

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH & STUDIES
(Deemed to be University under section 3 of the UGC Act 1956)

Ph.D ADMISSION TEST (MR-PAT)

Ph.D. in Biotechnology

Module 1: Molecules and their Interaction Relevant to Biology

- 1.1 Composition, structure and function of biomolecules
- 1.2 Metabolism of carbohydrates and lipids
- 1.3 Metabolism of amino acids, nucleotides and vitamins

Module 2: Cellular Organization & Fundamental Processes

- 2.1 Structural organization and function of intracellular organelles
- 2.2 Cell division, cell cycle, DNA replication, transcription, translation and regulation of gene expression
- 2.3 Cell Communication and Cell Signaling

Module 3: Inheritance Biology

- 3.1 Mendelian Genetics and Extensions of Mendelian principles
- 3.2 Microbial genetics- transformation, conjugation, transduction, mapping of genes
- 3.3 Human genetics, quantitative genetics and mutations

Module 4: Ecological Principles, Evolution and Behavior

- 4.1 Ecosystem ecology, species interactions, community ecology, Biogeography
- 4.2 Applied Ecology, environmental pollution, climate change and Biodiversity conservation
- 4.3 Evolution of life

Module 5: Methods in Biology and Biotechnology

- 5.1 Molecular Biology and Recombinant DNA methods
- 5.2 Histochemical and Immuno-techniques
- 5.3 Analytical techniques in Biology
- 5.4 Genetic Engineering and its applications

Suggested Readings:

1. Lehninger Principles of Biochemistry (VII Edition), By Nelson, D. L.; and Cox, M. M.W.H. Freeman and Company, 7th Edition, 2017.
2. Kuby- Immunology: R. A. Goldsby, T.J. Kindt, B.A. Osborne, W H Freeman & Co Publication, 8th Edition, 2018.
3. K. Wilson and J. Walker, 1994, Principles and techniques of Practical Biochemistry, Cambridge University Press Publication, 8th Edition 2018.
4. Lodish et.al., Molecular Cell Biology, W.H.Freeman & Co Ltd. Edition 2021.