

**Ph.D. IN BIOCHEMISTRY (PHDBC)**

**Term-End Examination**

**June, 2019**

**00582**

**RBC-004 : BIOPHYSICAL TECHNIQUES**

*Time : 3 hours*

*Maximum Marks : 100*

*Note : The questions paper has two sections, Section A and Section B. Both sections are compulsory. Calculators are allowed.*

**SECTION A**

1. Give reasons for the following statements :  $2\frac{1}{2} \times 4 = 10$
- (a) In light microscopy, brightness of an image decreases as we increase the magnification.
  - (b) In an experiment to measure DNA synthesis, use of [<sup>3</sup>H] Thymidine as label is a better choice than <sup>32</sup>P.
  - (c) Sedimentation coefficient of a small enzyme is 3.6 S. When it binds to its substrate, its sedimentation coefficient changes to 2.9 S.
  - (d) Unlabelled solutions of tyrosine and isoleucine can be distinguished by studying absorption in UV range.

2. Write brief notes on any **three** of the following : **3×5=15**

- (a) Intensifying Screens in Autoradiography
- (b) Density Gradient Centrifugation
- (c) UV-visible Spectrometry
- (d) IR Spectrometry

## SECTION B

Attempt any **five** questions.

3. (a) What is the limit of resolution of a system using an objective having  $NA = 1.3$  and using light of wavelength  $455 \text{ nm}$ ? 5
- (b) Write the working and application of phase contrast microscopy. 10
4. Write the applications of any **three** of the following:  $3 \times 5 = 15$
- (a) Atomic absorption spectrometry
- (b) FT - NMR
- (c) Jablonski diagram
- (d) Mass Spectrometry
5. (a) Explain subcellular centrifugation with the help of a suitable example. 10
- (b) A fixed angle rotor exhibits  $r_{\min} = 3.5 \text{ cm}$  and  $r_{\max} = 7 \text{ cm}$ . Calculate the RCF (Relative Centrifugal Field) at the top and bottom of the centrifugation tube, if the rotor is operated at speed =  $50,000 \text{ rpm}$ . 5
6. (a) Write any five precautions you should take while handling radioisotopes. 5
- (b) Radioisotopes are considered harmful for the biological systems. Briefly explain different parameters used to determine the toxic effects due to absorption of radiation on biological systems. 10

7. Write short notes on any *three* of the following : 3×5=15
- (a) Viscometry
  - (b) Electromagnetic Spectrum
  - (c) Bright Field Microscopy
  - (d) X-ray Diffraction
8. (a) What is radioactivity ? Explain different types of radioactive decays. 5
- (b) Differentiate between the following : 10
- (i) Preparative and Analytical Centrifugation
  - (ii) SEM and TEM
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