Syllabus Class XI

BIORESOURCES

Maximum Marks: 100

Theory Marks: 70

Practical Marks: 30

Term I

Theory: 35 Marks

U_1: 10 Marks

T_1: 25 Marks **Time: 2 ½ hours**

Unit I: Bioresources and livelihood 8 Marks

Types of bioresources (Plant, Animal and microbial bioresources); Relationship of bioresources with livelihood; World food security (Food crisis and malnutrition); Alternative sources of food (Algae as food — *chlorella, spirulina*, single cell proteins, transgenics with improved nutritional quality); Limitations of Non renewable sources of energy; Green energy (Concept of bionenergy); Health risks and environmental impact of chemical herbicides, pesticides and fertilizers; Bioherbicides and biopesticides (concept and advantages).

Unit II: Food and fodder crops 9 Marks

Cereals— cultivation and utility of rice (*Oryza sativa*) and wheat (*Triticum aestivum*); Pseudocereals (concept), Cultivation and nutritive value of buckwheat (*Fagopyrum spp.*) and foxtail millet (*Steria italica*); Plant oils (fixed oils and essential oils); Important edible oils, composition and health benefits (mustard, sun flower, linseed, coconut and olive oil); Fodder crops, cultivation and nutritive importance of alfalfa (*Medicago sativa*), Oats (*Avena sativa*) and clover (*Trifolium)*.

Unit III: Fruits, vegetables, spices and forest products 9 Marks

Rosaceous fruits (apple, peer, cherry, plums & peach) — fruit mophology, nutritive value and economic utility; Walnut and almond— fruit morphology and nutritive value; Wild vegetables— *Taraxicum officinale*, *Malva sylvestris* (morphology and health benefits); Spices and condiments, saffron, ginger, garlic, cumin, coriander, fennel— nutritive value and medicinal importance; Wood— constituent elements, chemical composition & physical properties; Wicker works; Gums & resins (sources and importance)**.**

Unit IV: Microbial and fungal resources 9 Marks

Bacterial synthesis of biopolymers (Biolplastic & starch polymers); Gut microbiota and human health; Microbes for production of bread, cheese, alcohol, single cell proteins, vitamins and recombinant proteins; Mushrooms as food— edible mushrooms (nutritive value), non-edible mushrooms (poisonous mushrooms); Microbes as a source of antibiotics (Penicillin and Streptomycin), interferons & amino acids.

Term I

Practical **Time: 3 hours**

Marks: 15

- Study life forms of *spirullina, chlorella, Lactobacillus, E.coli, Saccharomyces cervisiae, Agaricus, Morchella, Pleurotus and Amanita* through charts/slides/ specimens.
- Study seed structure of pseudocereals (buckwheat, amaranthus).
- Study T.S of mustard seed and linseed through permanent slides.
- Morphology of fodder crop (*Trifolium, Avena sativa)*.
- Study types of fruit.
- Collection of common wild vegetables and their morphological description.
- Collection of ten common spices and condiments, botanical names and part used.
- Determination and comparison of density of various wood samples.
- Collection of resin from various resin yielding plants.
- Study bacteria in a curd sample.

Term II

Theory: 35 Marks

U_2: 10 Marks

T_2: 25 Marks **Time: 2 ½ hours**

Unit V: Dairy Farming **9 Marks**

History, origin and domestication of diary animals; Important cattle breeds of Jammu and Kashmir (indigenous and exotic); Processing, homogenization, pasteurization and packaging of milk; Composition and method of manufacture of butter, dahi, ghee, condensed milk and milk powder; Epidemiology of common diseases of dairy animals (Anthrax, Foot & Mouth disease); Zonotic diseases (Brucellosis).

Unit VI: Fish Farming **9 Marks**

Fish Industry in J&K; Role of Fish industry in food supply and human service; Major food fishes of J&K; Integrated fish farming, Fish monoculture, polyculture and composite culture; Artificial breeding in fish; Carp and Trout Culture; Fish by-products; Processing and preservation of fish and its products; Important diseases of fish; Biomagnification.

Unit VII: Applied Entomology **9 Marks**

Beneficial role of insects (Pollination and waste degradation); Insect products— honey, bee wax, bee venom, silk, lac and lac byproducts; Importance and scope of insect based industries; Bee keeping Industry in J&K; Silkworm breeds, mulberry and non-mulberry silkworms; Synthesis of silk, cocooning, harvesting and grainage; Life history of Lac insect; Lac cropping techniques and harvesting.

Unit VIII: Poultry Farming **8 Marks**

Important breeds of fowl and turkey (indigenous and exotic); Present status and future prospects of poultry farming in J&K; Poultry farm management; Egg production, cable bird production, selection of eggs, hatching, incubation, brooding, sexing and vaccination; Common diseases and parasites of Poultry (Bird flu, Ranikhet, Fowl cholera and Fowl pox).

Term II

Practical **Time: 3 hours**

Marks: 15

- Test the fat content of milk.
- Study morphology of cultivable fishes (common carp, trout and schizothorax).
- Visit local fish hatcheries to study cultivation process and artificial breeding in fishes.
- Collection of insects and preparation of insectorium (10 insects)
- Study life cycle of honey bee through charts/slides/ specimens.
- Study life cycle of silk worm through charts/slides/ specimens.
- Quality test of silk by physical and chemical methods.
- Visit to poultry farms and study different breeds of poultry in Jammu and Kashmir.

Syllabus Class XII

BIORESOURCES

Maximum Marks: 100

Theory Marks: 70 **Time: 3 hours**

Practical Marks: 30

Unit I: Green Agriculture **10 Marks**

Organic farming— concept and importance; Biofertilizers, organic waste as fertilizers (composting); Vermicompost; Mycorrhizas— types and importance; Biological nitrogen fixation, cyanobacteria as biofertilizers; Plant growth promoting bacteria (PGPBR), their importance; Biocontrol, IPM (Integrated Pest Management), biopesticides.

Unit II: Biomedicine **10 Marks**

Concept of Indian System of Medicine (ISM/AYUSH); Herbal medicine; Morphology and ethno-medicinal uses of *Arnebia benthamii, Atropa acuminata, Rheum emodi, Podophylum hexandrum, Saussurea costus*; Aroma therapy; Leech therapy; Antidote, Medicinal uses of animal venom; Honey in traditional medicine; pollen tablets; Safety and efficacy of traditional medicine (Overview).

Unit III: Biocosmetics **10 Marks**

Biocosmetics (brief history), Classification of bio-based products in cosmetics according chemical nature (carbohydrates, glycosides, tannins, lipids, volatile oils, steroids, phospatides, protein and protein hydrolysates) and function (thickeners, scents, hair preparations, dental preparations and anti-aging products); Herbs in cosmetics (turmeric, aloevera, rose, rose merry, lavender, sandal, dandelion, ginseng); Animals products in cosmetics (musk, keratin, squaline, carmine, lanolin, hyaluronic acid, collagen and elastin).

Unit IV: Bioenergy **10 Marks**

Biomass as energy source; Burning, gasification & pyrolysis of biomass (brief concept); Biofuels— concept and classification (first, second, third and fourth generation biofuels); Biodiesel— preparation from oils by transesterification; Bioethanol— production from starch rich plant material; Biohydrogen (brief concept); Biogas production.

Unit V: Bioprospecting **9 Marks**

Bioprospecting, types of bioprospecting; Traditional Knowledge— importance for bioprospecting; Ethical issues of bioprospecting; Intellectual Property Rights (patents); Concept of Prior art; Biopiracy (Neem, Basmati, Turmeric); Prevention of Biopiracy, Concept of Traditional Knowledge Digital Library (TKDL).

Unit VI: Bioresources and Environment Management **9 Marks**

Bioremediation; Bioremediation processes (in-situ bioremediation, solid and slurry–phase bioremediation, liquid-phase bioremediation); Bioleaching and biodegradation; Bioremediation of organic, metals and inorganic contaminants, phytoextraction, rhizofiltration, phytostabilization; Microbes in waste water treatment; Sewage treatment plant, genetically modified microbes in sewage treatment; Biosensors.

Unit VII: Bioresource Management **12 Marks**

Biodiversity conservation (in-situ and ex-situ conservation methods); Hotspots and surrogate species (Concept and importance); Government livelihood programmes (Brief overview of Bioresource management (BM), National afforestration programme, Rural Livestock development programme, Horticulture and agricultural development programme); Environment Impact Assessment (EIA); Convention on Biological Diversity (CBD)— Aims and objectives; Ramsar Convention.

Practical **Time: 3 hours**

Marks: 30

Internal: 10 Marks

External: 20 marks

- Study of nitrogen fixing cyanobacteria from charts/slides/ specimens.
- Demonstrate preparation of vermicompositing.
- Morphology of common medicinal plants (*Saussurea lapa, Arnebia benthamii, Podophylum hexandrum*) and the parts used.
- Quality test of honey and lac.
- Preparation of glycerine.
- Test the presence of carbohydrates, tannins and alkaloids.
- Morphology of herbs (turmeric, rose, lavender). and their biochemical constituents used in cosmetics
- Preparation of biodiesel from oils by transesterification.
- Field visits and interaction with herbal healers.
- Visit sewage water treatment plant.
- Visit botanical garden and wild life sanctuary.
- Preparation of herbarium (10 sheets).