

Reg. No. :

Name :

Ph.D. ENTRANCE EXAMINATION, NOVEMBER 2022

FACULTY OF APPLIED SCIENCE AND TECHNOLOGY

MICROBIOLOGY

Time : 3 Hours

Max. Marks : 100

Instructions :

- 1) Answer **any ten** questions each from Section **A** and **B**.
- 2) Each question carries **5** marks.
- 3) No additional Answer sheets will be provided.
- 4) Candidates should clearly indicate the section, Question number in the answer booklet.

Section – A

Research Methodology

- I. Answer any **ten** questions. All Questions carry equal marks.
1. What do you mean by research? What are the types of research? What are the characteristics of a good researcher?
2. What are science and pseudoscience? How do you differentiate between scientific methods and illogical methods?
3. Define data. Explain the various methods of data collection.
4. Explain the various steps involved in a research process with a flowchart.
5. Describe the characteristics of a good literature review. What are the basic components of a review of literature?

6. Explain the hypothesis and its different types. What are the different types of errors that occur while testing a hypothesis?
7. What is the difference between a theory and a fact? Do you agree with the statement "Theory, when proved, becomes Fact"? If yes/no explain.
8. Explain the importance of research design? What are the types of research design?
9. Describe epistemology. What are the different branches of epistemology?
10. What do you mean by critical thinking? What are the qualities of a good critical thinker?
11. What is the meaning of ethics? What are the major concepts of ethics?
12. What is plagiarism? Why should you avoid plagiarism? How to avoid plagiarism?
13. Differentiate between correlation and regression in statistical analysis.
14. What are the major databases available for the retrieval of biological information?
15. What do you mean by a sample design? What are the basic sampling techniques?

(10 × 5 = 50 Marks)

Section – B

Microbiology

- II. Answer any **ten** questions. All Questions carry equal marks.
1. Explain the concept of antimicrobial drug resistance and the mechanisms of acquiring resistance considering any class of antibiotic.
 2. Explain the concept of commensalism, amensalism and symbiosis exhibited by bacteria.
 3. Explain the different stages of bacterial growth and describe any two methods to evaluate it.

4. Explain the principles and steps of recombinant DNA technology used in the cloning and expression of protein A in *Escherichia coli*.
5. Explain the significance of DNA and barcodes in the identification of living forms.
6. Explain the principle and procedure of Polymerase Chain Reaction.
7. Give examples of any three industrially important fungi with their uses.
8. What is the significance of bioinformatics in microbiology? Explain the use of three bioinformatic tools used in genome analysis.
9. Explain the different types of fermentation carried out for industrial fermentation of microbial enzymes. Comment on its downstream processing.
10. Explain the principle and procedure for monoclonal antibody synthesis.
11. Explain the various stages of cell cycle. Comment on the factors contributing to tumorigenesis.
12. Explain the life cycle of any retrovirus. Brief on the immunological surveillance evoked by body against viral infection.
13. Explain the principle, procedure of and use of Dark field microscopy or Fluorescent Microscopy.
14. Discuss the health benefits and mechanism of action of Probiotics.
15. Explain physiology and biochemistry of biological nitrogen fixation.

(10 × 5 = 50 Marks)