

BIOREOURCES
P. G. ENTRANCE TEST SYLLABUS- 2025

Note: The syllabus is based on NEP-2020 syllabi of Bioresources and Allied subjects taught at UG level. The syllabus prescribed for the entrance test has been divided into fifteen units. Each unit carries a weightage of four marks. Paper setters are required to set four multiple choice type questions with only one correct or most appropriate answer separately for each unit, giving uniform representation to the whole syllabus contained therein.

1. **Chemical Basis of Life:** Chemical bonding, types and bond strength, laws of thermodynamics, concept of equilibrium, free energy, enthalpy, entropy, principles of bioenergetics, redox reactions, redox potential, ATP as a biological currency. Importance of water to life, physical properties of water (structure of water, water as a solvent, osmosis, imbibition, diffusion). Chemical properties of water (ionization of water, concept of pH); buffers.
2. **Fundamentals of Bioresources:** Concept of biodiversity, components and levels of biodiversity; biodiversity hotspots, direct and indirect use values of biodiversity; loss of biodiversity and species extinction; IUCN threat categories; in-situ and ex-situ conservation strategies; sustainable development; Energy crisis and food insecurity; Convention on biological diversity (CBD); Ramsar convention; Environment impact assessment (EIA).
3. **Plant Resources:** Centres of origin of agriculture (Vavilov's work); Morphology and origin of Rice and Maize; Morphology and importance of wild vegetables—*Taraxacum officinale*, *Cichorium intybus*, *Malva sylvestris*; Surface and bast fibres (cotton and jute); Spices and condiments, Saffron (cumin, coriander, fennel); pseudo-cereals (buckwheat morphology and nutritional importance); Important sources of gums and resins.
4. **Animal Resources:** History of domestication; Important methods of selection and systems of breeding in farm animals, applications of inbreeding and out-breeding; Genetic basis of heterosis and its use; High milk yielding breeds of cattle; Aquaculture (carp and trout culture), Types of farming systems- extensive, semi intensive and intensive culture; Cage culture; Integrated fish farming with details of paddy-cum-fish culture.

5. **Microbial Resources:** Types of viruses, structure of viruses (TMV), viroids, prions; Structure of bacteria; Microbial growth (specific growth and doubling time); Nitrogen fixing bacteria (Rhizobium and azotobacter); Plant growth promoting bacteria; microbial cells as food (single cell proteins); microbes in bioremediation; microbes as source of medically important secondary metabolites; edible mushrooms—*Agaricus* (Life cycle).
6. **Herbal Technology:** Morphology and medicinal importance of *Arnebia benthamii*, *Atropa acuminata*, *Saussurea costus*, *Catharantus roseus* and *Rheum emodi*; Herbal sources of fragrances (lavender and rose); herbs in dental health (clove); herbs in skin care (alovera, rose, neem); herbal sources of hair colour; Bioprospecting— Concept, Role of traditional knowledge in bioprospecting, Biopiracy, case studies of biopiracy (Basmati, Neem, Turmeric), Traditional Knowledge Digital Library (TKDL).
7. **Industrial entomology:** History of apiculture, Social organization in honey bees, apiculture (Bee keeping equipment and methods, diseases of honey bee and their management, products of apiculture (honey, bee wax and bee venom); History of sericulture, Life cycle of silk worm, major breeds of silkworm, silkworm rearing (methods and management), diseases and predators of silkworm; Lac culture, life cycle of lac insect, lac products (lac dye, lac wax and shellac).
8. **Bioresources in immune modulation:** Introduction to immune system: Cells and organs of immune system; Innate immunity, phagocytosis, complement system, cytokines, chemokines, inflammatory mediators; acquired immunity, cell mediated and humoral immunity, Immunoglobulins, Hypersensitivity, probiotics and prebiotics, Immunomodulatory Proteins and Amino Acid.
9. **Cell biology:** Structure and functions of cell wall, plasma membrane, golgi apparatus, endoplasmic reticulum, chloroplast, mitochondria, ribosomes, and central vacuole; Fluid mosaic model of plasma membrane; Organization of genetic material with special reference to nucleosome model, chromosome structure; Concept and phases of cell cycle, mitosis and meiosis.
10. **Molecular biology:** DNA replication in prokaryotes and eukaryotes; Gene expression-transcription and its mechanism, role of enzymatic machinery involved in transcription.

Translation- concept of genetic code, structure and functions of rRNA, tRNA, mRNA in translation, mechanism of translation (initiation, elongation and termination).

11. **Carbohydrates and Lipids:** Classification of carbohydrates; Isomerism (D & L and R & S system); Reducing and Non-reducing sugars; Storage and structural polymers and their importance (starch, glycogen cellulose); Classification of lipids, structure and importance of triacylglycerols, phospholipids, glycolipids, sphingolipids and cholesterol; structure and properties of saturated and unsaturated fatty acids.
12. **Proteins and Enzymes:** Structure and classification of amino acids; Stereoisomerism in amino acids, Protein structure (primary and secondary structure of proteins); Fibrous and globular proteins (collagen, haemoglobin); Nomenclature and types of enzymes; concept of holozymes, apoenzymes, coenzymes and cofactors, mechanism of enzyme action; Enzyme inhibition (reversible and irreversible inhibition).
13. **Inheritance biology:** Mendel's laws of inheritance, allelic and non-allelic interactions; dominance, incomplete dominance, codominance, independent assortment; epistasis (13:3, 12:3:1), duplicate (15: 1) and complementary (9:7) genes with suitable examples. Structure and functions of nucleotides and nucleic acids, structure and forms of DNA (A, B and Z), Numerical changes in chromosomes (aneuploidy and euploidy), structural changes in chromosome, deletions, duplications, inversions and translocations.
14. **Environment and Energy:** Biogeochemical cycles of carbon and nitrogen; Causes and consequences of air, water and soil pollution; Global warming, Green house effect; Ozone depletion; Acid rain. Renewable energy— Biogas production, Energy plantation (Jatropha & Jojoba).
15. **Bioresources and Biotechnology:** Recombinant DNA technology, restriction enzymes, types of vectors, transformation techniques (calcium chloride method and electroporation), Agrobacterium mediated gene transfer, Polymerase chain reaction; genetically modified organisms or GMO's (mice, cattle, BT cotton and tomato) uses, ethical, environmental and health issues; Molecular farming (edible vaccines).