

Broad Outlines of Syllabus for Doctorate Degree Programme Entrance Exam- 2022

SYLLABUS:

Objective of such type of Entrance Test is to select the best candidates; therefore, no syllabus can be prescribed, however, broad outlines are given as follows:

AGRICULTURE

1. AGRICULTURAL ECONOMICS

Basic concepts in economics, theory of consumer demand, theory of production, market classification, theory of perfect and imperfect competition, theory of distribution, national income accounting, classical and Keynesian theories of income determination, money-concepts, functions, theories of demand for money, supply of money; general equilibrium of product and money markets; IS and LM functions; monetary and fiscal policies, banking - central and commercial, functions and problems of recent macroeconomic, policies of Government of India; research methodology, steps in agricultural economics research, data collection, analysis and report writing; simultaneous linear equations, linear programming, statistical inference, correlation and regression analysis, time series analysis and theory of index numbers. Nature and scope of agricultural production economics *vis-a-vis* farm management; farm business analysis, farm records and farm cost accounting; farm planning and budgeting, production function and resource allocation; assumptions of production function and different form of production functions, cost, profit and supply functions; nature and analysis of risk in farming; systems approach in farming; role of credit in agriculture, principles of agricultural finance, farm financial management, supply and demand for farm credit; recent innovations in the extension of credit to agriculture, theory and practice of cooperation; problems of cooperatives, management of co-operative institutions; cost-benefit analysis of agricultural projects. Scope of marketing in a developing economy; practice and problems of marketing agricultural inputs and outputs; functions and channels of marketing, co-operative marketing; agricultural price analysis; demand analysis; problems and prospects of storage and processing of agricultural products; agricultural exports -problems and prospects. Market intermediaries and their role, marketable & marketed surplus estimation, marketing efficiency, market integration, APMC regulated markets - Direct marketing, contract farming and retailing - Supply chain management, role of information technology, telecommunication in marketing of agricultural commodities. Theory of growth and growth models; agricultural policy, planning and development in India, interregional variations in agricultural development, agricultural technology and income distribution; agrarian reforms and output and input price policies; infrastructure and institutions for agricultural development, equity and ecological consideration in agricultural development. OLS and their properties, multi-collinearity, heteroscedasticity and autocorrelation. Concepts, classification and problems of natural resource economics- Economy Environment interaction, Resource scarcity - Limits to Growth - Measuring and mitigation natural resource scarcity, common property rights, sustainability, environmental pollution.

2. AGRONOMY

Principles of crop production, crop plants in relation to environment, concepts involved in growth analysis; quantitative agro-biological principles and their validity; classification of climate, agro-climatic zones of India and Rajasthan, their characteristic features; physiological limits of crop yield and variability in relation to the agro-ecological optimum; types of tillage - concepts and practices; resource conservation technology. Weed ecology & physiology; crop-weed interference; methods of weed control; principles

and practices of weed management in crops and cropping systems; herbicide- formulations, classification, selectivity and mode of action; adjuvants; integrated weed management; herbicide resistance, fate of herbicides. Agro-meteorology in relation to crop environment; solar radiation utilization & photosynthesis; air temperature and humidity; monsoon characterization; weatherforecasting; climate change: its impact on agriculture, mitigation and adaptation. Introduction, origin, history, production, distribution, cultural practices, varieties, quality, biomass production and bioenergetics of major field crops, forage, spices and condiment crops. Soil fertility and its management; essential plant nutrients, their functions and deficiency symptoms in plants; dynamics of major plant nutrients; organic manures, chemical and biofertilizers and fertilizer uses; integrated plant nutrient management; precision farming & site-specific nutrient management; organic farming: concept, principles & components, quality parameters, labeling, certification & accreditation process. History of irrigated agriculture, soil-water-plant relationship, soil moisture constants and soil water availability to plants, soil moisture stress and plant growth; drought resistance in crops, mechanisms of drought tolerance, and crop adaptability, soil and plant moisture conservation techniques, water harvesting and other agro techniques for dryland agriculture; measurement of soil moisture, methods of scheduling irrigation, methods of irrigation for crop plants, quality of irrigation water; watershed management concepts; management of excess soil water, agricultural drainage, principles and practices; problem soils- saline, alkali, saline-alkali and acid soils, soil erosion and its control. Cropping systems - principles and practices and assessment; changing cropping patterns in different agro-climatic zones; crop diversification, IFS, Sustainability - concept and practices; agro-forestry systems - concepts and practices. Principles of experimental designs, analysis and interpretation of data, methods of statistical analysis and statistical designs.

3. ENTOMOLOGY

Position of insects in animal kingdom - their origin, phylogeny and distribution; history and basis of insect classification; distinguishing characters of insect Orders and economically important families; concept of species and speciation; rules and regulations of zoological nomenclature; morphology - external and internal; embryonic and post-embryonic development. Insect ecology - biotic potential, biotic and abiotic resistance, effect of temperature, humidity and light on insect development and population dynamics; diapause, food chain, migration and dispersal. Life table concept, survivorship curves, degree-day model, predator prey relationship, diversity indices (index). Fundamentals of insect physiology, different systems, their structure and function, metabolism, sense organs, insect behavior, host plant relationship, ecosystems, horticultural crops, host parasite relationship. Social and other beneficial insects; pests of field crops and stored food; principles of pest control; classification, mode of action and metabolism of insecticides; insecticidal residues; resistance and resurgence; parasites, predators and pathogenic microorganisms of crop pests, biological control. Antifeedants, hormones, growth regulators, semiochemicals, host-plant resistance and genetic manipulation, insect quarantine; concept of integrated pest management; non-insect pests and their control. Principles of experimental designs, analysis and interpretation of data, methods of statistical analysis and statistical designs.

4. EXTENSION EDUCATION

Objectives, philosophy and principles of extension education; extension role of agricultural universities; comparative studies of extension education system in selected developed and developing countries; different models of organizing agricultural extension, particularly tools and methodology; agricultural information (knowledge) system; teaching and learning processes; principles of adult learning; audio visual aids and their classification; modern communication and information technology; application of PERT/CPM, principles of programme planning process; agricultural and rural development

programmes in India, namely CD, Panchayati raj System, IADP, IRDP, SGSY, PMGSY, DPAP, KVK, ATIC, ATMA, IVLP, ICDS, NREGP, Farmers Field School, Kisan Call Centre. Principles of extension management, different theories of management processes and functions of management organizational set-up for extension services in India including the T & V system; types of training programmes for extension personnel and farmers; model of modern training, modern technologies, experimental learning methods, entrepreneurial development process; factors affecting extension training. Participatory extension approaches (RRA, PRA, PLA, AEA, PAR, FPR); Participatory tools and techniques; Participatory technology development and dissemination. Scope and importance of psychology in extension education, concept of human society; characteristics of rural people; socio-psychological basis of human behavior, socio-psychological factors in transfer of technology; social structure; social interactions and processes; values and norms of rural social systems; rural institutions; role of leadership; process of diffusion and adoption; consequences of adoption of innovations; communication process and elements of communication; theories of communication, fundamentals of farm journalism; role of mass media; modern electronic media. Process of scientific research; research designs; data collection devices; validity and reliability of measuring devices; methods of observation and data collection; techniques of tabulation; analysis of data and report writing; methods of statistical analysis; statistical designs.

5. GENETICS AND PLANT BREEDING

Structure and function of cell and cell organelles, cell cycle; mitosis and meiosis; nucleic acids – their structure; Mendelian principles; gene interaction, multiple alleles, chromosome structure and organization; types of chromosomes; chromosome function; linkage and crossing over - theories and molecular mechanism; recombination and gene mapping in diploids, fungi, bacteria and human; ploidy variations - euploids and aneuploids; chromosomal aberrations; extra chromosomal inheritance; gene mutation-mechanism, induction; gene concept; complementation, genetic code, information transfer and protein synthesis, gene regulation and gene manipulation; gene transfer technology; origin and evolution of important crop plants like wheat, rice, maize, sugarcane, potato, brassica, cotton, etc. Genetic basis of plant breeding; pure line selection; male sterility and incompatibility and their use in plant breeding; principles and methods for self and cross pollinated crops and vegetatively propagated crops; heterosis; plant introduction and exploration and their role in plant breeding; breeding for disease, insect and pest resistance; role of interspecific and intergenetic hybridization; combining ability and its relationship with the components of gene action; seed production techniques; PBR, IPR, PPV&FR act 2001, farmers rights: changes in gene frequencies; mutation and its role in breeding; use of biotechnology in plant breeding. Molecular markers and their applications in genetic analysis and plant breeding. Genetic engineering & its tools, QTL and marker assisted selection. Inheritance of quantitative traits, polygenes, continuous variation, components of genetic variation, heritability and genetic advance, GxE interaction stability analysis, gene action, combining ability & its estimation, parent offspring regression. Principles of experimental designs, analysis and interpretation of data, methods of statistical analysis and statistical designs.

6. HORTICULTURE

Importance scope, area and production of major horticultural crops. Recent trends in planting systems, cropping systems, improved varieties, canopy management, nutrient management, water management, fertigation, role of bioregulators, biotic and abiotic factors limiting fruit production, physiology of flowering, pollination fruit set and development, physiological disorders, insect pest and diseases, maturity indices, harvesting, grading, packing, storage and ripening techniques of fruit crops – mango, banana, citrus, guava, grapes, pomegranate, papaya, sapota, custard apple, aonla, phalsa, ber, apple, pear, peach,

plum, strawberry, wood apple, bael, litchi. Propagation, tissue culture and nursery management of fruit plants. Biodiversity, germplasms conservation, gene centers, intellectual property rights of fruits crops. Introduction, botany and taxonomy, climatic and soil requirements, commercial varieties/hybrids, sowing/planting times and methods, seed rate and seed treatment, nutritional and irrigation requirements, intercultural operations, weed control, mulching, physiological disorders, harvesting, post-harvest management, plant protection measures of vegetables- tomato, brinjal, chilli, okra, cucurbitaceous vegetables, beans, sweet potato, yam, cole crops, root crops, peas, leafy vegetables, bulb crops. Introduction, importance of spice crops-historical accent, present status - national and international, future prospects, botany and taxonomy, climatic and soil requirements, commercial varieties/hybrids, site selection, sowing/planting times and methods, nutritional and irrigation requirements, pharmaceutical significance, plant protection measures, physiological disorders - black pepper, cardamom, clove, cinnamon and nutmeg, turmeric, ginger and garlic, coriander, fenugreek, cumin, fennel, ajwain, Scope and global scenario of cut flowers in global trade, varietal wealth and diversity, Patent rights, nursery management, influence of environmental parameters, light, temperature, moisture, humidity and CO₂ on growth and flowering. Cut flower standards and grades, harvest indices, Water and nutrient management, fertigation, weed management, rationing, training and pruning, disbudding, special horticultural practices, use of growth regulators, physiological disorders and remedies, IPM and IDM in crop- rose, chrysanthemum, carnation, gerbera, gladioli, tuberose, orchids, anthurium, aster, lilliums, dahlia, gypsophilla. Landscape designs, types of gardens, Styles of garden, Urban landscaping, Landscaping for specific situations, Garden plant components, Lawns, Establishment and maintenance, Bio-aesthetic planning, eco-tourism, theme parks, indoor gardening, therapeutic gardening, non-plant components, water scaping. Cacti, succulents, trees, shrubs, climbers, alpine and annual flower plants in landscaping. Important landscape gardens in India. Maturity indices, harvesting practices for specific market requirements, Physiology and biochemistry of fruit ripening, pre-cooling, Methods of storage ventilated, refrigerated, MAS, CA storage, physical injuries and disorders. Packing methods and transport, principles and methods of preservation, food processing, canning, fruit juices, beverages, pickles, jam, jellies, candies. Dried and dehydrated products, Role of photoperiod, vernalization, dormancy, respiration, transpiration, photosynthesis and senescence in plants. Essential plant nutrients and their uptake in horticultural crops. Principles of experimental designs, analysis and interpretation of data, methods of statistical analysis and statistical designs.

7. LIVESTOCK PRODUCTION AND MANAGEMENT

Advances in housing management of dairy cattle and buffaloes in various agroclimatic zone of India. Management systems for cattle and buffaloes. Establishing Dairy Cattle Enterprise. Breeding Management. Advances in Feeding Management of cattle and buffalo, feeding for milking herd, dry cows, bulls and calves, Management of high yielding animals. Numbers and distribution of milch and dual-purpose breeds of cattle and buffaloes. Sheep production. Advances in feeding management, Nutrient deficiencies in forage, General feeding practices, feeding materials, Feeding lambs and ewes during lactation. Role of sheep husbandry in agriculture, Present development programmes in sheep and goat production. Role of goat in animal agriculture, Goat farming in India, selection of Breeding stock, Breeding problems, Housing, Principles of feeding, Milking practices. The present and future of Swine production systems in India and production policies adopted in advanced countries. Principal of animal experimentation. Planning and designing of experiments. Integration of research in various disciplines of animal production. Scientific writing research papers, reviews and reports etc. and their presentation. Importance and limitations of rabbits for meat and fur production. Common breeds and strains of poultry. Utilization and disposal of animal waste, Health hazards, Waste utilization, technologies for

processing and treatment of animal wastes. Principles of experimental designs, analysis and interpretation of data, methods of statistical analysis and statistical designs.

8. MOLECULAR BIOLOGY AND BIOTECHNOLOGY

Structure and organization of prokaryotic and eukaryotic cells; Cytoskeletal elements; organization and expression of prokaryotic and eukaryotic genome; concept of gene; quantitative trait loci, mutation; genetic recombination; transformation; transduction; conjugation; structure, function and regulation of genes in prokaryotes and eukaryotes; transcription and translation; recombinant DNA, restriction enzymes, vectors, plasmids, cosmids and bacteriophages, expression vectors, cloning strategies, construction and screening of genomic and cDNA libraries, nucleic acid hybridization and DNA sequencing; restriction fragment length polymorphism; monoclonal antibodies and their application; enzyme engineering; genetic transformation of eukaryotes; crop improvement through genetic engineering; role of tissue culture in crop improvement; microbes in agriculture and industry; structure and function of proteins, nucleic acids, carbohydrates, lipids, enzymes; metabolism, glycolysis, citric acid cycle; respiration, bioenergetics; nucleic acid and protein biosynthesis; photosynthesis, nitrogen fixation. PR in Biotechnology. Biosafety and Bioethics issues. Cell division and regulation of Cell cycle; Membrane transport; Signal transduction; Protein targeting; Molecular marker and its application in Agriculture; Genomics, Proteomics and metabolomics; Properties of nanomaterials and characterization, Synthesis and Application of nanomaterials. Introduction to Bioinformatics and Biological database. BLAST and FASTA.

9. NEMATOLOGY

Nematode and its characteristics, History and development of Nematology in India and abroad, Nematode habitats and diversity - Plant, animal, human parasites and entomo-pathogenic nematodes, Economic importance of nematodes in Agriculture, Extraction of nematodes from soil and plant material, Staining nematodes in plant tissues, Estimation of population densities, Killing, fixing and preservation of nematodes, Preparation of permanent and semi-permanent mounts, perineal patterns and vulval cone of nematodes, Isolation and culture techniques of nematodes, Organization of nematode body, Morphology of plant parasitic nematodes - Body Wall, digestive, reproductive, excretory and nervous system, Principles of nematode taxonomy and its importance, Placement of nematodes in Animal Kingdom and comparison with related organisms, Phylum- Nematoda and its classes, Classification and characteristics of important Tylenchid, Aphelenchid and Dorylaimid nematodes. Biology and ecology of nematodes, Patterns of Nematode life cycle, Distribution and dispersal of nematodes. Types of nematode parasitism, Nematode behavior - Hatching, moulting, host finding, feeding and reproduction, Survival strategies of nematodes in adverse environmental conditions, Effect of abiotic and biotic factors on nematodes, Chemical composition of nematodes, hydrolytic enzymes, pseudocoelom and its function, Plant nematode relationships, Cellular responses to infection by important plant parasitic nematodes, Interaction of plant parasitic nematodes with other micro-organisms (Fungi, Bacteria, Viruses etc.), Nature of damage and symptomatology, Nematode diseases of Cereals, Pulses, Oil seed, Vegetables, Fruit, Ornamental, Fiber and Plantation crops, Nematode problems of protected cultivation, Crop loss estimation, ecological and socio-economic aspects, pest risk analysis of important nematodes, Principles and practices of nematode management - Physical, cultural, host resistance, biological, chemical and regulatory methods with their advantage and disadvantages, Integrated nematode management, Nematode management under protected cultivation, Nematode as biological models, Application of molecular techniques in Nematology.

10. PLANT PATHOLOGY

Landmarks and pioneers of plant pathology; theory of microscopy and staining; morphology of fungi,

bacteria, rickettsia's, phytoplasma and spiroplasma, viruses and viroids; principles of culturing and preservation of pathogens; characteristic symptoms; host-parasite relationships and its basis; symbiosis; economically important diseases of crop plants induced by fungi, bacteria, rickettsia's, phytoplasma and spiroplasma, viruses and viroids; phanerogamic parasites, non-parasitic diseases; nutrition, growth, reproduction, lifecycle, ultra-structure, genetics and classification of microorganisms; Molecular methods for detection and diagnosis of Pathogenic microbes like fungi, bacteria and viruses.; beneficial microorganisms including mycorrhiza; variation in phytopathogens and their ecology; introductory epidemiology. Principle of disease management, disease resistance, plant quarantine, seed and soil health. Disease forecasting. Important statistical designs; methods of their statistical analysis.

11. SOIL SCIENCE AND AGRICULTURAL CHEMISTRY

Rocks and minerals; mineral weathering and soil formation; classification of soils, major soils of India; Soil texture, structure, soil water, soil temperature, soil air and their management, principal silicate structures; nature and properties of organic and inorganic constituents of soils, ion exchange phenomenon; activity of ions in soil system; fixation and release of nutrients. Soil fertility evaluation; movement of water; problematic soils, soil-related constraints in crop production and remedial measures, soil amendments; soil and water conservation; sampling and analytical procedures for soils, plants, water, manures, fertilizers and soil amendments; quality of irrigation water; fertilizer recommendations; soil organic matter, soil micro flora; carbon, nitrogen and phosphorus cycles; biofertilizers; phosphate solubilization; Darcy's law; Ficks law, steady and transient state diffusion in soils. Essential plant nutrients; manures; utilization of organic wastes and industrial by-products; fertilizers and their production, properties and usage; secondary and micronutrients. Microbial transformation of N, P, S, Fe & Mn; land capability classification, chemistry of submerged soil, soil & water pollution, fertilizer control order. Principles of experimental designs, analysis and interpretation of data, methods of statistical analysis and statistical designs

HORTICULTURE

1. FRUIT SCIENCE

Importance scope, area and production of fruits, classification of fruit crops, climatic and soil requirement, Principles of pruning and training, weed control; modern methods of propagation including root stock and micro propagation; Use of growth regulators in fruit crops; water management; use of biofertilizers; High density orcharding. Improvement of plant types of important fruit crops; physiological manipulations for overcoming problems like biennial bearing, spongy tissue, malformation, necrosis and black tip in mango; delayed maturity and uneven ripening in grapes and granulation in citrus. General principles of flower and vegetable production; major methods of preservation and processing of horticultural crops. Cultivation practices of major fruit crops like mango, citrus, banana, grape, papaya, guava, pineapple, loquat, phalsa, jackfruit, mangosteen, sapota, cashew nut, ber, pomegranate, date palm, aonla and temperate fruits like apple, pear, peach, almond, plum, apricot and cherry. Important statistical designs; methods of their statistical analysis.

2. VEGETABLE SCIENCE

Introduction, botany and taxonomy, climatic and soil requirements, commercial varieties/hybrids, sowing/planting times and methods, seed rate and seed treatment, nutritional and irrigation requirements, intercultural operations, weed control, mulching, physiological disorders, harvesting, post-harvest management, plant protection and production techniques of vegetables- okra, solanaceous and cucurbitaceous crops, peas and beans, cole and bulb crops, yams, root and tuber crops, leafy vegetables and

underutilized vegetables. Scope of vegetable seed industry, breeding (conventional and molecular) and seed production of vegetables crops- genetical and agro-technological principles, methods of seed production of different vegetable crops; seed standards, laws & policies, seed certification, Seed harvesting, processing, packaging and storage. General principles of flower and fruit production; major methods of preservation and processing of horticultural crops. Important statistical designs and methods of their statistical analysis.

HOME SCIENCE

1. FOOD SCIENCE AND NUTRITION/ FOODS AND NUTRITION

Overview of macro and micro nutrients- digestion, absorption, metabolism. Basis of requirement, functions, sources, digestion and absorption of carbohydrates, fat, protein; amino acid pool, protein turn over, methods of assessing protein quality. Functions and role of dietary fiber in various physiological disorders. Chemistry, distribution, functions, absorption, transport, metabolism, deficiency manifestations, toxicity of vitamins and minerals. Evaluation of food by subjective and Objective methods. Effect of cooking and other processing on their nutritive value of foods. Physiological changes and nutritional requirements during various stages of life cycle Therapeutic modifications of diet interms of nutrients, consistency and composition for various disorders and diseases. Modes of feeding. Assessment of the nutritional status at individual, household and institutional level: direct and indirect methods. National nutritional programmes and policies; nutritional surveillance. Food and nutrition security at national and household level.

2. HUMAN DEVELOPMENT AND FAMILY STUDIES

Meaning, types and functions of theory, theoretical perspectives- biological, environmental, interactional and cultural. Life span development; Regulation of developmental processes, Integrated view of development from a life span perspective- recent research trends in human development issues. Gender issues in family involvement and cohesiveness (socialization, family roles, responsibilities and family adjustment). Demographic challenges and family ecology. Multi-disciplinary view of children with special needs. Impact of a child with developmental challenges on parents and families, ethical issues in the assessment of human development. Development of test /scale & standardization procedure, Current & emerging issues in early childhood care & education, Guidance and counselling- concept, aims, need, nature and scope of guidance and counselling, Impact of aging on physical, psychological, socio-emotional aspects. Consequences of puberty changes, sexual development, early and late maturation and psychological implications. Objectives and theoretical approaches to parent education programme. Orientation to the supportive and substitutive services related to the welfare of families. Need and scope of children's literature, Meaning, area and scope of marital and family therapy.

3. EXTENSION EDUCATION & COMMUNICATION MANAGEMENT

Extension efforts after independence -Community Development Programme; Panchayati Raj Institutions; Area and target oriented programme - IAAP, T&V; Special programme for poor, women and children - IRDP, TRYSEM, DWCRA, JRY, IAY, SGSY, MGNREGA; Extension systems in India ;ICAR research and extension systems- KVK, NATP, IVLP, ATIC, NAIP, AICRP; Support structures and their functions - DRDA, Central Social Welfare Board, State Social Welfare Board, NABARD; National Level Voluntary Agencies - CAPART and KVIC; Extension Approaches to rural development; Communication skills; Concept of development communication; Recent advances in communication- print and electronic, internet, e-mail, fax, mobile, interactive video and teleconferencing, e-Governance; Participatory planning – concept and techniques (RRA, PRA and PLA); Project management techniques - PERT, CPM, SWOT analysis; Implementation and evaluation of extension programme; Concept and formation of SHGs;

[18]

Training for Human Resource Development (HRD); Types of training; Experiential Learning Cycle; Participatory training methods- lecturette, interactive demonstration, brain storming, case studies, simulation exercises, role -play, group discussion, small group tasks, games, in-basket exercise, T-group and fish bowl exercise; Models of training process- Simple, Elaborated and Spiral; Designing, management and delivery of training programme; Monitoring and evaluation; HRD- concept and techniques; Role of multimedia in communication; Process of producing newspaper, magazine and other printed literature (leaflets, brochures, newsletters, bulletins, booklets, posters etc.); Process of producing radio, television and multimedia programme; Different programme formats for radio and television; Concept of administration and management, principles and process of extension management-planning, organizing, staffing, directing, communicating, coordination, controlling, reporting and budgeting; Organizational climate, behavior, development; Management by Objective (MBO) Various formats of scientific communication; Editing: concepts and techniques; Corporate communication; corporate goals; corporate policy, strategy and corporate niche, branding; Event management - concept, need and types of events; Process of organizing an event; Planning events- press meets/conferences/ exhibitions, organizing media tours.

4. TEXTILE AND APPAREL DESIGNING

Chemistry of polymers- Polymerization, types, degree & characteristics; Structure of textile fibers-general, molecular bonding, length, orientation, and requirements of fiber forming substances, Structure-property relations of the fibers - repeating units, bonds, reactive groups and reactions of cotton, viscose rayon, silk, wool, linen, polyester, acrylic, spandex and minor fibers; action of heat, light, bleach and micro-organisms on different fibers; commercial processes of fibers, standardization and quality control, functions of ISI and other standards. abrasion resistance- flat, flex; Pilling; crease recovery; stiffness; drapability; air permeability; thermal properties; flammability & assessment of other safety aspects in textiles; water permeability - repellency, wicking and dimensional stability; comfort & fabric handle measurement. Shuttle less looms- projectile, rapier, air jet, water jet weaving; multiple-shed loom, automatic controls in modern looms & scope of modern methods of weaving; detailed pre-weaving processes. Complex & fancy structures - leno, crepe, double cloth, honey comb, mock-leno, diaper, diamond, dobby, warp and weft figuring, terry and pile, huck -a-back. Principles of contouring, surplice/off shoulder and halter designs; built-in necklines, cowls and collars. Selection, care and maintenance of different household textiles; floor coverings, rugs and carpets; Types and role of under linings in draperies. Status of textile industry in India- cotton, wool, silk, rayon, jute, handlooms, and knitting industry; Government Textile & Clothing policies.

5. DEPARTMENT OF RESOURCE MANAGEMENT AND CONSUMER SCIENCE

Management-concept, system approach to management, motivating factors, motivation theories. Functions of management-planning, supervision, controlling, organizing, evaluation. Resources- classification, characteristics, factors affecting availability and use of resources, resource conservation. Time and energy management, work simplification techniques, Mundels classes of change, fatigue and its management. Decision making process. Money management-family income, types, budgeting, household accounts, family savings and investment, tax. Elements of art and principles of design. Colour - dimensions of colour, psychological effects of colour, colour schemes and factors affecting use of colour. Furniture and furnishing - types, selection, care and maintenance. Floor and floor coverings, wall finishes, window and window treatments. Flower arrangement, tools and accessories used. Space planning and design-housing need and importance, principles of space planning, types of house plans, economy in construction. Housing problems in India- rural and urban. Building regulations-norms and standards, zoning, housing for special groups and areas, housing finance. Housing and environment- building materials- impact on environment, green rating systems. Consumer-definition, role, rights and responsibilities, consumer

behavior, consumer problems, redressal mechanism, standardization and its marks, quality control, buying aids, consumer legislation, education and empowerment. Consumer protection- consumer organization, cooperatives. Ergonomics– definition, significance, scope, anthropometry, man- machine- environment relationship, factors affecting physiological cost of work, body mechanics, functional design of work place, time and motion study. Management of natural resources-land, forest, water, air, rain water harvesting, municipal solid waste management, concept of sustainable development, environment and health hazards due to pollution. Entrepreneurship-concept, process, barriers, entrepreneurial motivation, challenges, enterprise setting, project planning and appraisal, enterprise management.

FORESTRY

1. SILVICULTURE AND AGROFORESTRY

Forest ecosystem concept, stand dynamics-forest succession, productivity and vegetation forms and natural/artificial regeneration of tree species. Tree measurements, forest inventory and yield concepts. Forest management, ecosystem management, site quality evaluation, stand density and forest valuation.

Forest protection through diseases and pest management. Seed development in tropical, sub- tropical and temperate region, testing and certification.

Soil and water management in Agroforestry including biogeochemical cycling of nutrients. Nutrient and Weed Management and Management of Insect-Pests and Diseases in Nursery and Plantation, various aspects of production, integrated nutrient and irrigation management and ecological factors in raising forest plantations. Plantations of Neem, Casuarina, Poplars, Eucalyptus, Terminalias, Acacias, Pine, Oak, Gmelina, Teak, Sandal, Bamboo, etc.

Modern nursery techniques about types of nurseries, vegetative propagation, use of green house, mist chamber and fertilizer use. Scope and advantages of using and raising bio-energy plantations. Concept and objectives of agroforestry, community forestry and social forestry, land use including diagnosis and design methodologies.

Major Agroforestry practices in different agro ecological zones of India- arid and semi-arid regions- agroforestry practices for wasteland reclamation, salt affected soils, wetlands and waterlogged areas. Non-wood forest products-based agroforestry. Recent trends in Agroforestry systems research and development. National Agroforestry Policy 2014, National and International organizations in Agroforestry. Climate change risk on farming and forests, in agroforestry systems. Principles of economics and use of economic tools in appraisal of the agroforestry systems.

Interactions between tree and livestock including their management, principles of crops and fodder production in Agroforestry. Fodder from trees/shrubs and their nutritive value/ propagation techniques. Woody elements in agro-forestry systems, their role in biomass production. Suitability of species for different purposes. Multipurpose trees in agro-forestry systems. Fruits crop and their need and relevance in Agroforestry fruit tree species suitable for various assemblage and then planting plan in different agro climatic situation and Agroforestry systems. Role of nitrogen fixing trees/ shrubs. Choice of species for various agro climatic zones for the production of timber, fodder, fuel wood, fiber, fruits, medicinal and aromatic plants. Generic and specific characters of tree and shrubs for Agroforestry. Generic and specific characters of trees and shrubs for agro-forestry. Importance of rangeland, components of rangeland their characteristics and distribution, major types of rangelands in world and their characteristics, types of grasslands in India. Importance Remote sensing, components of Digital image processing, image analysis and classification, Use of GIS and GPS. Use of GIS software in Forestry. Forest soils and land reclamation, Watershed management practices. Probability distribution, Measurement of central tendency, Standard error and deviation, Correlation and regression, Tests of Significance- large and small sample test, ANOVA, Sampling and experimental designs-CRD, RBD, LSD, SPD and Factorial experiments.