AGRONOMY

General: Basic principles of crop production, cultivation of rice, wheat, maize, common pulses and oilseeds, sugarcane, groundnut, rapeseed, mustard and potato. Principles of Agronomy, crop ecology and geography and Agricultural Meteorology: Agronomy - meaning and scope, National & International agricultural research institutes in India, Agro climatic zones of India, Tillage, crop stand establishment and planting geometry and their effect on crop, Organic farming, precision farming, integrated farming systems, principles of field experimentation. Climate shift and its ecological implications. Agro-ecological regions in India, Climatic factors and their effect on crop productivity, weather & climate, Earth's atmosphere, solar radiation, Atmospheric temperature and global warning. Crops and atmospheric humidity, weather forecasting.

Field crops: Origin, distribution, economic importance, soil and climatic requirement, varieties, cultural practices and yield of cereals (rice, wheat, maize, sorghum, pearl millet, minor millets, barley), pulses (chickpea, lentil, peas, pigeon pea, mungbean, urdbean), oilseeds (groundnut, sesame, soybean. rapeseed & mustard, sunflower, safflower, linseed). fiber crops (cotton, jute, sunnhemp), sugar crops (sugarcane), fodder & forage crops (sorghum, maize, napier, berseem. Lucerne, oats), and commercial crops (potato, tobacco).

Weed management: Principles of weed management, classification, biology and ecology of weeds, crop weed competition and allelopathy, concepts and methods of weed control, integrated weed management, classification, formulations, selectivity Application methods. and equipments, special and problematic weeds and their management in cropped and non cropped situations, weed management in field crops

Water management: Principles of irrigation, water resources and irrigation development in India, soil-crop-water relationship, water and irrigation requirements, concepts and approaches of irrigation scheduling, methods of irrigation, measurement of irrigation water, application distribution and use efficiencies, conjunctive use of wheat, irrigation water quality and its management, water management in major field, crops (rice, wheat, maize, groundnut, sugarcane) Agricultural drainage.

Soil fertility and fertilizer use : Essential plant nutrients and their deficiency symptoms, concept of essentiality of plant nutrients, indicators of soil fertility and productivity, fertilizer materials and their availability to plants, Chemistry of submerged soil; slow release fertilizers, nitrification inhibitors, principles and methods of fertilizer application, integrated nutrient management, site specific nutrient management.

Dryland Agronomy: Characteristics of Dryland farming and delineation of Dryland tracts, constraints of Dryland farming in India, Types of drought and their management, contingency crop planning and mid-season corrections for aberrant weather and its recycling.
Watershed management.

Sustainable land use systems: Sustainable agriculture: parameters and indicators, use conservation agriculture, safe disposal of agri-industrial waste for crop production, Agro-2 forestry systems, shifting cultivation. Alternate land use systems, Wastelands and their remediation for crop production.

SOIL SCIENCE

Unit-I

Soil-definition, component of soil. Rocks and minerals-definition, types and classification. Weathering-definition and types. Fundamental processes of soil formation, Different process of soil formation like podzolization, laterizationetc. Soil taxonomy. Land capability classification. Soils of India. Soil survey-defintion, classification.

Unit -II

Physical properties of soil – soil texture and its classification. Soil structure formation and classification. Assessment of soil texture and soil structure. Soil density and pore space. Soil consistency and plasticity- concept and factors influencing, Atterberg'sconstants.Soilcolour - Definition, description, causes, importance/significance of soil colour, determination and interpretation of soil colour.Soil water- classification. Soil water potential. Saturated and unsatirated flow of water in soil. Soil aeration processes. Soil temperature regimes. Soil crusting and compaction- effect on plant growth and management options

Unit-III
Soil colloids- structure and properties of layer silicate clay. Concept of ion exchange in soil

Unit-IV
Problematic soil- soil acidity, alkalinity, soil salinity-genesis, characteristics, effect on plant growth and management

Unit-V
Essential plant nutrients- functions in plant. Soil fertility evaluation-methods and concepts. Manures-classification and properties. Definition and classification of NPK fertilizers. Biofertilizers

Unit-VI
Soil quality and health- concept and assessment

Unit-VII
Remote sensing and GIS- concept and application in soil.

GENETICS & PLANT BREEDING

Pre Mendelian concepts of heredity. Mendelian principles of heredity and Post Mendelian concepts. Cell division –mitosis, meiosis, Probability and Chi-square. Dominance relationships, gene interaction; pleiotropism and pseudoalleles. Epistatic interactions with examples. Multiple alleles. Blood group genetics. Sex determination and sex linkage; sex limited and sex influenced traits. Linkage and its estimation, crossing over mechanisms and chromosome mapping. Structural and numerical changes in chromosome, Mutation, classification. Methods of inducing mutation& CIB technique; mutagenic agents and induction of mutation. Qualitative & Quantitative traits, Polygenes and continuous variations; multiple factor hypothesis,. Cytoplasmic inheritance and maternal effect. Genetic disorders. Nature, structureand replication of genetic material. Transcription and translational mechanism of genetic material. Protein synthesis. Gene concept: Gene structure, function and regulation; Lac operon and Trp operon. Structural and numerical changes in chromosomes.
Experiments on mono hybrid, dihybrid, trihybrid, testcross and backcross. Experiments on epistatic interactions. Study on mitotic and meiotic cell divisions. Study on probability and Chi-square test. Determination of linkage and cross over analysis (through two point test cross and three point test cross data).
Historical development, concept, nature and role of plant breeding; major achievements and future prospects; Genetics in relation to plant breeding; modes of reproduction and apomixes. Mode of pollination; self–incompatibility and male sterility-genetic consequences. Domestication, Acclimatization, introduction; Centre of origin/diversity. Components of Genetic variation; Heritability and genetic advance; Genetic basis and breeding methods in self- pollinated crops-mass and pure line selection. Hybridization techniques and handling of segregating generations. Pedigree method, Bulk method, Backcross Method and their modifications. Multiline concept. Concepts of population genetics and Hardy-Weinberg Law ,Genetic basis and methods of breeding cross pollinated crops , modes of selection and population improvement;

Heterosis and inbreeding depression, development of inbred lines and hybrids; composite and synthetic varieties;Breedingmethods in asexually propagated crops,clonal selection and hybridization; Wide hybridization andpre-breeding; Polyploidy in relation to plant breeding, mutation breeding-methods and uses; Breeding for important biotic and abiotic stresses; Major achievements. Participatory plant breeding. Utilization of aneuploids in gene location - Variation in chromosome behaviour - somatic segregation and chimeras - endomitosis and somatic reduction ; Evolutionary significance
of chromosomal aberrations - balanced lethals and chromosome complexes.
Emasculation and hybridization techniques in self and cross pollinated crops. Consequences of inbreeding on genetic structure of resulting populations. Handing of segregation populations. Methods of calculating mean, range, variance, standard deviation, heritability. Designs used in plant breeding experiment and their analysis-Randomized Block Design, Split Plot Design and Augmented Design. Prediction of performance of double cross hybrids.

Concepts and applications of plant biotechnology. Biotechnological tools-Introduction to recombinant DNA methods: physical ,chemical and Agrobacterium mediated gene transfer methods; Transgenics and its importance in crop improvement; PCR techniques and its applications; DNA markers and their application-RFLP, RAPD, AFLP, CAPS, SSR etc. Marker Assisted Breeding in crop improvement; Biotechnology regulations. Plant Cell and Tissue Culture-organ culture, embryo culture, cell suspension culture, callus culture, anther culture, pollen culture, ovule culture and their applications; Micro-propagation methods; organogenesis and embryogenesis, Synthetic seeds andtheir significance;Embryo rescue and its significance. Somatic hybridization and cybrids. Somaclonal variation and its use in crop improvement. Cryo-preservation. Application of in-vitro techniques.
Composition of various tissue culture media and preparation of stock solutions for MS nutrient medium. Callus induction from variousexplants and plant regeneration. Micro-propagation, hardening and acclimatization. Demonstration on isolation of DNA and PCR technique. Demonstration of gel electrophoresis techniques and DNA finger printing.
Centers of origin, distribution of species, wild relatives in different cereals, pulses, oilseeds,fibres, fodders and cash crops; vegetable and horticultural crops – Rice, Maize, Mungbean, Urdbean, Sesame, Cowpea, Jute, Pegionpea, Brinjal, Tobacco and underutilized crops; study of genetics of qualitative and quantitative characters. Important concepts of breeding self-pollinated, cross pollinated and vegetatively propagated crops (kharif). Major breeding objectives and procedures including conventional and modern innovative approaches for development of hybrids and varieties for yield, adaptability, stability, abiotic and biotic stress tolerance and quality (physical, chemical, nutritional) in kharif crops. Plant genetic resources, their utilization and conservation. Ideotype concept and climate resilient crop varieties for future.
Emasculation and hybridization techniques in different crop species; viz., Rice, Maize, Pigeon pea, Urdbean, Mungbean, , Sesame, Cowpea, Brinjal and Tobacco. Maintenance breeding of different kharif crops. Handling of germplasm and segregating populations by different methods like pedigree, bulk and single seed decent methods. Estimation of heterosis, inbreeding depression and heritability; Layout of field experiments; Study of quality characters, donor parents for different characters.
Centers of origin, distribution of species, wild relatives in different cereals; pulses; oilseeds; foddercropsand cash crops; vegetable and horticultural crops - Wheat, Oat, Barley, Chickpea, Lentil, Fieldpea, Lathyrus, Rapeseed, Mustard, Sunflower, Potato, Cowpea, Brinjal and Tomato; study of genetics of qualitative and quantitative characters. Important concepts of breeding self pollinated, cross pollinated and vegetatively propagated crops(rabi). Major breeding objectives and procedures including conventional and modern innovative approaches for development of hybrids and varietiesfor yield, adaptability, stability, abiotic and biotic stress tolerance and quality (physical, chemical, nutritional) in rabi crops. Ideotype concept and climate resilient crop varieties for future.
Emasculation and hybridization techniques in different crop species namely Wheat, Oat, Barley,Chickpea, Lentil, Field pea, Rapeseed, Mustard, Sunflower, Potato, Cowpea, Brinjal and Tomato. Handling of germplasm and segregating populations by different methods like pedigree,

bulk and single seed decent methods. Estimation of heterosis, inbreeding depression and heritability; Lay out of field experiments; Study of quality characters, study of donor parents for different characters.

SEED SCIENCE AND TECHNOLOGY

Seed and seed technology: introduction, definition and importance.
Deterioration causes of crop varieties and their control
Maintenance of genetic purity during seed production, seed quality
Definition, Characters of good quality seed, different classes of seed
Foundation and certified seed production of important cereals, pulses, oilseeds
Seed certification, phases of certification, procedure for seed certification, field inspection
Seed Act and Seed Act enforcement. Duty and powers of seed inspector, offences and penalties.
Seeds Control Order 1983
Varietal Identification through Grow Out Test and Electrophoresis
Molecular and Biochemical test
Seed drying, processing and their steps, seed testing for quality assessment, seed treatment, its importance, method of application and seed packing
Seed storage; general principles, stages and factors affecting seed longevity during storage
Measures for pest and disease control during storage
Seed marketing: structure and organization, sales generation activities, promotional media. Factors affecting seed marketing, Role of WTO and OECD in seed marketing.

BIOCHEMISTRY

Fundamentals of Plant Biochemistry
Importance of Biochemistry. Properties of Water, pH and Buffer.
Carbohydrate: Importance and classification. Overview of optical isomerism; Structures of Monosaccharides, Reducing and oxidizing properties of Monosaccharides, Mutarotation; Structure of Disaccharides and Polysaccharides.
Lipid: Importance and classification; Structures and properties of fatty acids; storage lipids and membrane lipids.
Proteins: Importance of proteins and classification; Structures, titration and zwitterions nature of amino acids; Structural organization of proteins.
Enzymes: General properties; Classification; Mechanism of action; Michaelis&Menten and Line Weaver Burk equation & plots; Introduction to allosteric enzymes.
Nucleic acids: Importance and classification; Structure of Nucleotides; A, B & Z DNA; Watson-Crick model of DNA double helix; RNA: Types and Secondary & Tertiary structure.
Metabolism of carbohydrates: Glycolysis, TCA cycle, Glyoxylate cycle, Electron transport chain and oxidative phosphorylation, photosynthesis, photophosphorylation, C3, C4 and CAM pathways, photorespiration.
Metabolism of lipids: Beta oxidation, Biosynthesis of fatty acids, Metabolism of Nitrogen containing compounds, phytohormones.
Overview of nutrition, antioxidants and antinutritional factors.
Use of Analytical Techniques in Biochemistry and Molecular Biology: PCR, gene cloning, Liquid and gas chromatography etc.

PLANT PATHOLOGY

Fundamentals of Plant Pathology, Principles of Plant Pathology, Diseases of field and horticulture crops and their management, Diseases of Fruits, Plantation, Medicinal and aromatic plants.

ENTOMOLOGY

Fundamentals of Entomology
Part – I:

History of Entomology in India. Major points related to dominance of Insecta in Animal kingdom. Classification of phylum Arthropoda upto classes. Relationship of class Insecta with other classes of Arthropoda. Morphology: Structure and functions of insect cuticle and molting. Body segmentation. Structure of Head, thorax and abdomen. Structure and modifications of insect antennae, mouth parts, legs, Wing venation, modifications and wing coupling apparatus. Structure of male and female genital organ. Metamorphosis and diapause in insects. Types of larvae and pupae. Structure and functions of digestive, circulatory, excretory, respiratory, nervous and reproductive system, in insects. Types of reproduction in insects.

Part-II:

Insect Ecology: Introduction, Environment and its components. Effect of abiotic factors– temperature, moisture, humidity, rainfall, light, atmospheric pressure and air currents. Effect of biotic factors – food competition, natural and environmental resistance.

Part -III:

Categories of pests. Concept of IPM, Practices, scope and limitations of IPM. Classification of insecticides, toxicity of insecticides and formulations of insecticides. Chemical control-importance, hazards and limitations. Recent methods of pest control, repellents, antifeedants, hormones, attractants, gamma radiation. Application techniques of spray fluids. Symptoms of poisoning and antidotes.

Part – IV:

Systematics: Taxonomy –importance, history and development and binomial nomenclature. Definitions of Biotype, Sub-species, Species, Genus, Family and Order. Classification of class Insecta upto Orders, basic groups of present day insects with special emphasis to orders and families of Agricultural importance like Orthoptera: Acrididae, Tettigonidae, Gryllidae, Gryllotalpidae; Dictyoptera:; Odonata; Isoptera: Termitidae; Thysanoptera: Thripidae; Hemiptera: Pentatomidae, Coreidae, Cicadellidae, Delphacidae, Aphididae, Coccidae, Aleurodidae, Pseudococcidae; Neuroptera: Chrysopidae; Lepidoptera: Pieridae, Noctuidae, Pyralidae, Gelechiidae, Arctiidae, Saturnidae, Bombycidae; Coleoptera: Coccinellidae, Chrysomelidae, Cerambycidae, Curculionidae, Bruchidae, Scarabaeidae; Hymenoptera: Tenthridinidae, Apidae. Trichogrammatidae, lchneumonidae, Braconidae,; Diptera: Cecidomyiidae, Agromyziidae, Culicidae, Muscidae, Tephritidae

Pests of Crops and Stored Grains and their Management

General account on nature and type of damage by different arthropods pests. Scientific name, order, family, host range, distribution, biology and bionomics, nature of damage, and managementof major pests of various field crop, vegetable crop, fruit crop, plantation crops, ornamental crops, spices and condiments. Role of physical, biological, mechanical and chemical factors in deterioration of grain. Insect pests, mites, rodents, birds and microorganisms associated with stored grain and their management. Storage structure and methods of grain storage and fundamental principles of grainstore management.

Management of Beneficial Insects

Importance of beneficial Insects, Beekeeping and pollinators, bee biology, commercial methods of rearing, equipment used, seasonal management, bee enemies and disease. Bee pasturage, bee foraging and communication. Insect pests and diseases of honey bee. Role of pollinators in cross pollinated plants.

Types of silkworm, voltinism and biology of silkworm. Mulberry cultivation, mulberry varieties and methods of harvesting and preservation of leaves. Rearing, mounting and harvesting of cocoons. Pest and diseases of silkworm, management, rearing appliances of mulberry silkworm and methods of disinfection.

Species of lac insect, morphology, biology, host plant, lac production – seed lac, button lac, shellac, lac- products. Identification of major parasitoids and predators commonly being used in biological control.

Insect orders bearing predators and parasitoids used in pest control and their mass multiplication techniques. Important species of pollinator with their importance.

Insect Pests of Fruit, Plantation, Medicinal and Aromatic Crops

General – economic classification of insects; Bio-ecology and insect-pest management with reference to fruit, plantation, medicinal and aromatic crops; pest surveillance. Distribution, host range, bio- ecology, injury, integrated management of important insect pests affecting tropical, sub-tropical and temperate fruits, plantation, medicinal and aromatic crops like coconut, cashew, tea, coffee, betel vine, neem, belladonna, pyrethrum, Tulsi, datura. Storage insects – distribution, host range, bio-ecology, injury, integrated management of important insect pests attacking stored fruits, plantation, medicinal and aromatic crops and their processed products. Insecticide residue problems in fruit, plantation, medicinal and aromatic crops and their maximum residue limits (MRLs).

Insect Pests of Vegetable, Ornamental and Spice Crop

Economic importance of insects in vegetable, ornamental and spice crops-ecology and pest management with reference to these crops. Pest surveillance in important vegetable, ornamental and spice crops. Distribution, host range, bio-ecology, injury, integrated management of important insect- pests affecting vegetable, ornamental and spice crops. Important storage insect-pests of vegetable, ornamental and spice crops, their host range, bio-ecology, injury and integrated management.

Agricultural Economics

1. Basics of Economics & Agricultural Economics. Importance of agriculture in national economy: Theory of consumer behavior, utility theory, theory of demand, elasticity of demand, indifference of curve analysis, theory of firm, cost curves, theory of supply, price determination, market classification, concept of Microeconomics and Macroeconomics, money and banking, national income, inflation. Agricultural marketing-role, practice, institutions, recent trend, problem and reforms

2. Role of capital in agriculture, capital formation in agriculture, agrarian reforms, globalization, WTO & its impact on Indian agriculture.

Agrarian reforms in India

3. Basic principles of Farm Management, concept of Farming System and Types, economics of Farming Systems, Agricultural Production Economics - scope and analysis, Factor-Factor, Factor-Product and Product-Product relationship, marginal cost and marginal revenue (profit maximization), cost of cultivation and farm business analysis,

farm financial statement, depreciation of farm assets, farm planning and budging and risk management in farm.

4. Agricultural Finance and Farm Finance: nature and scope, roles of agricultural credit. Time value of money, compounding and discounting. Agricultural credit: meaning, definition, need, classification. Credit analysis: 4R's, 5C's and 7P's of credit, repayment plans, crop insurance, credit institutions, cooperatives. History of financing agriculture in India. Commercial banks, nationalization of commercial banks. Lead bank scheme, regional rural banks, scale of finance. Higher financing agencies, RBI, NABARD, AFC, Asian Development Bank, World Bank.

5. Concept of Agribusiness, Management, relevance of agribusiness & agro-industry, marketing Management, Financial Management, Project Management, Product Management

Agricultural Extension Education

Rural Sociology and Educational Psychology

Sociology and Rural Sociology-Meaning, Definition, Scope, its significance in Agricultural Extension, Indian Rural Society-Important characteristics, Differences and Relationship between Rural and Urban societies; Social Groups – Meaning, Definition, Classification, Factors considered in formation and organization of groups, Motivation in group formation and Role of Social groups in Agricultural Extension; Social Stratification – Meaning, Definition, Functions, Basis for stratification, Forms of Social stratification – Characteristics and – Differences between Class & Caste System; Cultural concepts – Culture, Customs, Folkways, Mores, Taboos, Rituals and Traditions – Meaning, Definition and their Role in Agricultural Extension; Social Institutions – Meaning, Definition, Major institutions in Rural society, Functions and their Role in Agricultural Extension; Social change – Meaning, Definition, Nature of Social change, Dimensions of social change and factors of social change. Psychology and Educational Psychology – Meaning, Definition, Scope and Importance of Educational Psychology in Agricultural Extension; Behaviour: Cognitive, affective and psychomotor domain, Intelligence – Meaning, Definition, Types, Factors affecting intelligence and Importance of intelligence in Agricultural Extension; Personality – Meaning, Definition, Types, Factors influencing the Personality and Role of personality in Agricultural Extension; Motivation – Meaning, Definition, Motivation cycle, Types, Classification of Motives, Theories of motivation, Techniques of motivation and Role of Motivation in Agricultural Extension; Teaching – Learning process – Meaning and Definition of Teaching, Learning, Learning experience and Learning situation, Elements of learning situation and its characteristics; Principles of learning.

Fundamentals of Agricultural Extension Education

Education: Meaning, definition & Types; Extension Education- meaning, definition, scope and process; objectives and principles of Extension Education; Extension Programme planning- Meaning, Process, Principles and Steps in Programme Development. Extension systems in India: extension efforts in pre-independence era (Sriniketan, Marthandam, Firka Development Scheme, Gurgaon Experiment, etc.) and post-independence era (Etawah Pilot Project, Nilokheri Experiment, etc.); various extension/ agriculture development programmes launched by ICAR/ Govt. of India (IADP, IAAP, HYVP, KVK, IVLP, ORP, ND,NATP, NAIP, etc.). New trends in agriculture extension: privatization extension, cyber extension/ e- extension, market-led extension, farmer-led extension, expert systems, etc.

Agricultural Statistics

AST 102 (Elementary Mathematics)

Straight lines : Distance formula, section formula (internal and external division), Change of axes (only origin changed), Equation of co-ordinate axes, Equation of lines parallel to axes, Slope-intercept form of equation of line, Slope-point form of equation of line, Two point form of equation of line, Intercept form of equation of line, Normal form of equation of line, General form of equation of line, Point of intersection of two straight lines, Angles between two straight lines, Parallel lines, Perpendicular lines, Angle of bisectors between two lines, Area of triangle and quadrilateral.Circle: Equation of circle whose centre and radius is known, General equation of a circle, Equation of circle passing through three given points, Equation of circle whose diameters is line joining two points (x_1, y_1) & (x_2,y_2), Tangent and Normal to a given circle at given point (Simple problems), Condition of tangency of a line $y = mx + c$ to the given circle $x^2 + y^2 = a^2$ .Differential Calculus : Definition of function, limit and continuity, Simple problems on limit, Simple problems on continuity, Differentiation of x^n , e^x , sin x and cos x from first principle, Derivatives of sum, difference, product and quotient of two functions, Differentiation of functions of functions (Simple problems based on it), Logarithmic differentiation (Simple problems based on it), Differentiation by substitution method and simple problems based on it, Differentiation of Inverse Trigonometric functions. Maxima and Minima of the functions of the form y=f (x) (Simple problems based on it). Integral Calculus: Integration of simple functions, Integration of Product of two functions, Integration by substitution method, Definite Integral (simple problems based on it), Area under simple well-known curves (simple problems based on it). Matrices and Determinants: Definition of Matrices, Addition, Subtraction, Multiplication, Transpose and Inverse up to 3rd order, Properties of determinants up to 3rd order and their evaluate.

AST 201 (Agri-informatics & Computer Applications)

IT and its importance. IT tools, IT-enabled services and their impact on society; computer fundamentals; Definition and Characteristics of computers; Organization of computers; Computer Generations; Classifications of Computers; Data representation in Computer, Word and character representation; Hardware and software; Computer memory and permanent storage devices, Input and output devices; Logic gates, Adder circuit, Binary addition and subtraction; Introduction to programming languages, features of machine language, assembly language, high-level language and their advantages and disadvantages; Principles of programming- algorithms and flowcharts; BASIC language, concepts, basic and programming techniques; Operating systems (OS) - definition, basic concepts and types; Internet and World Wide Web (WWW), Concepts and components, HTML and IP.

AST 202 (Fundamentals of Statistical Methods)

Basic Concept: Concept of Statistics, Frequency Distribution of Ungrouped and Grouped data, Measures of Central Tendency: AM, GM, HM, Median, Mode, Quartiles, Deciles, Percentiles; Measures of Dispersion.

Correlation and Regression: Simple Correlation and Regression.

Probability and Distributions: Theory of Probability: Definitions (Classical, Empirical, Axiomatic) of Probability; Theorem on Total and Compound Probability (For two events only without proof), Pair-wise and Mutual Independence of Events, Random variable: Probability Mass Function and Probability Density Function; Mathematical Expectation and Variance; Theoretical Distributions: Binomial Distribution, Poisson Distribution and Normal Distribution; Central Limit Theorem (Statement only).

Sampling: Basic concept of sampling, Advantages of Sample Survey over Census Survey; SimpleRandom Sampling (SRS), SRSWR and SRSWOR; Estimators of Population Mean, Total and theirVariances (formulae only) for SRS; Concepts of Sampling Errors and Non-sampling Errors.

Test of Significance: Concept of Statistical Hypotheses, Critical Region, Acceptance Region, Levelof Significance; Type I Error, Type II Error, Power of a Test and Test of Significance; Application ofτ, t, chi-square and F Statistics.

Experimental Design: Basic concept, Completely Randomized Design, Randomized Block Designand Latin Square design.

Rural Development: concept, meaning, definition; various rural development programmes launched by Govt. of India. Community Dev.-meaning, definition, concept & principles, Physiology of C.D. Rural Leadership: concept and definition, types of leaders in rural context; extension administration: meaning and concept, principles and functions. Monitoring and evaluation: concept and definition, monitoring and evaluation of extension programmes; transfer of technology: concept and models, capacity building of extension personnel; extension teaching methods: meaning, classification, individual, group and mass contact methods, media mix strategies; communication: meaning and definition; models and barriers to communication. Verbal and nonverbal communication, individual and group presentations, impromptu presentation, public speaking; Group discussion. Organizing seminars and conferences, oral presentation skills, visual communication, body language, Audio – visual aids: importance, classification and selection. Teaching and learning-concepts and principles, Teaching steps, Programming planning process – meaning, scope, principles and steps. Evaluation: meaning, importance and methods. Scope and importance of Participatory Rural Appraisal (PRA) & Rapid Rural Appraisal (RRA). Management and administration: meaning, definition, principles and functions. Concepts of human resource development (HRD), Training and capacity building, Rural leadership. ICT in Extension education, ICT use in rural India. Diffusion and adoption of innovation: concept and meaning, process and stages of adoption, adopter categories.

Entrepreneurship Development and Business Communication

Concept of Entrepreneur, Entrepreneurship Development, Characteristics of entrepreneurs; Assessment of entrepreneurship skills, SWOT Analysis & achievement motivation, Entrepreneurial behavior, Government policy and programs and institutions for entrepreneurship development, Entrepreneurial and managerial characteristics; managing an

enterprise; motivation and entrepreneurship development; importance of planning, monitoring, evaluation and follow up; managing competition; entrepreneurship development programs, Entrepreneurial Development Process; Business Leadership Skills; Communication skills for entrepreneurship development, Developing organizational skill , Developing Managerial skills, Problem solving skill, Achievement motivation; time management; Supply chain management and Total quality management, Project Planning Formulation and report preparation; Opportunities for entrepreneurship and rural entrepreneurship. Generation, incubation and commercialization of ideas and innovations. Government schemes and incentives for promotion of entrepreneurship. Government policy on Small and Medium Enterprises (SMEs) / SSIs. Venture capital. Contract farming and joint ventures, public-private partnerships. Supply chain management and total quality management.

Agricultural Journalism

Agricultural Journalism – The nature and scope of agricultural journalism, Characteristics and training of the agricultural journalist, how agricultural journalism is similar to and different from other types of journalism. Newspapers and magazines as communication media: characteristics, kinds and functions of newspapers and magazines, characteristics of newspaper and magazine readers. Form and content of newspaper and magazines: style and language of newspapers and magazines, parts of newspapers and magazines. The agricultural story: Types of agricultural stories, subject matter of the agricultural story, structure of the agricultural story. Gathering agricultural information: Sources of agricultural information, interviews, coverage of events, abstracting from research and scientific materials, wire services, other agricultural news sources. Writing the story; organizing the material, treatment of the story, writing the news lead and the body, readability measures, Illustrating agricultural stories: Use of photographs, use of artwork (graphs, charts, maps etc.), writing the captions, Editorial mechanics: Copy reading, headline and title writing, proofreading, lay outing.