

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

[Microbiology]

Unit	Content	Marks
1	General & Industrial Microbiology	[10]
	<ol style="list-style-type: none">1. History & scope of Microbiology. Structural features and modes of reproduction of bacteria, fungi and viruses. Methods of sterilization and control of microorganisms. Isolation and cultivation of bacteria, fungi and viruses and their importance. Microbiological media and its types. Microbial nutrition & Microbial growth. Cell division. Sporulation. Preservation and Maintenance of Microbial cultures. Identification methods and principles of bacterial taxonomy. Microbial diversity.2. Screening of industrially important microorganisms and strain improvement. Bioreactor Design, medium formulation, scale up of fermentations and Fermentation Economics. Upstream and downstream processing. Fermentative productions – Alcoholic beverages, amino acids, antibiotics, organic acids, vitamins, enzymes, solvents and biomass. Biotransformations. Quality control, quality assurance and Safety Measurement in pharmaceutical industries.	
2	Soil, Water and Food Microbiology	[10]
	<ol style="list-style-type: none">1. Soil Microorganisms and their activities in soil. Plant-microbe interactions. Nitrogen Cycle, Sulfur Cycle, Carbon Cycle, Phosphorus Cycle. Bio-fertilizers, Biopesticides, Bioleaching, MEOR, Bioremediation, Biodetariation, Biofuels, biodesulfurization of coal.2. Microbiology of drinking water and waste water.3. Fermented foods, Spoilage of foods, Food preservation methods, Food poisoning, Mycotoxins. Microbial degradation, Microbes as Food and Food Products: Fermented dairy products, Starter culture. Cheese: Types, curdling, processing, ripening, other fermented dairy products, Introduction to probiotics, prebiotics and synbiotics. Indian fermented food products. Microbes as food: Mushrooms, spirulina and yeasts. Methods in Food Microbiology: Biological methods, Bacteriological analysis of milk, Microbiological criteria of food safety	
3	Immunology & Medical Microbiology	[10]
	<ol style="list-style-type: none">1. Antigen, antibody, adjuvants, vaccines. Immunity and Immune response, T cell, B cell, Types of immunity, prophylaxis. Major histocompatibility, complex and immunoglobulin. Immunological methods. Tumors, Hybridoma technology.2. Immune Disorders, Immunohaematology and Immunoprophylaxis. Cells and molecules involved in innate and adaptive immunity.3. Normal flora, Microbiota of Human Body, Epidemiology.4. Bacterial and viral infections (Air born, water born, food born, insect born and zoonotic), Mycosis, Medical diagnostics and Toxins.5. Host-Parasite Relationship. Clinical Microbiology: Types of specimen, method of collection, storage and transport, Methods used for diagnosis and identification of pathogen.	
4	Microbial biochemistry & Bioinstrumentation	[10]
	<ol style="list-style-type: none">1. Carbohydrate, proteins, lipids & nucleic acids. Enzymes: nomenclature, kinetics, Regulation of enzyme activity. Transport of solutes. Energy: its generation & conservation. Generation of ATP & reducing power.	

2. Various pathways responsible for metabolism of carbohydrates, amino acids, nucleotides and lipids.
3. Biosynthesis of peptidoglycan, Methods of studying biosynthesis.
3. Principles and applications of microscopy, spectroscopy, chromatography, electrophoresis, and centrifugation in microbiology.

5 Microbial genetics

[10]

1. Nucleic acids Structure and Replication. Transcription. Translation. Mutation and DNA Repair.
2. Bacterial Transformation, transduction and conjugation. Recombination. Plasmids.
3. Agrobacterium genetics: Ti-plasmid, Interkingdom gene transfer (Key early experiments, vir regulon, protein secretion apparatus, conjugation model of T-DNA transfer, Integration products).
4. Viral genetics: Bacteriophages, Bacteriophage recombination (complementation, fine structure analysis).
5. Fungal genetics: Tetrad analysis and Mitotic recombination Restriction-Modification systems, Transposable elements, Molecular markers, Gene chip and microarrays, Molecular biology of tumor, Apoptosis.

Reference Books

1. Pelczar et al., Microbiology, Tata Mc Graw Hill Publishing Co.
2. Dubey and Maheshwari, General Microbiology, S. Chand, New Delhi.
3. Madigan et al., Brock biology of microorganisms, Pearson.
4. Willey et al., Prescott's Microbiology, Mc Graw Hill Publishing Co.
5. Modi HA, Handbook of Elementary Microbiology, Shanti Prakashan.
6. Stanier et al., General Microbiology, Printice Hall of India Pvt. Ltd., New Delhi.
7. Owen et al., Kuby-Immunology, 7th Edition, W. H. Freeman and Co.
8. Pepper et al., Environmental Microbiology, Academic Press, Elsevier.
9. Rehm and Reid, Biotechnology, VCH, Weinheim.
10. Atlas and Bartha, Microbial Ecology: Fundamentals and Applications, Pearson.
11. Bitton, Wastewater Microbiology, John Wiley & Sons Ltd.
12. Denyer et al., Hugo and Russel's Pharmaceutical Microbiology, Blackwell Science.
13. Watson et al., Molecular Biology of the Gene, Cold Spring Harbor Laboratory Press.
14. Ananthanarayanan and Paniker, Text Book of Microbiology, Orient Longman Pvt. Ltd.
15. Nelson and Cox, Lehninger - Principles of Biochemistry, 6th edition, W.H Freeman.
16. Keith Wilson and John Walker, Principles and Techniques of Practical Biochemistry, 5th Edition, Cambridge University Press.
17. Moat, A.G., Foster, J.W., Spector, M.P. Microbial Physiology, 4th Edition, Wiley.