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## ***Agriculture***

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### **Senior Secondary Level**

Indian Agriculture: History, branches, scope and importance. Climate and weather. Soil - Composition, soil texture, structure, factors affecting soil structure, soil temperature, soil air. Problematic soils, their formation and reclamation. Soils of Rajasthan. Nutrients and fertilizers, Irrigation and drainage. Agricultural implements and mechanisation. Organic Farming- Definition, importance, vermicompost, green manuring, biofertilizers, sustainable agriculture. Weed- definition, characteristics, classification, losses, weed control methods. Dryland farming and crop rotation- definition, importance and principles. Tillage- Definition, objectives, types, tillage. Cultivation of important crops: cereals and millets, pulses, oilseeds, fodder, commercial, fibre crops and seed spices.

Importance of fruits and vegetables in human diet. Crop diversification and processing industry. Orchard- location and layout, ornamental and kitchen gardening. Planting system, training, pruning, intercropping, protection from frost and sunburn. Tree, shrubs, climbers, annuals, perennials- definition with examples. Propagation by seed, cutting, layering, budding and grafting. Nursery, its objectives and raising of seedlings. Scope and importance of medicinal crops. Cultivation practices, processing and marketing of: fruit crops- (mango, papaya, banana, guava, citrus, grapes, brinjal, date palm, pomegranate) vegetables- (radish, carrot, potato, onion, cauliflower, brinjal, tomato, spinach, okra, chilli and cabbage), flowers- (gladiolus, canna, chrysanthemum, roses and marigold). Principles and methods of fruit and vegetable preservation. Preparation of jellies, jams, ketchup, chips, pickles and their packaging.

Importance of livestock and poultry in national economy. Development of milk industry in India. Important Indian and exotic breeds of cattle, buffalo, sheep, goat, camel and poultry. Different livestock development programmes of government of India. Breeding, feeding, housing and health management of livestock and poultry. Factors affecting milk yield and composition. Importance of dairy and poultry products.

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## **Graduation Level**

Agro-climatic zones of India and Rajasthan, Agroecological Regions, Adaptation and distribution of crops. Climatic variables. Basics of weather forecasting. Modern concepts of tillage. Conservation agriculture. Straight and complex fertilizers, foliar application. Plant nutrients: occurrence, cycling in soils and their availability. INM concept. Cropping and farming systems. Organic farming: principles, objectives, certification, labelling and accreditation process. Water resources of India and Rajasthan. Methods and systems of irrigation. Water management in crops. Soil plant water relation. Quality of irrigation water, CU,WR, drainage. Dryland agriculture in India and Rajasthan. Watershed, Moisture Conservation, Monsoon, Contingent crop Planning. Agronomy of important crops. Weed biology and ecology. Herbicide selectivity. Adjuvants.

Agriculture Statistics. Measurement of Central Tendency, Corelation, Regression, Test of Significance, F& Chi Square test, Experimental designs, CRD, RBD, SPD. Farm power and machinery

Soil fertility evaluation, nutrient recommendation. Formation and management of saline, saline sodic, sodic and acid soils. Micro-organisms in soils and their role. Physical, Chemical and Biological properties of soil. Clay minerals, Soil reaction and buffering capacity

Ornamental gardening, Vegetables- type of farming and classification. Raising of seedling in nursery and portray. Cultivation of important vegetables. Propagation and cultivation of important fruits of Rajasthan. Physiological disorders of important fruit and vegetable crops. Seed spices production technology. Post harvest management of horticultural crops. Intrtroduction to forestry and hitech horticulture

Cell and cell division. Mendelian principles of heredity, Multiple alleles and blood groups. Linkage, crossing over mechanisms, changes in chromosome, polygenes and continuous variations, cytoplasmic inheritance, genetic material, modes of reproduction and pollination, apomixes, self – incompatibility and male sterility, domestication, acclimatization, introduction; centre of origin, Plant genetic resources, its utilization and conservation. Variation – its causes and importance. Principles and breeding methods of self & cross pollinated crops and vegetatively propagated crops, Breeding for biotic and abiotic stresses, heterosis and inbreeding depression, population improvement, polyploidy, mutation and mutation breeding, release and notification of varieties, Patenting, PPV&FR Act 2001, Plant Breeders and & Farmer's Rights. Seed technology, seed production of important crops of Rajasthan Minimum seed certification standards. Seeds Act, Seeds Control Order.

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Chemistry of carbohydrates, lipids, proteins and plant (phyto) hormones. Chemistry of Nucleic acids and their functions. Outlines of metabolism of carbohydrate, lipid and protein. General account of enzymes, coenzymes and secondary metabolites. Brief outlines of plant tissue culture and plant biotechnology. Molecular markers and their application in Agriculture

Photosynthesis and photorespiration. Respiration. Physiology of flowering, Photoperiodism. Physiology of growth, PGRs and their role. Seed development, germination and dormancy.

Classification of economically important insects and mites upto family level. Study of ecosystems and wild life preservation. Insect dominance. Concept and principles of IPM, Components of IPM: Physical, mechanical, cultural, chemical (including novel insecticide molecules), biological, legal and other modern approaches. Identification, nature of damage, bionomics and management of insect-pests and mites of agricultural importance. Lac culture, sericulture and apiculture.

Milestones in plant pathology and nematology. Terms and concepts of Plant Pathology. General introduction to plant pathogenic organisms (Fungi, Bacteria, Nematodes, Virus, Viroids). Causes and classification of plant diseases. Classification of plant pathogenic fungi, bacteria and nematodes. Morphology, growth, nutrition and reproduction of fungi and bacteria. Phanerogamic parasites. Symptoms, etiology and management of important diseases of major cereals, pulses, oilseeds, fruits, vegetables, spices & cash crops. Fungicides and antibiotics for plant disease management.

Meaning and definition of extension education, philosophy of extension, process of extension education, basic concepts in extension (need, knowledge, attitude, skill, behavior, objectives, rural leadership and motivation). Rural social institutions, caste, family and social groups. Extension programmes in India. Teaching- learning process, teaching methods, use of audio-visual aids in training & communication process. Organizing trainings, front line demonstrations, field days, kisan mela, exhibition, campaign. Writing reports, radio talks, news, writing of farm literature and scientific information.

Meaning and scope of Economics. Basic concept : Goods and services, desire, want, demand, utility, cost and price, wealth, capital, income and welfare. Agricultural economics : meaning, definition, characteristics of agriculture, importance and its role in economic development. Demand : meaning and definition, kinds of demand, law of demand, demand schedule and demand curve, determinants of demand. Supply: Stock v/s supply, law of supply, supply schedule, supply curve, determinants of supply. Cost: Cost concepts, short run and long run cost curves. Concepts of rent, wage, interest and profit. National income: Meaning and importance, concepts of national income accounting and approaches to measurement. Tax : meaning, direct and indirect taxes, agricultural taxation, GST. Credit needs and its role in Indian Agriculture. Agricultural credit : meaning, definition and classification. 3 R's, 5C's and 7P's of credit. Sources of agricultural finance : institutional and non-institutional sources. An introduction to higher

financing institutions - RBI, NABARD, ADB, IMF, World bank, Insurance and Credit Guarantee Corporation of India. Financial statements- Balance Sheet and Income Statement. Meaning, concept and principles of farm management. Law of returns and returns to scale. Farm business analysis. Importance of farm records and accounts in managing a farm, farm inventory, balance sheet, profit and loss accounts. Meaning and importance of farm planning and budgeting, Concept of risk and uncertainty in agriculture production.

Classification of feeding stuff and computation of balance ration for various categories of farm animals. Conservation of feeds and fodder-hay and silage. Puberty, estrus cycle, pregnancy and parturition in farm animals. Milk secretion, composition, milking methods in dairy animals. Factors affecting milk yield and composition in farm animals. Breeding, feeding, housing and health management in livestock and poultry. Basis and methods of selection in livestock and poultry. Hatching, brooding and feeding management in poultry.

## **Post Graduation Level**

Adverse climatic factors, Remote sensing, Herbicidal resistance, site specific nutrient management, concept and importance of water shed management in dryland areas, Good agronomic practices, Agroforestry systems, Effect of excess water on plant growth and production, drought, measurement of irrigation water; irrigation efficiencies, design of irrigation structures, Amelioration of salt affected soils.

Protected cultivations of vegetables and flowers, Role of PGR's in Horticulture, Micropropagation, Ripening and Maturity indices of important vegetables and fruits; Landscape, gardening and postharvest management of Flowers, dryland Horticulture.

Transgenic plants in relation to IPM. Exploitation of natural enemies in insect pest management, Semiochemicals and newer molecules of insecticides, biopesticides. Rearing of parasitoids and predators for inoculative and inundative release.

Major epidemics and their social impact. Edible fungi. General principles of plant disease management and IDM.

Combining ability and nature of gene action, Denaturation and renaturation, Gene amplification, Transposable genetic elements, Types/kinds of genes, Genomics and proteomics, Gene regulation, allel mining and TILLING, Bioinformatics, Nanotechnology, DNA sequencing, gene pyramiding, karyotyping, Alien addition and substitution lines, Endomitosis, Balanced Lethals.

Peculiarities of Agricultural Marketing. Marketed and Marketable surplus. Functions of Agricultural Marketing. GST, e-NAM, Marketing efficiency, Regulated Markets.

Factors affecting productive and reproductive efficiency in livestock and poultry. Selection and breeding of livestock and poultry for higher production. Constraints of cattle, buffalo, sheep, goat and camel production in Rajasthan. Management of livestock and poultry under adverse



climatic conditions. Economics of milk and egg production. Common nutritional disorders in livestock and poultry.

Need assessment, bench mark survey and PRA technique. Programme planning & evaluation, impact assessment.

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