

AGRICULTURE OPTIONAL

Syllabus

Paper 1 :

- Ecology and its relevance to man, natural resources, their sustainable management and conservation.
 - Physical and social environment as factors of crop distribution and production.
 - Agro ecology; cropping pattern as indicators of environments.
 - Environmental pollution and associated hazards to crops, animals and humans.
 - Climate change—International conventions and global initiatives.
 - Greenhouse effect and global warming.
 - Advanced tools for ecosystem analysis—Remote Sensing (RS) and Geographic Information Systems (GIS).
- Cropping patterns in different agro-climatic zones of the country.
 - Impact of high-yielding and short-duration varieties on shifts in cropping patterns. Concepts of various cropping, and farming systems.
 - Organic and Precision farming. Package of practices for production of important cereals, pulses, oil seeds, fibres, sugar, commercial and fodder crops.
- Important features, and scope of various types of forestry plantations such as social forestry, agro-forestry, and natural forests : Propagation of forest plants.
 - Forest products.
 - Agro-forestry and value addition.
 - Conservation of forest flora and fauna.
- Weeds, their characteristics, dissemination and association with various crops; their multiplications; cultural, biological, and chemical control of weeds.
- Soil—physical, chemical and biological properties.
 - Processes and factors of soil formation.
 - Soils of India.
 - Mineral and organic constituents of soils and their role in maintaining soil productivity.
 - Essential plant nutrients and other beneficial elements in soils and plants.
 - Principles of soil fertility, soil testing and fertiliser recommendations, integrated nutrient management Biofertilizers.
 - Losses of nitrogen in soil, nitrogen-use efficiency in submerged rice soils, nitrogen fixation in soils.
 - Efficient phosphorus and potassium use.
 - Problem soils and their reclamation.
 - Soil factors affecting greenhouse gas emission.
- Soil conservation, integrated watershed management.

- Soil erosion and its management.
- Dry land agriculture and its problems.
- Technology for stabilising agriculture production in rainfed areas.
- Water-use efficiency in relation to crop production, criteria for scheduling irrigations, ways and means of reducing run-off losses of irrigation water.
 - Rainwater harvesting.
 - Drip and sprinkler irrigation.
 - Drainage of water-logged soils, quality of irrigation water, effect of industrial effluents on soil and water pollution.
 - Irrigation projects in India.
- Farm management, scope, importance and characteristics, farm planning.
 - Optimum resource use and budgeting.
 - Economics of different types of farming systems.
 - Marketing management strategies for development, market intelligence.
 - Price fluctuations and their cost; role of cooperatives in agricultural economy; types and systems of farming and factors affecting them.
 - Agricultural price policy.
 - Crop Insurance.
- Agricultural extension, its importance and role, methods of evaluation of extension programmes, socio-economic survey and status of big, small and marginal farmers and landless agricultural labourers; Training programmes for extension workers.
 - Role of Krishi Vigyan Kendra's (KVK) in dissemination of Agricultural technologies.
 - Non-Government Organisation (NGO) and self-help group approach for rural development.

Paper 2 :

- Cell structure, function and cell cycle. Synthesis, structure and function of genetic material.
 - Laws of heredity.
 - Chromosome structure, chromosomal aberrations, linkage and cross-over, and their significance in recombination breeding.
 - Polyploidy, euploids and aneuploids.
 - Mutation—and their role in crop improvement.
 - Heritability, sterility and incompatibility, classification and their application in crop improvement.
 - Cytoplasmic inheritance, sex-linked, sex-influenced and sex-limited characters.
- History of plant breeding.
 - Modes of reproduction, selfing and crossing techniques.
 - Origin, evolution and domestication of crop plants, center of origin, law of homologous series, crop genetic resources—conservation and utilization.
 - Application of principles of plant breeding, improvement of crop plants.
 - Molecular markers and their application in plant improvement.

- Pure-line selection, pedigree, mass and recurrent selections, combining ability, its significance in plant breeding.
- Heterosis and its exploitation.
- Somatic hybridization.
- Breeding for disease and pest resistance.
- Role of interspecific and intergeneric hybridization.
- Role of genetic engineering and biotechnology in crop improvement.
- Genetically modified crop plants.
- Seed production and processing technologies.
 - Seed certification, Seed testing and storage.
 - DNA finger printing and seed registration.
 - Role of public and private sectors in seed production, and marketing.
 - Intellectual Property Rights (IPR) issues, WTO issues and its impact on Agriculture.
- Principles of Plant Physiology with reference to plant nutrition, absorption, translocation and metabolism of nutrients. Soil-water-plant relationship.
- Enzymes and plant pigments; photosynthesis—modern concepts and factors affecting the process, aerobic and anaerobic respiration; C₃, C₄ and CAM mechanisms.
 - Carbohydrate, protein and fat metabolism.
 - Growth and development; photoperiodism and vernalization.
 - Plant growth substances and their role in crop production.
 - Physiology of seed development and germination; dormancy.
 - Stress physiology—draught, salt and water stress.
- Major fruits, plantation crops, vegetables, spices and flower crops.
 - Package practices of major horticultural crops.
 - Protected cultivation and high tech horticulture.
 - Post-harvest technology and value addition of fruits and vegetables.
 - Landscaping and commercial floriculture.
 - Medicinal and aromatic plants.
 - Role of fruits and vegetables in human nutrition.
- Diagnosis of pests and diseases of field crops, vegetables, orchard and plantation crops and their economic importance.
 - Classification of pests and diseases and their management.
 - Integrated pest and disease management.
 - Storage pests and their management.
 - Biological control of pests and diseases.
 - Epidemiology and forecasting of major crop pests and diseases.
 - Plant quarantine measures.
 - Pesticides, their formulation and modes of action.
- Food production and consumption trends in India.
 - Food security and growing population—vision 2020.
 - Reasons for grain surplus.
 - National and International food policies.
 - Production, procurement, distribution constraints.

- Availability of foodgrains, per capita expenditure on food.
- Trends in poverty, Public Distribution System and Below Poverty Line population, Targeted Public Distribution System (PDS), policy implementation in context to globalisation.
- Processing constraints.
- Relation of food production to National Dietary Guidelines and food consumption pattern.
- Food based dietary approaches to eliminate hunger.
- Nutrient deficiency—Micronutrient deficiency : Protein Energy Malnutrition or Protein Calorie Malnutrition (PEM or PCM), Micro nutrient deficiency and HRD in context of work capacity of women and children.
- Food grain productivity and food security.



Scan this QR Code for details on UPSC CSE Optional Subjects. Get Subject Specific Syllabus, Booklist, PYQs instantly for free!

OR Visit upscmonk.in/optional-subject/