

Ph.D. IN BIOCHEMISTRY (PHDBC)

Term-End Examination

June, 2018

00065

RBC-004 : BIOPHYSICAL TECHNIQUES

Time : 3 hours

Maximum Marks : 100

Note : The question paper consists of three sections. All sections are compulsory. Instructions for each section are given separately.

SECTION A

All the questions are compulsory.

1. State whether the following statements are True (T) or False (F). Justify your answer. $5 \times 2 = 10$
 - (a) In an experiment designed to measure DNA synthesis using radiolabel, labelling with ^{32}P is a better choice than $[^3\text{H}]$ thymidine.
 - (b) Counting efficiency of a Geiger-Müller (GM) counter increases with increase in its count rate.
 - (c) Phase-contrast microscopy can be used only for non-absorbing samples.

- (d) Energy of a radiation is directly proportional to its wave number.
 - (e) A fibrous protein moves slower during centrifugation as compared to a globular protein having same mass and density.
2. Briefly explain/define the following terms : $5 \times 2 = 10$
- (a) Eyepiece
 - (b) Svedberg's Constant
 - (c) Molar Absorptivity
 - (d) Chromophores
 - (e) Quenching



SECTION B

Attempt any **five** questions. All questions carry equal marks.

5×6=30

3. (a) What is the purpose of using cover-slip in preparation of samples for microscopy? 2
- (b) Differentiate between optical and electron microscopy. 4
4. Explain radioactive decay and its different types. 6
5. Discuss the fate of an electronically excited molecule with the help of Jablonski's diagram. 6
6. Explain the stages : embedding, sectioning and staining during sample preparation of electron microscopy. 6
7. Explain the effect of solvent on $n - \pi^*$ and $\pi - \pi^*$ transitions. 6
8. Explain any **two** of the following terms with suitable examples : 6
 - (a) Chemical Shift
 - (b) FT-NMR
 - (c) Spin-Spin Coupling
9. What is RCF ? Explain its significance. 6

SECTION C

Attempt any **five** questions. All questions carry equal marks.

5×10=50

10. Describe the important applications of any **two** of the following : 10
- (a) IR Spectroscopy
 - (b) ORD and CD
 - (c) Radioisotopes
 - (d) Analytical Centrifugation
11. (a) Explain the Beer-Lambert law. 5
- (b) Distinguish between a colorimeter and a spectrophotometer. 5
12. Explain the working principle of fluorescence microscopy and its applications. 10
13. (a) What is the importance of measurement of radioactivity in context with experiments in biochemistry ? Name two methods used for measurement of radioactivity. 5
- (b) Explain any one of the methods used for the measurement of radioactivity. 5

14. (a) Describe different types of rotors used in routine centrifugation experiments for biological samples. 5
- (b) Write briefly about important points in care and maintenance of centrifuges. 5
15. Write a brief note on phase contrast microscopy and live cell imaging. 10
16. Write the principle and applications of atomic absorption spectroscopy. 10
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