

Ph.D. IN BIOCHEMISTRY (PHDBC)**Term-End Examination****December, 2018****RBC-004 : BIOPHYSICAL TECHNIQUES***Time : 3 hours**Maximum Marks : 100*

Note : The question paper has two sections. All sections are compulsory. Calculators are allowed.

SECTION - A

Attempt all the questions.

2.5x4=10

1. Choose the correct option and justify your answer :
 - (a) A fixed angle rotor exhibits minimum radius at the top of the centrifuge and maximum radius at the bottom of the tube. (T/F)
 - (b) A researcher wants to measure DNA synthesis in an experiment by using radioisotopes. He/ She would use ($[^3H]$ thymidine or ^{32}P - label) for this experiment.
 - (c) Two molecules A and B have rod like structures with same molecular weight, thickness and length. However, A has lower sedimentation coefficient (S) than B because it is flexible, while B is rigid. (T/F)

- (d) You just prepared two concentrated solutions of amino acids tyrosine and leucine and forgot to put labels on the bottles. You have no more chemical to form the fresh solution. You would choose (*Spectroscopy/Microscopy*) technique to distinguish between the two solutions.
2. Briefly explain **any three** of the following and give their importance. 3x5=15
- (a) Calibration curve in spectroscopy
 - (b) Nomograph
 - (c) Half life of radioisotope
 - (d) NMR

SECTION - B

Attempt **any five** questions.

3. Explain the difference between light :
- (a) Microscopy and electron microscopy. 10
 - (b) Briefly explain the role of 'fixation' and 'staining' in microscopy. 5
4. Describe different types of energy : 7
- (a) Transitions for an electronically excited molecule with the help of Jablonski's diagram.
 - (b) Write applications of **any two** of the following spectroscopic techniques : 2x4=8
 - (i) Fluorescence spectroscopy
 - (ii) Mass spectroscopy
 - (iii) UV-visible spectroscopy
 - (iv) IR- spectroscopy

5. (a) What are radioisotopes and why are these used in biochemical studies? 5
- (b) Enlist commonly used methods for detecting and quantifying radioactivity. Describe any one of these methods in detail. 3+7
6. Write short notes on **any three** of the following : 3x5=15
- (a) Autoradiography
- (b) Electromagnetic spectrum
- (c) Circular dichroism
- (d) Harmful effects of radioisotopes
7. (a) State the Lambert-Beer's Law and explain the terms absorbance, transmittance and molar absorption coefficient. 8
- (b) The molar absorption coefficient of benzene is $100 \text{ M}^{-1}\text{cm}^{-1}$ at 260 nm. What concentration of benzene would give an absorbance of 1.0 in a 1 cm cell at 260 nm? Also determine the concentration that would allow 1% of 260 nm light to be transmitted through a 1-cm cell. 7
8. (a) Write a brief note on 'Viscometry and its applications'. 5
- (b) Differentiate between : 10
- (i) Density gradient and differential centrifugation
- (ii) Bright field and Dark field microscopy
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