



‘সমানো মন্ত্র: সমিতি: সমানী’

UNIVERSITY OF NORTH BENGAL

B.Sc. Honours 1st Semester Examination, 2023

GE1-P1-MICROBIOLOGY

Time Allotted: 2 Hours

Full Marks: 40

The figures in the margin indicate full marks.

**The question paper contains GE1-Paper-I and Paper-II.
Candidates are required to answer any *one* from the *two* papers.
Candidates should mention it clearly on the Answer Book.**

GE1

PAPER-I

INTRODUCTION AND SCOPE OF MICROBIOLOGY

1. Answer any **five** of the following: 1×5 = 5
 - (a) State Koch’s postulates.
 - (b) Define the term sterilization.
 - (c) What is numerical aperture of a microscope?
 - (d) Give an example of microorganism responsible for the spoilage of Yoghurt.
 - (e) What is fermentation?
 - (f) What are biopesticides?
 - (g) Why resolving power of electron microscope is higher than light microscope?
 - (h) What is biodeterioration?

2. Answer any **three** of the following: 5×3 = 15
 - (a) Explain with ray diagram the working principle of Dark-field microscope. 5
 - (b) Write a note on the contribution of Louis Pasteur in the field of Microbiology. 5
 - (c) With suitable example elucidate the ‘Commensalism’ type microbe-microbe interaction. 5
 - (d) Explain the method of sterilization using Moist heat and Filtration. $2\frac{1}{2}+2\frac{1}{2}$
 - (e) Explain the Whittaker’s five kingdom classification system. 5

3. Answer any **two** of the following: 10×2 = 20
 - (a) How are primary metabolites different from the secondary metabolite? Explain the role of microbes with example in producing important industrial products through fermentations. 4+6
 - (b) Explain the contributions of Selman A. Waksman and Joseph Lister in the field of Microbiology. 5+5
 - (c) Briefly discuss the term “active and passive” immunity. What are the different types of antibody found in human system? What is an antigen and an epitope? 5+3+2
 - (d) Differentiate between algae and fungi based upon their structural features. Write down the general characteristics of a protozoa. 5+5

GE1

PAPER-II

MICROBIAL METABOLISM

1. Answer any **five** of the following: 1×5 = 5
 - (a) Define specific growth rate.
 - (b) What is continuous culture?
 - (c) What is the utility of pentose phosphate pathway?
 - (d) What are chemolithotrophs?
 - (e) How many ATP are produced after glycolysis using 1 molecule of glucose?
 - (f) Define symport.
 - (g) State the function of hydrogenase enzyme.
 - (h) State the function of di-nitrogenase reductase enzyme.

2. Answer any **three** of the following: 5×3 = 15
 - (a) With the help of flow diagram describe the ED pathway. 5
 - (b) Compare and contrast between the term anaerobic respiration and fermentation. 2+3
With suitable diagram discuss the role of a mitochondrial complex-I in electron transport chain.
 - (c) How does active transport differ from facilitated diffusion? Briefly describe the process of Iron uptake by a cell. 2+3
 - (d) Describe the effect of pH on microbial growth. 5
 - (e) Explain the phenomenon called Pasteur effect. Explain the role of triose-phosphate isomerase enzyme. 2+3

3. Answer any **two** of the following: 10×2 = 20
 - (a) With simplified schematic diagram represent the anoxygenic photosynthesis. Write a short note on methanogenesis. 6+4
 - (b) Schematically represent the biological nitrogen fixation. Elucidate in brief the process called assimilatory nitrate reduction. 6+4
 - (c) Elucidate in detail the various steps involved in hetero-lactic fermentation process. Briefly discuss hydrogen-oxidation pathway. 6+4
 - (d) Explain the role of following enzymes involved in various biochemical pathways operated in a cell — 2×5 = 10
 - (i) Pyruvate kinase
 - (ii) Hexokinase
 - (iii) Succinate dehydrogenase
 - (iv) Citrate Synthase
 - (v) 6-phosphogluconate dehydrogenase.

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