

**2016**

**M.Sc. 1st Semester Examination**

**MICROBIOLOGY**

**PAPER—MCB-103**

*Full Marks : 40*

*Time : 2 Hours*

*The figures in the margin indicate full marks.*

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

*Illustrate the answers wherever necessary.*

**Use separate Answer-scripts for Group-A & Group-B**

**Group—A**

Answer any *two* questions.

1. (a) Why weak bonds are important for determining structural and functional aspect of biomolecules? Name the different weak bonds found in biomolecules.

*(Turn Over)*

(b) Name two covalent bonds found in (i) nucleic acids and (ii) proteins.

(c) Screen the gases mentioned below in terms of polarity (i.e., polar or non-polar) and arrange them in ascending order of their solubility.  $O_2$ ,  $CO_2$ ,  $NH_3$ ,  $H_2S$ .

(2+2)+(1+1)+(2+2)

2. Why the cell need ion channels ? How one can know when a channel is opening or closing ? Why elements like Oxygen and Nitrogen can't be used for biological studies ? How rate of decay can be calculated ?

1+4+2+3

3. Write short notes on the following (any four) :

(a) Negatron decay ;

(b) Facilitated diffusion ;

(c) Active transport

(d) Townsend avalanche effect ;

(e) Solid scintillation counting ;

(e) Energy transfer in liquid scintillation counting.

$4 \times 2 \frac{1}{2}$

**Group—B**

Answer any *two* questions.

1. Write down the principle of gel filtration chromatography. Differentiate ion-exchange chromatography with affinity chromatography. What are different types of detectors used in HPLC system? Write down four applications of thin layer chromatography (TLC). 2+3+3+2
2. (a) Arrange in the correct order of increasing wave number of the stretching vibrations of (i) C-H (alkane), (ii) O-H (alcohol), (iii) C = O (ketone) and (iv) C  $\equiv$  C (alkyne)? How many signals do the aldehyde  $(\text{CH}_3)_3\text{CCH}_2\text{CHO}$  have in  $^1\text{H}$  NMR and  $^{13}\text{C}$  NMR spectra?  
(b) How linearly polarized light differs from circularly polarized light? Write down the applications of CD spectroscopy? (2+3)+(3+2)
3. (a) A researcher is working with two unknown compound  $\text{U}_1$  &  $\text{U}_2$ . Mass spectrometry result revealed its molecular weight and molecular formula as 78.54 and  $\text{C}_3\text{H}_7\text{Cl}$  respectively for both the compound. How he will differentiate between the two compounds  $\text{U}_1$  &  $\text{U}_2$  using  $^1\text{H}$ -NMR? Justify.

- (b) What is the usage of nujol mull in FT-IR spectroscopy? Calculate the limits set on the resolution of light microscope. What are basic differences between SEM and TEM? 5+(1+2+2)
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