BHARATI VIDYAPEETH
(DEEMED TO BE UNIVERSITY), PUNE, INDIA
PhD Entrance Test – 2024
SECTION-II: Pharmaceutical Biotechnology - 35 Marks

Section II	
1	**Cell structure and functions** Basic aspects of cell function, and cell organelles. Eukaryotic and prokaryotic cell structure. Cell division, mitosis and meiosis, Chromosomes, organization of DNA in chromosomes. Transcription and Translation process. Nucleic acids and their structure, Synthesis of DNA polymerization of nucleotides into DNA, Synthesis of protein- the three role of RNA in translation (m-RNA, t-RNA, r-RNA)
2	**Basic Molecular and genetic mechanisms** DNA replication. Transcription-structure of mRNA and tRNA-splicing-translation-post transcriptional modifications. DNA repair mechanism, excision of thymin-diamer. Mutations and mutagenesis, types of mutations, insertion deletion, point and frameshift mutations. Chromosomal organization and morphology in eukaryotes and prokaryotes-exons and introns, mobile and organelle DNAs, nucleosome-structure and spatial organization-histones-transposons
3	**Recombinant DNA technology** Basic techniques, a detailed study of basic tools used in Recombinant DNA Technology namely Restrictive Endonucleases, Vectors and DNA ligases, Cloning strategies and different host systems. Applications of genetic engineering in the production of some recombinant therapeutic proteins
4	**Immune functions** Vaccine design in relation with the immune response, Modern vaccine technologies such as DNA vaccines, anticancer vaccines, genetically improved live vaccines, genetically improved subunit vaccines, synthetic peptide based vaccines etc. Pharmaceutical Considerations, Monoclonal antibody based pharmaceuticals and immunoglobulins, Regulatory issues.
5	**Enzyme technology** Enzyme sources, techniques in extraction and purification, Enzyme stability and Kinetics, effects of pH, temperature, ionic concentrations on enzyme activity. Applications and immobilization techniques.
6	**Omics, Pharmacogenomics, and bioinformatics.** Biological macromolecules databases and search tools: computational tools and databases, Database mining tools, Genome analysis, Functional genomics and Proteome analysis. Pharmacogenomics, Pharmacogenetics and Proteomics, Next generation sequencing, microarray technology.
7	**Advanced tools in biotechnology** Animal tissue culture, their pharmaceutical applications, Monoclonal antibody production and Biosimilars. A detailed study on the theory, instrumentation and applications of following techniques *viz*., PCR, Blotting techniques, Real-time PCR, Flow Cytometry, ELISA

References:

1. Elements of Biotechnology by P.K. Gupta.
2. Pharmaceutical Biotechnology, Vyas, CBS, Delhi.
3. J. Kubey, Immunology – an Introduction, 2004.
4. E. Benjamini, Molecular Immunology, 2002.
5. Arthur M. Lesk, Introduction to Bioinformatics (2002), Oxford University Press.
6. Text Book of Biotechnology by R.C. Dubey.
7. J.M. Walker and E.B. Gingold: Molecular Biology and Biotechnology by Royal Society of Chemistry.
8. Stanbury F., P., Whitakar A., and Hall J., S., Principles of fermentation technology, 2nd edition, Aditya books Ltd., New Delhi
9. S.B. Primrose: Molecular Biotechnology (Second Edition) Blackwell Scientific Publication.

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