TWO YEARS P.G. PROGRAMME IN MICEROBIOLOGY
CENTRE OF RESERACH FOR DEVELOPMENT
UNIVERSITY OF KASHMIR, SRINAGAR – 190006

ENTRANCE TEST SYLLABUS FOR ADMISSION TO M. SC. MICROBIOLOGY AS PER NEP-2020 (SESSION: 2026)

Note:
The syllabus prescribed for the entrance test has been divided into twelve units. Each unit carries a weightage of four marks. Paper setters are required to set five multiple choice type questions with only one correct or most appropriate answer for each question separately for each unit, giving uniform representation to the whole syllabus contained therein.

Unit: 1
Development of microbiology as a discipline; Establishment of fields of medical microbiology, immunology and environmental microbiology; Binomial nomenclature of microbes; Whittaker's five kingdom and Carl Woese's three kingdom classification systems and their utility; Difference between prokaryotic and eukaryotic microorganisms.

Unit: 2
General characteristics, distribution, occurrence, morphology, mode of reproduction and economic importance of acellular microorganisms (Viruses, Varroids, Prions) and cellular microorganisms (Bacteria, Algae and Fungi); Fungi: Fungal wall structure and synthesis; Fungal asexual and sexual reproduction, heterokaryosis, heterothallism and parasexual mechanism. Precise account of typical eubacteria, chlamydia and rickettsiae, mycoplasma and archaebacteria (extremophiles). General characteristics of algae: occurrence, thallus organization, algae cell ultra structure, pigments, flagella and vegetative, asexual and sexual reproduction. General characteristics of protozoa with special reference to Amoeba, Paramecium and Giardia.

Unit: 3
Concept of innate and adaptive immunity; Structure, functions and properties of immune cells, stem cell, T-cell, B-cell, macrophage, neutrophil, eosinophil, basophil, mast cell, dendritic cells and immune organs–bone marrow, thymus, lymph node, spleen, GALT, MALT, CALT; Characteristics of an antigen; Haptens; Epitopes (T & B cell epitopes); Structure, types, functions and properties of antibodies; Antigenic determinants on antibodies; VDJ rearrangements; Primary and secondary immune response; Generation of humoral and cell mediated immune response.

Unit: 4
Basic organic reaction mechanisms; Oxidation-reduction; Redox potential; Coupled reactions; Elirninafion, isomerization and rearrangements; Dipole-dipole interactions, hydrogen bonds, vanderwaals forces, concepts of acids and bases; Electrophiles and nucleophiles; Chemical kinetics and catalysis; Orders of reactions, concepts of activation energy and reaction rates; Laws of photochemistry; Photochemical reactions; Laws of thermodynamics. Glycolysis, TCA cycle, pentose phosphate pathway, gluconeogenesis, glycogen synthesis and breakdown; β-oxidation of fatty acids; Metabolisrn of fatty acid, triacylglycerol and cholesterol; Eiectron transport chain and oxidative phosphorylation; Transamination and deamination reactions; Urea cycle; Metabolism of phenylalanine, tyrosine and tryptophan.

Unit: 5
History, general characteristics, nomenclature, classification and activity of enzymes; Concept of holoenzymes, apoenzymes, coenzymes and cofactors; Mechanism of enzyme action; Structure and function of carbohydrates, lipids, vitamins, nucleic acids, amino acids and proteins; Anabolism and catabolism of biomolecules (carbohydrates, lipids, aminoacids and nucleic acids); Units of energy, BMR and its measurements; Protein energy malnutrition.

Unit: 6

Eukaryotic cells and genomes; Structure, composition and function of cell wall, plasma membrane, mitochondria, plastids, endoplasmic reticulurn, nucleus, lyssomes and ribosomes; Composition and structure of cellular membranes; Active and passive membrane transport; Role of mitochondria and chloroplasts for cellular energy transaction.

Unit: 7

Mendelian genetics (laws and principles of segregation and independent assortment); Linkage and crossingover; Chromosome organization; Basic concepts of genetic information; Central dogma of molecular biology; Replication, transcription and translation of prokaryote and eukaryotes; Spontaneous and induced chromosomal and gene (point) mutations; Regulation of gene expression; Human genetic disorders (single gene, multiple gene and chromosomal); Genetic counseling, eugenicsand euphenics; Gene therapy; Stem cell and regenerative medicine; Reproductive cloning. Concept of recombinant DNA technology; Cloning vectors: Plasmids, Bacteriophages, Cosrnids, phagenrids, YAC; Restriction enzymes and ligases; PCR.

Unit: 8

Definition and scope of clinical biochemistry in diagnosis; Enzyme patterns in health and disease states with reference to plasma lipase, amylase, cholinesterase, alkaline and acid phosphatase; SGOT, SGPT, LDH and CPK; Kidney and liver function test; Antigens and antibodies reactions; Antibody mediate immunity; Major histo-compatibility complex. Standard values for important constituents in blood and urine; kidney, liver and thyroid function test (KFT, LFT and TFT); Lipid profile; Glucose tolerance tests; Urine and stool examination. Different stages and regulation of cell cycle; Receptor mediated cell signaling; Different types of receptors; Secondary messengers; Protein modification with specific emphasis on oncogenesis; The role in signal transduction processes.

Unit: 9

Photosynthetic pigments; Z-scheme; C3, C4 and CAM pathways; Aerobic and anaerobic respiration; Krebs cycle and electron transport mechanism; Transport across plant cell; Transpiration; Flowering; Plant hormones; Biology of nitrogen fixation and ammonium assimilation; Photoperiodism; Physiologiocal effects of auxins, gibberellins, cytokinins, abscisic acid and ethylene.

Unit: 10

Protocols for plant tissue culture; Sterile methods in plant tissue culture; Media for plant tissue culture; Safety in plant tissue culture; Agrobacterium culture; Production of transgenic plants; Morphology, cultivation and economic importance of rice; Types of plant fibres; Processing and uses of jute; Types of vegetable oil; Extraction, processing and uses of mustard; Medicinal importance of plants.

Unit: 11

Biotic and abiotic components of ecosystems; Food chain and food webs; Population size, growth, limiting factors, carrying capacity; Land, water and air pollution; Theories of organic evolution; Captive breeding; Ecological succession; Biogeochemical cycles; Hydrological cycle and global water balance. Wild-life of J & K; Fish and fisheries of J & K.

Unit: 12

Types of biological data; Descriptions of samples and populations; Measures of central tendency and dispersion; Coefficient of variation and standard deviation (SD); Analysis of variance; Hypothesis testing using standard normal variate; Probability; Distribution theory; Standard error of mean; Confidence interval and hypothesis testing of the population mean-t test; Chi square test and its applications; Linear regression and correlation.

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