

**U.G. 3rd Semester Examination - 2020**  
**Molecular Biology & Biotechnology**  
**[HONOURS]**

**Course Code : MBBT-H-303-T-CCR7**  
**(Biophysics)**

Full Marks : 40

Time :  $2\frac{1}{2}$  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.*

1. A. Answer any **five** of the following :  $1 \times 5 = 5$

State **True** or **False**.

- i) Enthalpy is a state function.
- ii)  $^{32}\text{P}$  is a  $\beta$  emitter.
- iii) Peptide bonds absorb at visible range wavelength.
- iv) Water can be used as a solvent for IR spectroscopy.
- v) The denser the solution, the more slowly the particle will move.
- vi) Gamma ray is particle in nature.

B. Answer any **five** of the following questions.

$1 \times 5 = 5$

- i) Write down the names of two radioactive isotopes used in biological studies.
- ii) State the application of ESR.
- iii) Mention the names of two high energy compounds present in our body.
- iv) What is the effect of high concentration of analyte on Beer-Lambert's law?
- v) Explain at what condition,  $\text{pH} = \text{pKa}$ .
- vi) Bacterial cells do not absorb light. But we get O.D. value of bacterial suspension. How is it possible?

2. Answer any **five** of the following questions.  $2 \times 5 = 10$

- i) State Bragg's law. What is lattice plane?  $1+1$
- ii) What do you mean by 50S? Write down the names of two compounds used in density gradient centrifugation.  $1+1$
- iii) What is the role of free energy of activation on enzyme catalyzed biochemical reactions?
- iv) Write down the Henderson-Hasselbalch equation. What is the best buffering range of a buffer system?  $1+1$

*[Turn over]*

- v) Illustrate the function of weak bonds in maintenance of double helical DNA structure.
- vi) How do you make a non-radioactive substance into a radioactive one?
- vii) What is Rayleigh scattering?

3. Answer any **three** of the following questions:

4×3=12

- i) What is disintegration rate? State the principle and procedure of Autoradiography. 1+3
- ii) How do the temperature and concentration gradient of solute affect diffusion rate? 2+2
- iii) What are the criteria of a substance to be IR positive? Why are glass or quartz cuvettes not used for IR spectroscopy? Then how do you take liquid samples for IR? 2+1+1
- iv) Define chemical shift. What are the causes of chemical shift? Write down the application of NMR. 1+2+1

4. Answer any **one** of the following questions. 8×1=8

- i) How do you measure the concentration of an aqueous solution of DNA using ultraviolet spectroscopy? Compare between Atomic Absorption Spectroscopy and Atomic Emission Spectroscopy. Write the principle of measurement

of the hydrodynamic radius of a particle using DLS system. What is the significance of zeta potential? 2+2+2+2

- ii) Define sedimentation coefficient. How does sedimentation coefficient vary with molecular shape and molecular mass? Write down the principle of Ultracentrifugation. What is RPM? 1+3+3+1

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