

Karnataka Examinations Authority, Bengaluru - 560012**PGCET: 2024 – 25****Number of MCQ questions for PGCET is 100. Each question carry one mark.****Syllabus for PGCET in Biotechnology****(1)Engineering mathematics**

(i)Linear Algebra: Matrices and determinants, Systems of linear equations, Eigen values and Eigen vectors.

(ii)Calculus: Limit, continuity and differentiability, Partial derivatives, Maxima and minima, Sequences and series, Test for convergence, Fourier Series.

(iii)Differential Equations: Linear and nonlinear first order ODEs, higher order ODEs with constant coefficients, Cauchy's and Euler's equations, Laplace transforms, PDE- Laplace, heat and wave equations.

(iv)Probability and Statistics: Mean, median, mode and standard deviation, Random variables, Poisson, normal and binomial distributions, Correlation and regression analysis.

(v)Numerical Methods: Solution of linear and nonlinear algebraic equations, Integration of trapezoidal and Simpson's rule, Single and multistep methods for differential equations.

(2) C Programming for problem solving

(i)Overview of C: Basic structure of C program, executing a C program, variable and data types, operators and expressions. Managing input and output operations, conditional branching and loops. Example programs. Finding roots of quadratic equation, computation of binomial coefficients, plotting of Pascal's triangle.

(ii)Arrays: Arrays (1D, 2D), character arrays and strings, basic algorithms, searching and sorting algorithms (linear search, bubble sort and selection sort).

(3) Technical English

(i) Introduction Listening Skills and Phonetics: Introduction to phonetics, sounds mispronounced, silent and non-silent letters, Homophones and homonyms, aspiration, pronunciation of "The" words ending with age. Use of articles – indefinite and definite articles.

(ii) Identifying Common Errors in writing and speaking English: Subject verb agreement (concord rules with exercises), common errors in subject verb agreement, noun-pronoun agreement. Adjective, adverb, verb, sequence of tenses, misplaced modifiers, Articles and prepositions, common errors in conjunctions. Gender, singular and plural.

(4)Microbiology

Fundamentals of Microbiology; Classification of microorganisms; diversity of Microorganisms; Prokaryotic and eukaryotic cell structure; Microbial nutrition, growth and control; Microbial metabolism (aerobic and anaerobic respiration, photosynthesis); Nitrogen fixation; Chemical basis of mutations and mutagens; Microbial genetics (plasmids, transformation, transduction, conjugation); Microbial diversity and characteristic features; Viruses; Microbial Mechanisms of Pathogenicity; Antimicrobial Drugs ; Microbes and human Welfare.

(5)Biochemistry

Amino Acids, Peptides, Carbohydrates, Lipids: Structure, Function, Methods of Characterization, Separation Techniques, classification, Clinical Significance.: Nucleic Acids and Polynucleotides, Biomolecules and their conformation; Weak inter-molecular interactions in biomacromolecules; Chemical and functional nature of enzymes; Kinetics of single substrate and bisubstrate enzyme catalyzed reactions; Bioenergetics; Metabolism

(Glycolysis, TCA and Oxidative phosphorylation); Membrane transport and pumps; Cell cycle and cell growth control; Cell signalling and signal transduction.

(6) Molecular Biology and Genetics

Basics of Genomics and Proteomics; Molecular structure of genes and chromosomes; DNA replication and control; Transcription and its control; Translational processes; Regulatory controls in prokaryotes and eukaryotes; Mendelian inheritance; Gene interaction; Complementation; Linkage, recombination and chromosome mapping; Extra chromosomal inheritance; Chromosomal variation; Population genetics; Transposable elements; Molecular basis of genetic diseases and applications.

(7) Process Biotechnology

Bioprocess technology for the production of cell biomass and primary/secondary metabolites, such as baker's yeast, ethanol, citric acid, amino acids and antibiotics etc.; Microbial production, purification and bioprocess application(s) of industrial enzymes; Production and purification of recombinant proteins on a large scale; Chromatographic and membrane based bioseparation methods; Immobilization of enzymes and cells and their application for bioconversion processes; Aerobic and anaerobic biological processes for stabilization of solid / liquid wastes; Bioremediation.

(8) Chemical/Bioprocess Engineering

Stoichiometry and chemical equations. Units, dimensions and conversions; Phase rule; gas-liquid and vapour-liquid systems; Material and energy balance for non-reacting and reacting systems; First and Second laws of thermodynamics; Laminar and turbulent flows in fluids; Velocity and pressure drop in pipes; Stoke's law and its applications; Fundamentals of Heat Transfer; Mass transfer coefficient ; Theories of mass transfer.

Kinetics of microbial growth, substrate utilization and product formation; Simple structured models; Sterilization of air and media; Batch, fed-batch and continuous processes; Aeration and agitation. Mass transfer in bioreactors; Rheology of fermentation fluids; Scale-up concepts; Design of fermentation media; various types of microbial and enzyme reactors; Instrumentation in bioreactors.

(9) Immunology

The origin of immunology; Inherent immunity; Humoral and cell mediated immunity; Primary and secondary lymphoid organ; Antigen; B and T cells and Macrophages; Major histocompatibility complex (MHC); Antigen processing and presentation; Synthesis of antibody and secretion; Molecular basis of antibody diversity; Polyclonal and monoclonal antibody; Complement; Antigen-antibody reaction; Regulation of immune response; Immune tolerance; Hyper sensitivity; Autoimmunity; Graft versus host reaction.

(10) Recombinant DNA Technology

Restriction and modification enzymes; Vectors: plasmid, bacteriophage and other viral vectors, cosmids, Ti plasmid, yeast artificial chromosome; cDNA and genomic DNA library; Gene isolation; Gene cloning; Expression of cloned gene; Transposons and gene targeting; DNA labeling; DNA sequencing; Polymerase chain reactions; DNA fingerprinting; Southern and northern blotting; In-situ hybridization; RAPD; RFLP; Site-directed mutagenesis; Gene transfer technologies; Gene therapy; biosafety measures and regulations.

(11) Bioinformatics:

Major Bioinformatics resources (NCBI, EBI, ExPASy); Sequence and structure databases; Sequence analysis (biomolecular sequence file formats, scoring matrices, sequence alignment, phylogeny); Genomics and Proteomics (Large scale genome sequencing strategies;

Comparative genomics; Understanding DNA microarrays and protein arrays); Molecular modelling and simulations (basic concepts including concept of force fields).

(12)Agricultural Biotechnology:

Micropropagation; Genetic engineering for qualitative and quantitative improvement of plant productivities; Protection of traditional knowledge, biodiversity and plant breeders' rights; Germ plasm conservation.

(13)Food Biotechnology

Determining Microorganisms and their Products in Foods; Food Spoilage : Spoilage of Fruits and Vegetables, Microbial Spoilage of Vegetables, Spoilage of Fruits, Spoilage of Fresh and Processed Meats, Poultry, and Seafood, Spoilage of Miscellaneous Foods; Food Preservation, Food Irradiation; Food Preservation; food and beverage fermentation, enzymes and food processing, sweeteners, food waste; Microbial food products, Unconventional food products, GMOs and GM Foods, rapid diagnostics, bioprocess technology for food applications , public acceptance and safety of new biotechnology foods.

(14)Environmental Biotechnology

Introduction to ecology and ecosystem; Environmental pollution (water, soil and air), Waste water (sewage and industrial effluents) treatments; Solid waste management: landfills, composting, recycling; and processing of organic residues; biodegradation of xenobiotic compounds.

