**70(Sc)**	UG-I/Microbiol-II(H)/21

# 2021
# MICROBIOLOGY
**[HONOURS]**
**Paper : II**

Full Marks : 75                    Time : 4 Hours

*The figures in the right-hand margin indicate marks.*

*Candidates are required to give their answers in their own words as far as practicable.*

**Answer all the questions.**

**Write the answers to questions of each Group in separate books.**

## GROUP-A

**(Biomolecules and Enzymology)**

**(Marks: 40)**

1.  Answer any **two**, state whether the following statement are *True* or *False* :        1×2=2

   a)   Proline is not an α-amino acid.

   b)   Galactose is a reducing sugar.

   c)   Oleic acid is a saturated fatty acid.

   d)   Peptide bond in protein is chemically called amide linkage.

*[Turn over]*

2.  Answer any **two** from the following :    2×2=4

   a)   What do you mean by deoxy Pentose Sugar present in DNA molecule?

   b)   Write down the structure of fructose.

   c)   Write down structure of one phospholipid.

   d)   What do you mean by nucleotide?

3.  Answer any **four** from the following:    6×4=24

   a)   Write down the structures of one saturated and one unsaturated fatty acids present in living cell. Discuss briefly their functions and properties.

   b)   What is secondary structures of proteins? How the same structures are stabilized?

   c)   Define $K_m$ from the Michaelis-Menten equation. Write down the unit $K_m$. Whether $K_m$ of an enzyme can be affected with the change of pH and temperature? Justify.

   d)   Discuss briefly properties and stability of DNA.

   e)   How a protein can be extracted a purified from a living cell?

   f)   Discuss briefly the nomenclature of enzyme.

70(Sc)            [ 2 ]

g) How do you determine the base composition from helix coil transition temperatures and nucleotide sequences of DNA?

4. Answer any **one** from the following: 10×1=10

a) Write the Michaelis—Menten equation. How the same equation can be deduced? Why is initial rate of reaction $v_0$ directly proportional to the concentration of substrate within the range of very low concentration of substrate?

b) What is primary structure of proteins? How sequences of amino acid can be determined in one protein molecule?

**GROUP-B**

**(Biophysico-Chemical Techniques, Biostatistics and Bioinformatics)**

**(Marks: 35)**

5. Answer any **three** of the following: 1×3=3

a) What is negative staining?

b) What is a sample?

c) Two coins are tossed, find the probability that two heads are obtained.

d) What is the full form of NCBI?

e) What is the full form of SDS-PAGE?

6. Answer any **two** of the following: 2×2=4

a) Define $R_f$ value.

b) What is Standard Deviation?

c) What is resolving power of a microscope?

d) What is fluorescence?

7. Answer any **three** of the following: 6×3=18

a) Mention the working principle of spectrophotometer? What is the difference between turbidity and absorbance? 4+2

b) What are the different measures of central tendency? What is null hypothesis? 4+2

c) What is autoradiography? Write its application in biological research with example. 3+3

d) You have isolated a new bacterium from a pond. What type of microscopy techniques would be appropriate for each of the below and why? $1\frac{1}{2}\times4$

i) You wish to see if it is motile.

ii) You want to know if that specific bacterial strain is present in other ponds.

iii) You wish to see if it has any storage inclusions.

iv) You want to see if there are any obvious surface features that are too small to see by light microsope.

e) What is test of hypothesis? Mention the application of Students' t-test.                3+3

8.   Answer any **one** of the following:        10×1=10

a) What is molecular phylogeny? What is a phylogenetic tree? Why are nucleic acid and protein sequence databases useful to draw the phylogenetic lineage?                3+3+4

b) Write short notes:                $2\frac{1}{2}×4$

i) $\chi^2$ – test

ii) Agarose gel electrophoresis

iii) BLAST

iv) Ultracentrifugation

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