AGRICULTURE OPTIONAL REPORT

- Geography: 50%
- Zoology: 20%
- Botany: 20%
- Economics: 10% (Can be dealt by Geography faculty)

Macro topic	Micro Topics
Ecology	❖ Ecology and its relevance to man, natural resources, their sustainable management and conservation. ❖ Physical and social environment as factors of crop distribution and production. ❖ Agroecology, cropping patterns 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).
Agronomy	❖ 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, oilseeds, fibres, sugar, commercial and fodder crops.

Forestry	❖ Important features and scope of various types of forestry plantations, such as social forestry, agroforestry, and natural forests. ❖ Propagation of forest plants. Forest products. ❖ Agroforestry and value addition. ❖ Conservation of forest flora and fauna.
Weed Science	❖ Weeds, their characteristics, dissemination and association with various crops; their multiplications; cultural, biological, and chemical control of weeds.
Soil science and nutrient management	❖ 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 the soil, nitrogen-use efficiency in submerged rice soils, and nitrogen fixation in soils. ❖ Efficient phosphorus and potassium use. ❖ Problem soils and their reclamation. ❖ Soil factors affecting greenhouse gas emission.

Soil and water conservation	❖ Soil conservation, integrated watershed management. ❖ Soil erosion and its management. ❖ Dryland 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 runoff losses of irrigation water. ❖ Rainwater harvesting. ❖ Drip and sprinkler irrigation. ❖ Drainage of waterlogged soils, quality of irrigation water, the effect of industrial effluents on soil and water pollution. ❖ Irrigation projects in India.
Agricultural economics	❖ 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 and 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	❖ 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 the dissemination of Agricultural technologies. ❖ Non-Government Organizations (NGO) and self-help group approach for rural development.

Agriculture Optional Syllabus - Paper 2

Macro topic	Micro topics
Cell biology/ Plant Genetics	❖ 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. ❖ Mutations – 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.
Plant breeding	❖ History of plant breeding. Modes of reproduction, selfing and crossing techniques. ❖ Origin, evolution and domestication of crop plants, centre of origin, law of homologous series, crop genetic resources conservation and utilization.

	❖ Application of principles of plant breeding, and improvement of crop plants. ❖ Molecular markers and their application in plant improvement. ❖ Pure-line selection, pedigree, mass and recurrent selections, combining ability, and 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 technology	❖ Seed production and processing technologies. ❖ Seed certification, seed testing and storage. ❖ DNA fingerprinting 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.
Plant physiology	❖ 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. ❖ Carbohydrates, protein and fat metabolism. ❖ Growth and development; photoperiodism and vernalisation. - Plant growth substances and their role in

	crop production. - Physiology of seed development and germination; dormancy. - Stress physiology – draught, salt and water stress.
Horticulture and landscaping	❖ 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.
Plant protection	❖ 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 nutrition Management	❖ 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, and distribution constraints. - Availability of food grains, 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 patterns. ❖ 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 the context of the work capacity of women and children. ❖ Food grain productivity and food security.