGEMENT**

CO1. The student will feel confident to address the insect pest problems of farmers both under field and storage conditions so that immediate steps can be taken up by the stakeholders to keep the pest population under check and to avoid significant crop damage.

CO2. This course lays the foundation for higher studies in the field of entomology

CO3. The farmers' major problem is the insect pests of crops and their control. The students will be taught in such a way that they will be able to identify the insect pest, diagnose the symptom and advocate the necessary remedial measures.

CO4. Students will equip themselves with the sound knowledge needed for future challenges in plant protection.

### **AGRB3104C: DISEASE OF FIELD AND HORTICULTURAL CROPS AND THEIR MANAGEMENT -I**

CO 1- Students get to know about the Introduction, definition of disease and terminology use in Plant Pathology

CO 2- Students get to know about the Symptoms, Etiology, Disease cycle and Management of FIELD Crops: Rice, Maize, Sorghum, Bajra, Groundnut, Soybean, Pigeon pea, Finger millet, gram, Castor, Tobacco

CO 3- Students get to know about the Symptoms, Etiology, Disease cycle and Management of FRUIT Crops: Banana, Papaya, Pomegranate, Cruciferous vegetables, Brinjal, Tomato, Okra, Beans, Ginger, Colocasia

CO 4- Students get to know about the Symptoms, Etiology, Disease cycle and Management of Plantation Crops: Coconut, Tea and Coffee

### **AGRB3105C :CROP IMPROVEMENT I(KHARIF CROPS)**

CO1.Students will be able to identify floral structure, reproductive structures in many cereal crops (rice, maize) and pulses (pigeonpea, chickpea).

CO2.Students will be able to describe and define basic topics in qualitative and quantitative traits of various crops

CO3.Students will be able to identify and distinguish between populations of self-pollinated, cross-pollinated, often-cross pollinated and vegetatively propagated plants.

CO4.Students will be able to apply the acquired knowledge in the possible creation of pure lines, inbred lines and hybrids.

CO5.Students will be able to understand genetic basis of physiological response of cereal crops to biotic and abiotic stressful conditions and recognize the possible application of those insights in relation to genetic gain for grain yield and quality of different crops

CO6.Students will be able to plan and organize the experiment to handle various segregating generations.

CO7.Students will be able to understand Hybrid seed production technology in cereals and pulses.

CO8.Students will be able to describe Ideotype concept and climate resilient crop varieties for future

### **AGRB3106C:ENTERPRENEURSHIP DEVELOPMENT AND BUISNESSCOMMUNICATION**

CO 1 -To familiarize the students understand with key concepts and processes in entrepreneurship and business development.

CO 2- To provide context to the processes in the form of differences between small and large firms, and the economic environment.

CO 3- To introduce key debates around entrepreneurship and small businesses.

## **AGRB3107: GEOINFOMATICS AND NANOTECHNOLOGY FOR PRECISIONFARMING**

CO 1- Students get to know about the basic concepts of geo-informatics and nanotechnology

CO 2- Students get to know about various applications of geo-informatics and nanotechnology for precision agriculture

CO 3- Students get to know about basic handling of various geo-informatics tools

## **AGRB3109T: INTELLECTUAL PROPERTY RIGHTS**

**CO1-** Students will be able to know about different kinds of intellectual property, intellectual property rights associated with them.

**CO2-** Students will learn about the laws and agencies associated like GATT, WTO, TRIPS, WIPO etc.

**CO3-** Students will learn in detail about Indian Biological Diversity Act-2002, UPOV act and PPV&FR act 2001, the rights given to farmers and plant breeders.

**CO4-** Students will be able to understand the importance of traditional knowledge (TK), its utility and rights of a TK holder.

**CO5-** They will understand the role of ITPGRFA for the conservation of plant genetic resources

## **AGRB3111C WEED MANAGEMENT**

CO1. By studying this course, students will come to know about weeds, characteristics of weeds their harmful and beneficial effects on ecosystem.

CO2Students will understand Classification, reproduction and dissemination of weeds.

CO3Students will know about Herbicide classification, concept of adjuvant, surfactant

CO4Students will understand herbicide formulation and their use.

CO5Students will come to know about w mode of action of herbicides and selectivity

CO6Students will become aware about Allelopathy and its application for weed management. and also about Bio-herbicides and their application in agriculture.

CO7Students will understand the concept of herbicide mixture and utility in agriculture

CO8Students will get to know about herbicide compatibility with agro-chemicals and their application and herbicide resistance and its management.

CO9Students will understand about integration of herbicides with non chemical methods of weed management.

## **AGRIB31310C: AGRI-BUSINESS MANAGEMENT**

CO1- The students will study about the transformation of agriculture into agribusiness as well as importance of agribusiness in Indian Economy.

CO2- The students will study about the different type of agro based industries and its importance.

CO3- The student will study about procedure to set up agro-based industries.

CO4- The students will study about PEST and SWOT analysis.

CO5- The students will study about types and components of planning.

CO6- The students will study about organization, staffing, directing and motivation.

CO7- The students will study about capital and financial management of agribusiness.

CO8- The students will know about project management and its techniques.

### **AGRIB3112C: PROTECTED CULTIVATION**

CO1- Students will get familiar about importance, scope and status of greenhouse technology and its different types.

CO2- Students will learn about different types of cladding materials.

CO3- Learn about design criteria of greenhouse environment control, lights.

CO4- Students will gain knowledge regarding greenhouse equipment's, materials and their automation.

CO5- Students get familiar with heating systems used in greenhouse technology and different types of containers and benches..

CO6- Learn about soil and substrate management in greenhouse cultivation.

CO7- Students will be able to understand about cultivation of important horticultural crops and economically important medicinal aromatic plants.

CO8- Students learn about pest and disease management in important horticultural crops.

CO9- Students learn about different kinds of dryer used in greenhouse technology.

CO10- Learn about material handling equipment's.

### **SEMESTER-VI**

#### **PATH-302 INTEGRATED PEST AND DISEASE MANAGEMENT**

CO1. Student will come to know about the history, importance, tools, principles of IPM.

- CO2. Through this course, students will analyse the pest risk to crops and effective methods of detection and diagnosis of insect pest and their diseases
- CO3. Students will get to know about the safety issues while using pesticides
- CO4. Students will get to know about specific pesticides for specific pest.
- CO5. Students are able to know about the dynamics of economic injury level and compare the economic threshold level.  
Students are able to understand various cultural, mechanical, physical, biological and chemical control of insect pest.
- CO6. Student will be able to understand Ecological management of crop environment and Conventional pesticides for the insect pests and disease management
- CO7. Student will come to know about Development and validation of IPM module and their Implementation and impact (IPM module for Insect pest and disease).
- CO8. Student will also get knowledge about Political, social and legal implication of IPM.

### **HORT-302 POST-HARVEST MANAGEMENT OF HORTICULTURAL CROP AND VALUE ADDITION**

- CO1. Student will learn the basic nature of the crops and how they get spoiled after harvest due to pre harvest factors
- CO2. Student will be able to learn the science behind the ripening of fruits and vegetables
- CO3. This course will help to know about how to different environmental factors affect the quality of the fruits and vegetables
- CO4. Students will be get knowledge about the different types of packaging material used in packaging
- CO5. Students will learn the basic methods of preservation of fruits and vegetables
- CO6. How different products from fruits and vegetables are made
- CO7. Students will be able to learn the different parameters on which the post harvest management of the crops is done and the value addition with respect to different crops.
- CO8. Students will be learn about drying and dehydration with science behind it and different methods of doing it
- CO9. Students will be able to differentiate between the all the packaging materials that are commonly used

### **FOOD-301 DAIRY TECHNOLOGY**

- CO1. By studying dairy technology, students come to know about the factor affecting quality and

yield, different properties of milk and milk products

CO2. Students will become aware of different adulterants added to milk by sellers to increase its quantity and sale and their harmful effects on the body of individuals.

CO3. Students will know about the various processes involved in dairy industry to produce different products and methods used by them to increase the sale of milk.

CO4. Students will know about the various milk products such as cream, butter, ghee, cheese, ice cream etc., their properties and how to prepare these products.

CO5. Students will become aware of marketing of milk and various organization involved in this process.

### **AGRON301 PRINCIPLES OF ORGANIC FARMING**

CO1. Students will be able to understand of Organic farming, principles of organic farming and scope of organic farming in India

CO2. Students will be able to know Initiatives taken by Government (central/state), NGOs and other organizations for promotion of organic agriculture.

CO3. Students will be able to understand about Organic ecosystem and their concepts.

CO4. Students will be able to describe Organic nutrient resources and its fortification and Restrictions to nutrient use in organic farming

CO5. Students will be get knowledge about Choice of crops and varieties use in organic farming and Biodynamics

CO6. Students will be able to explain the management methods for control of insect, disease and weed under organic crop production

CO7. Students will be able to describe the Operational structure of NPOP

CO8. Students will understanding about Certification process and standards of organic farming.

CO9. Students will be able to do Processing, leveling, economic considerations and viability, marketing and export potential of organic products.

CO10. Students will be able to learn Future scope of organic farming

## **COMP301 COMPUTER APPLICATION IN AGRICULTURE**

CO1 Introduce students to the use of computers for various academic activities; and provide students with opportunities to develop basic computing skills with respect to

CO2 preparation of documents, use of spreadsheets, making PowerPoint presentations, and efficient use of the Internet.

## **SOIL-301 ANALYTICAL TECHNIQUES IN SOIL, PLANT, FERTILIZER AND WATER**

CO1. Students will get knowledge on identification and understanding of problems of soil

CO2. Students will be capable of handling and understand about advanced instruments colorimetric, flame photometric and AAS (Atomic absorption Spectrophotometer)

CO3. Student will get experience on advanced analytical and instrumentation methods in the estimation of soil, water and plantsamples.

CO4. Students will be able to understand various soil physical, chemical and biological properties and their impact on plantgrowth

CO5. To develop skill on analytical techniques and manage problems of soil and irrigation water

CO6. To get knowledge about basic information of fertilizer industry

CO7. Students will be able to understand nature of problem soil in relation to scope of crop cultivation

## **HORT-303 PRODUCTION TECHNOLOGY OF SPICES, PLANTATION, MEDICINAL AND AROMATIC PLANTS**

CO1. Students will be able to explain the importance, classification, taxonomy and scope of spices, plantation, medicinal and aromatic plants in human nutrition in national economy

CO2.Detailed Knowledge to students about origin, classification, taxonomy, species, area and package and practices of spices (Cardamom, Cumin, Coriander, Nutmeg, Mace, Pepper, Clove andSaffron)

CO3.Students will be learning about origin, classification, taxonomy, species, area and package and practices of different plantation crops (Tea, coffee, Coconut, Rubber, Cocoa and Cashewnut.).

CO4. Students will be learning about origin, classification, taxonomy, species, area and package and practices of different medicinal (Glycyrrhiza, Stevia, Aloe, pium,Ocimum,Rauvolfia and Isabgol)

CO5.Students will be learning about origin, classification, taxonomy, species, area and package and practices of different aromatic crops (Rose, Jasmine, Citrus, Tuberose, Mentha, Lemongrass,Citronella and Geranium).

## SEM- VII

### PATH- 401 MUSHROOM CULTIVATION

CO1. Historical development of mushroom cultivation and present status, taxonomy, classification, food, medicinal value, uses of mushroom, edible and poisonous mushrooms.

CO2. Life cycle of cultivated mushrooms, reproduction and strain improvement, maintenance of pure culture, facilities required for establishing commercial spawn lab.

CO3. Preparation of substrate for mushroom cultivation, preparation and maintenance of spawn

CO4. Long, short and indoor composting methods, formulae for different composts and their computation, qualities and testing of compost, uses of spent mushroom compost/substrate.

CO5. Facilities for setting up mushroom farm for seasonal and environmentally control cultivation, requirement and maintenance of temperature, relative humidity, CO<sub>2</sub>, ventilation in cropping rooms

CO6. Cultivation technology of *Agaricus bisporus*, *Pleurotus* sp., *Calocybe indica*, *Lentinus edodes* and *Ganoderma lucidum*.

CO7. Insect pests, diseases and abnormalities of cultivated mushroom and their management

CO8. Post-harvest processing and value addition, economics of mushroom cultivation, biotechnology and mushroom cultivation.

### ENTO 401-APICULTURE, SERICULTURE, LACCULTURE, PISCULTURE

CO1. Students will be able to understand the rearing of Bee, silk worms and LAC insects..

CO2. Students are able to understand different types of Bee species and silk worm.

CO3. Students are able to understand different behavior of Bees.

CO4. Students will be able to understand the life cycle of Bees, silk worm, lac insect and fishery.

CO5. Students are able to understand composition of honey, silk and resin.

CO6. Students will be able to understand the extraction of honey, silk and resin.

CO7. Students are able to understand the different diseases of bees and silk worm.

CO8. Students are able to understand different insect, pest, Bees and silk worm

CO9. Students are able to understand about the products of bees and silk worm.

CO10. Students are able to understand the economic importance of pisciculture.

## **ABM-401 AGRI-BUSINESS MANAGEMENT**

- CO1- The students will study about the transformation of agriculture into agribusiness as well as importance of agribusiness in Indian Economy.
- CO2- The students will study about the different type of agro based industries and its importance.
- CO3- The student will study about procedure to set up agro-based industries.
- CO4- The students will study about PEST and SWOT analysis.
- CO5- The students will study about types and components of planning.
- CO6- The students will study about organization, staffing, directing and motivation.
- CO7- The students will study about capital and financial management of agribusiness.
- CO8- The students will know about project management and its techniques.

## **AGRONOMY**

### **AGRON-401 PRINCIPLES AND PRACTICES OF WEED MANAGEMENT**

- CO1. Weed biology and ecology, crop-weed competition including allelopathy and weed indices.
- CO2. Principles and methods of weed control and classification, Herbicides introduction and history of their development, classification based on chemical, physiological application and selectivity
- CO3. Herbicide structure-activity relationship, factors affecting the efficiency of herbicides, mode and mechanism of action of herbicides.
- CO4. Herbicide formulations, herbicide mixtures, herbicide resistance and management
- CO5. Weed control through bio-herbicides, myco-herbicides and allelo-chemicals.
- CO6. Degradation of herbicides in soil and plants, herbicide resistance in weeds and crops and herbicide rotation.
- CO7. Weed management in major crops and cropping systems, parasitic weeds, weed shifts in cropping systems and aquatic and perennial weed control.
- CO8. Integrated weed management and cost: benefit analysis of weed management

### **AGRON-402 FARMING SYSTEM AND SUSTAINABLE AGRICULTURE**

- CO1. Students are able to understand about sustainable agriculture and their effects
- CO2. Students are able to understand about different practices of sustainable agriculture
- CO3. Students are able to understand about farming system/cropping system

CO4. Students are able to understand about efficient cropping zone

CO5. Students are able to understand about organic farming

CO6. Students are able to understand about biological intensive nutrient management

CO7. Students are able to understand about quality consideration and certification

CO8. Students are able to understand about precision farming .

### **AGRON-403 RAINFED FARMING AND WATERSHED MANAGEMENT**

CO1. Students will be able to learn about concept and characteristics of dry land farming; dry land versus rainfed farming; significance and dimensions of dry land farming in Indian agriculture.

CO2. Students will be able to learn about soil and climatic parameters with special emphasis on rainfall characteristics; constraints limiting crop production in dry land areas.

CO3. Students will be able to learn about types of drought, characterization of environment for water availability; crop planning for erratic and aberrant weather conditions.

CO4. Students will be able to learn about stress physiology and resistance to drought, adaptation of crop plants to drought, drought management strategies; preparation of appropriate crop plans for dry land areas; mid contingent plan for aberrant weather conditions.

CO5. Students will be able to learn about tillage, tith, frequency and depth of cultivation, compaction in soil tillage; concept of conservation tillage; tillage in relation to weed control and moisture conservation.

CO6. Students will be able to learn about techniques and practices of soil moisture conservation (use of mulches, kinds, effectiveness and economics); anti-transpirants.

CO7. Students will be able to learn about soil and crop management techniques, seeding and efficient fertilizer use.

CO8. Students will be able to learn about concept of watershed resource management, problems, approach and components.

### **AGRON-404 MODERN CONCEPTS IN CROP PRODUCTION**

CO1. Students will be able to understand crop growth analysis and geological zones of India.

CO2. Students will be able to understand different aspect of physiology of grain yield of cereals and concept of plant population optimization & crop modelling.

CO3 Students will be able to understand the various principles of crop production, yield and environmental stress and soil-plant relationship.

CO4 Students will be able to understand various types of integrated farming systems, concept of organic farming and modern tillage, integrated nutrient management and precision agriculture

CO5 Students will be able to understand the concept of information technology and role of information technology in natural resource management and land & water management

CO6 Students will be able to understand the internet applications and production of multimedia and development of database concept for natural resource management

CO7 Students are able to understand the application of remote sensing, GPS and GIS, use of mathematical models.

CO8 Students are able to understand the multi-sensor data loggers, software packages and concept of video conferencing

### **AGRON-405 PRINCIPLES AND PRACTICES OF WATER MANAGEMENT**

CO1. Students will be able to know water resources and major irrigation projects in India.

CO2. Students will be able to understand water movement in soil and plants.

CO3. Students will be able to understand the mechanism of crop adaptation under extremes weather conditions.

CO4. Students will be able to understand various factors affecting water needs of the crops

CO5. Students will be able to understand the scheduling and depth of irrigation, management of water under controlled conditions

CO6. Students will be able to understand the quality of irrigation water and management of saline water for irrigation

CO7. Students are able to understand the water management in problem soils.

CO8. Students are able to understand the drainage requirement of crops and methods of field drainage

## **HORTICULTURE**

### **HORT401-NURSERY MANAGEMENT OF HORTICULTURE**

CO1- The students will study Introduction, importance and modern field preparation and planting in nursery.

CO2- The students will study the micropropagation and propagation by specialized organs.

CO3- The students will learn about the nursery raising in protected structures and microirrigation techniques.

CO4-The students will learn about methods of sexual and asexual propagation in horticulture crops.

CO5-The students will learn about seed germination and seed dormancy.

CO6- The students will study apomixes and its different types.

CO7- Students will learn about use of growth regulators in rooting.

CO8- The students will study the scion-stock relationship and different factors influencing cutting and layering and formation of union.

CO9- The students will study the bud wood certification.

CO10- The students will know about the plant protection measures of nursery plants and cost establishment of protected structures.

### **HORT-402: COMMERCIAL FRUIT PRODUCTION**

1. Students will have knowledge to learn about horticulture classification, horticulture zones, area, productions and export potential of different tropical, minor, subtropical and temperate fruit crops
2. Students will know more about origin, area, climate, soil, improved varieties and cultivation practices, special technique like PGR's, physiological disorders and major problem of different tropical & minor fruit crops (Mango, banana, grapes, citrus, papaya, sapota, guava, pomegranate, bael, ber, amla, anona, fig, pineapple and jackfruit)
3. Students will learn about the harvesting and post harvest handling of tropical and minor fruit crops
4. Students will know more about origin, area, climate, soil, improved varieties and cultivation practices, canopy management, bioregulation, abiotic factors limiting fruit production, physiology of flowering, fruit set and development, abiotic factors limiting production, physiological disorders and major problem of important subtropical and temperate fruit crops (Apple, pear, Plums, peach, apricot, cherries, Litchi, loquat, persimmon, kiwifruit, strawberry, walnut, almond, pistachio, pecan, mangosteen, carambola, fig and jamun)
5. Students will learn about the harvesting and post harvest handling of subtropical and temperate fruit crops.

### **HORT-403: COMMERCIAL VEGETABLE PRODUCTION**

CO1. Student will be able to understand the enough information about Importance of vegetables and spices

CO2 Students are able to know about the origin, area, production, improved varieties and cultivation practices solanaceous vegetables.

CO3. Students are able to know about the origin, area, production, improved varieties and cultivation practices Cucurbitaceous vegetables .

CO4. Students are able to know about the origin, area, production, improved varieties and cultivation practices colecrops .

CO5. Students are able to know about the origin, area, production, improved varieties and cultivation practices Bulb crops.

CO6. Students are able to know about the origin, area, production, improved varieties and cultivation practices root crops and tuber crops.

CO7. Students are able to know about the origin, area, production, improved varieties and cultivation practices leafy vegetables

## **HORT404- COMMERCIAL FLORICULTURE AND LANDSCAPE ARCHITECTURE**

CO1- The students will study about the History, importance, scope, area and production of ornamental crops.

CO2- The students will learn about importance, design and establishment of different ornamental plants viz. annuals, palms, shrubs, climbers etc.

CO3- The students will learn about Importance, design and establishment of different types of gardens and their components viz. garden walls, gates, floral clock, bird bath, statutes, sculptures etc.

CO4- The students will come to know about establishment and management of lawns.

CO5- The students will study about different types of flower arrangements and uses of vertical gardens, terrariums etc.

CO6- The students will learn about art of making and maintenance of bonsai

### **HORT-405 Seed Production of Horticultural Crops**

CO1. To have understanding about the history of seed industry in India and about seed, its quality, types of classes and differences between grain and seed. To acquire knowledge of new seed policies including DUS test and to learn about the scope of vegetable seed industry in India.

CO2. To train the students about the understanding of genetical and agronomical principles of seed production. It includes various methods of seed production use of growth regulators and chemicals in vegetable seed production

CO3. The course deals with the study of floral biology, types of pollination, breeding behavior of different crops, seed development and maturation. To get acquainted with methods of hybrid seed production, different categories of seed along with maintenance of nucleus, foundation and certified seed. To enrich the understanding of seed certification, seed standards, seed act and law enforcement and plant quarantine and quality control.

CO4. The students will learn about physiological maturity, seed harvesting and post harvesting techniques such as extraction, curing, drying, grading. Moreover, studying about processing of seed, seed coating and pelleting, packaging (containers/packets), storage and cryopreservation of seeds and synthetic seed technology.

CO5. The course deals with principles involved in vegetable seed production and the role of temperature, humidity and light in vegetable seed production

CO6. It deals with having comprehensive knowledge of land requirements, climate, season, planting time, nursery management, seed rate, rouging, seed extraction and storage of different groups of vegetables. This includes cole crops, root vegetables, solanaceous vegetables, cucurbits, okra, leafy vegetables, bulb crops, leguminous vegetables and exotic vegetables, vegetatively propagated vegetables.

CO7. To train the students about the production of hybrid and open pollinated seeds in different flower crops viz Chrysanthemum, Dahlia, Gaillardia, Petunia, Zinnia, Cosmos, Dianthus, Snapdragon, Pansy, marigold, antirrhinum and china aster.

CO8. To acquaint the students about various activities like harvesting, processing and storage of seeds, seed certification. To know about Seed germination and purity analysis. Also, different field and seed standards are studied. To learn about seed drying and extraction and Seed legislation.

## VIII

### **EXT401 EXTENSION METHODOLOGIES AND COMMUNICATION SKILLS FOR TECHNOLOGY TRANSFER**

CO1. Students will come to know the basic concept, scope and objectives of extension education and its principles

CO2 Students will be able to understand extension education process extension programme planning

CO3 Students will get too acquainted with pre and post independent era extension efforts in India.

CO4 Students will come to know about various agriculture development programmes launched by ICAR and Govt. of India

CO5 Students will be able to know about new trends in agriculture extension

CO6 Students will come to know about rural development programmes launched by Govt. of India and about concept of community development

CO7 Students will learn about concept and different types of rural leadership and know about concept, principles and functions of extension administration

CO8 Students will learn about concept of monitoring and evaluation and transfer of technology and also able to understand how to do capacity building of extension personnel

CO9 Students will be able to know about different Extension teaching methods, ICT Applications in TOT (New and Social Media) and media mix strategies

CO10 Students will come to know about meaning of communication, Principles, Functions, models and barriers to communication

CO11 Students will learn about Agriculture journalism, diffusion and adoption of innovation verbal and nonverbal communication and about reading and comprehension of general and technical articles, Organizing seminars and conferences etc.

### **AGRI-401 PROTECTED CULTIVATION AND SECONDARY AGRICULTURE**

CO1- Students will get familiar about importance, scope and status of greenhouse technology and its different types.

CO2- Students will learn about how plants respond to controlled environment.

CO3- Learn about design criteria of greenhouse environment control.

CO4- Students will gain knowledge regarding greenhouse equipment's, materials and their automation.

CO5- Students get familiar with heating systems used in greenhouse technology.

CO6- Learn about soil and substrate management in greenhouse cultivation.

CO7- Students will be able to understand about cultivation of important horticultural crops and economically important medicinal aromatic plants.

CO8- Students learn about pest and disease management in important horticultural crops.

CO9- Students learn about different kinds of dryer used in greenhouse technology.

CO10- Learn about material handling equipment's.

### **PDC401 PERSONALITY DEVELOPMENT AND COMMUNICATION SKILLS**

CO1 to develop the reading and writing skills through these passages so that students are capable of communicating efficiently

CO2to help widen student's vocabulary by learning new words

CO3helps students to use multiple skills while answering one question

CO4To develop the writing skills of the students so to better understand the gist of passages, write down more concisely

CO5to develop skills that will be helpful for professional purposes through better drafting and logical thinking

CO6to learn the students about basic and to form sentences and how to relate them

CO7To develop the writing skills of the students so that they are capable of communicating efficiently

CO8This course is designed to develop the skills of the students in preparing job search artifacts and negotiating and to know about professional writingcapable of communicating efficiently

### **AGRON 406 FERTILIZER USE IN CROP PRODUCTION**

CO1. Students are able to understand Soil fertility and soil productivity; nutrient sources Fertilizers and manures; essential plant nutrients - functions and deficiency symptoms.

CO2. Students are able to understand about soil and fertilizer nitrogen

CO3. Students are able to understand about soil and fertilizer phosphorus -

CO4. Students are able to understand about potassium

CO5. Students are able to understand about sulphur

CO6. Students are able to understand about micronutrients

CO7. Students are able to understand about common soil test methods for fertilizer recommendations

CO8. Students are able to understand about soil fertility evaluation - biological methods, soil, plant and tissue tests; soil quality in relation to sustainable agriculture.

### **AGRON407CROPPING SYSTEM**

At the end of the course, a student will be able to understand:

**CO1** -Introduction and Application of different farming system in sustainable agriculture

**CO2**- Efficiency of various cropping system and allied activities

**CO3** –The modern concept of crop production like LEISA, HEIA, LEIA etc.

**CO4** – Plant-environment interactions and conservation of natural resources

**CO5**- Calculation of various indices to evaluate the efficiency of cropping systems and assessment of land use

**CO6**- Different types of cropping systems and evaluation of their sustainability

**CO7**- Above and below ground interactions and allelopathic effects

**CO8**- Crop residue management, crop diversification and plant ideotypes for drylands

### **HORT 407TISSUE CULTURE AND MICROPROPAGATION TECHNIQUES IN HORTICULTURE**

CO1- Various tools and techniques of biotechnology used in Horticulture industry

CO2- Different processes of Plant Tissue Culture viz. Organogenesis, somatic embryogenesis, cytodifferentiation

CO3- Role of various types of cultures in regeneration of plant cells, tissues and organs

CO4- How haploid plants can be produced through anther and pollen culture

- CO5- Methodology to produce different types of Cybrids
- CO6- Hardening and Acclimatization of plants developed through plant tissue culture methods
- CO7- Production of secondary metabolites and their quantification using HPLC
- CO8- Various achievements of biotechnology in Horticultural crops

### **HORT-408 BREEDING OF HORTICULTURAL CROPS**

CO1. To gain knowledge about origin and distribution, taxonomical status - species and cultivars, cytogenetics, genetic resources, blossom biology, breeding systems, breeding objectives, ideotypes

CO2. The course deals with the study of approaches for crop improvement viz. introduction, selection, hybridization, mutation breeding, polyploid breeding, rootstock breeding, improvement of quality traits, resistance breeding for biotic and abiotic stresses, biotechnological interventions, achievements and future thrust in the following fruit crops Mango, banana, Citrus, grapes, guava, papaya, Apple, pear, plums, peach, and strawberry.

CO3. The students will learn about origin, botany, taxonomy, cytogenetics, genetics, breeding objectives, breeding methods (introduction, selection, hybridization, mutation), varieties and varietal characterization, resistance breeding for biotic and abiotic stress in vegetable crops: Potato, tomato, Eggplant, hot pepper, sweet pepper, okra, Peas, melons, pumpkins, Cabbage, cauliflower, carrot and radish.

CO4. To acquaint the students about quality improvement, molecular marker, genomics, marker assisted breeding and QTLs, biotechnology and their use in breeding in vegetable crops: Potato, tomato, Eggplant, hot pepper, sweet pepper, okra, Peas, melons, pumpkins, Cabbage, cauliflower, carrot and radish.

CO5. It deals with having comprehensive knowledge about the genetic inheritance of flower colour, doubleness, flower size, fragrance, post-harvest life.

CO6. To train the students about breeding methods suitable for sexually and asexually propagated flower crops and ornamental plants introduction, selection, domestication, polyploid and mutation breeding for varietal development,

CO7. The course deals with studying the role of heterosis, Production of hybrids, Male sterility, incompatibility problems, seed production of flower crops.

CO8. The students will learn about breeding constraints and achievements made in commercial flowers - rose, chrysanthemum, marigold, tuberose, carnation, gerbera and gladioli and ornamental foliage. Providing knowledge about issue of patenting and Plant Variety Protection in India.

### **HORT -104: POST HARVEST MANAGEMENT FOR HORTICULTURAL CROPS**

CO1 Facilitate deeper understanding on principles and methods of postharvest management of horticultural crops.

CO 2 Maturity indices, harvesting practices for specific market requirements, influence of pre and post-harvest practices, respiration, transpiration loss.

CO3 Physiology and biochemical change during ripening, senescence, ethylene evolution and ethylene management, factors leading to post-harvest loss and its control, pre-cooling.

CO4 Study of post harvest loss and their control.