

GANPAT UNIVERSITY

Syllabus for the Ph. D. Entrance Examination

Instructions:

1. The question paper of the Ph. D. Entrance Examination shall be of 100 marks, to be attempted in 2 hours duration.
2. The question paper will have 2 sections (Section-A and Section-B).
3. Section-A (From Research Methodology) will consist of 50 objective type questions (Multiple Choice), each carrying one mark. Section A shall be common for all the candidates appear in Entrance Examination.
4. Section-B shall be of 50 marks which is Subject specific depends on respective discipline/branch) will consist two parts.
 - Part - I shall be of 25 marks having 25 objective type of questions with multiple choice answers having only one correct answer.
 - Part - II shall be of 25 marks and having descriptive type of questions.
5. There is no negative marking.

SECTION – A

(Common for all candidates)

RESEARCH METHODOLOGY

Total Marks: 50

Unit	Content	Marks
1	Basics of Research: Research: Meaning, Objective, Characteristics, Steps of research, Methods of research, Types of research – Descriptive vs. Analytical, Applied vs. Fundamental, Quantitative vs. Qualitative, Conceptual vs. Empirical.	[05]
2	Research Problem and Research Design Introduction to Research Problem, Necessity of Defining the Problem, Selecting the Problem, Techniques Involved in Defining a Problem, Meaning and Types of Research Design, Important Concepts Relating to Research Design	[10]
3	Data Collection and Analysis Methods of Data Collection- Observation, Interview, Questionnaires, Schedules, Survey and Experimental. Selection of Appropriate Method for Data Collection, Different Techniques of Sampling such as Probability and Non-Probability, Basic Statistical Methods of Data Analysis such as Frequency distribution, Measures of central tendency, Measures of Dispersion, Coefficient of variation, correlation and regression.	[20]
4	Ethics in Research: Environmental impacts and Ethical issues, Commercialisation, Copy right, Royalty, Intellectual property rights and Patent law, Plagiarism, Citation, Referencing style and acknowledgement.	[05]

Reference Books

1. 'Research Methodology- A Step-By-Step Guide for Beginners', Ranjit Kumar, (Pearson Education, Delhi) ISBN: 81-317-0496-3.
2. 'Research Methodology- Methods and Techniques', Kothari, C.K., New Age International, New Delhi.
3. Research In Education, John V. Best, John V. Kahn 10th ed., Allyn & Bacon Publisher, 2005.
4. Practical Introduction of copyright by Gavin Mcfarlane, McGraw Hill Inc., USA.
5. Introduction to Scientology Ethics, Hubbard, L. Ron. New Era Publisher, Denmark.
6. Research Methodology by Deepak Chawala, Vikas Publications.
7. Statistics for Management, Levin & Rubin, Pearson Publication

SECTION – B

Faculty of Science

[Biotechnology]

Unit	Content	Marks
1	<p>A. Composition, structure and function of biomolecules (carbohydrates, lipids, proteins, nucleic acids and vitamins)</p> <p>B. Stabilizing interactions (Van der Waals, electrostatic, hydrogen bonding, hydrophobic interaction, etc.).</p> <p>C. Principles of biophysical chemistry (pH, buffer, reaction kinetics, thermodynamics).</p> <p>D. Metabolism of carbohydrates, lipids, amino acids, nucleotides</p> <p>E. Glycolysis, oxidative phosphorylation, coupled reaction, group transfer, biological energy transducers.</p> <p>F. Principles of catalysis, enzymes and enzyme kinetics, enzyme regulation, mechanism of enzyme catalysis, isozymes</p> <p>G. Conformation of proteins (Ramachandran plot, secondary structure, domains, motif and folds).</p> <p>H. Conformation of nucleic acids (helix (A, B, Z), t-RNA, micro-RNA).</p>	[10]
2	<p>A. Microbial growth: Growth curve, measurement of growth, continuous culture, factors affecting growth; culture collection and maintenance of cultures.</p> <p>B. Microbial nutrition and metabolism: Metabolic diversity among microorganisms; chemolithotrophy; hydrogen-iron-nitrite-oxidizing bacteria; methanogenesis; fermentation.</p> <p>C. Membrane structure and function: Structure of fluid mosaic model of membrane, lipid bilayer, transport across membrane, mechanism of sorting and regulation of intracellular transport.</p> <p>D. Organization of chromosomes: Structure of chromatin and nucleosome, heterochromatin, euchromatin.</p> <p>E. Cell division and cell cycle: Mitosis and meiosis, cell cycle and regulation.</p> <p>F. Cellular communication and Cell signalling pathway</p> <p>G. Cancer: Oncogenes, tumor suppressor genes, apoptosis, chemotherapy.</p> <p>H. Types, causes and detection, mutant types – lethal, conditional, biochemical, loss of function, gain of function, Structural and numerical alterations of chromosomes: Deletion, duplication, inversion, translocation, ploidy and their genetic implications.</p>	[10]
3	<p>A. DNA replication, repair and recombination in prokaryotes and eukaryotes</p> <p>B. RNA synthesis and processing in prokaryotes and eukaryotes</p> <p>C. Protein synthesis and processing in prokaryotes and eukaryotes</p> <p>D. Control of gene expression at transcription and translation level</p> <p>E. Linkage maps, tetrad analysis, mapping with molecular markers, mapping by using somatic cell hybrids, development of mapping population in plants.</p> <p>F. Microbial genetics: transformation, conjugation, transduction, fine structure analysis of genes.</p> <p>G. Human genetics: Pedigree analysis, karyotypes, genetic disorders and QTL</p>	[10]

- mapping.
- 4** A. Microscopic techniques: Scanning and Transmission, Phase Contrast, Bright field and Fluorescence Microscopy. **[15]**
- B. Molecular Biology and Recombinant methods: Isolation, Purification, Analysis and Expression of Nucleic acids and Proteins, Protein sequencing methods, detection of post translation modification of proteins, DNA sequencing methods, strategies for genome sequencing.
- C. Biochemical and Molecular markers
- D. Biophysical Methods: Molecular analysis using UV/visible, fluorescence, circular dichroism, NMR and ESR spectroscopy Molecular structure determination using X-ray diffraction and NMR, Molecular analysis using light scattering, different types of mass spectrometry and surface plasma resonance methods.
- E. Radiolabeling Techniques: Different type of Isotopes, Beta and Decay law, Liquid Scintillation counter
- F. Design of bioreactors: Biosensors, scale up of bioreactors
- G. Microbial fermentation and production of small and macro molecules.
- H. Tissue and cell culture methods for plants and animals.
- I. Guidelines for Biosafety and Bioethics, Intellectual property rights, Plant breeders' rights, Cartagena protocol
- 5** A. Cells and molecules involved in innate and adaptive immunity, antigens, antigenicity and immunogenicity. B and T cell epitopes, structure and function of antibody. **[5]**
- B. Monoclonal antibodies, antibody engineering, antigen-antibody interactions
- C. MHC molecules, antigen processing and presentation, activation and differentiation of B and T cells, B and T cell receptors.
- D. The complement system, Toll-like receptors, cell-mediated effector functions, inflammation, hypersensitivity and autoimmunity
- E. Histochemical and Immunotechniques