



MBC-003-001014022 Seat No. _____

**B. Sc. (Sem. IV) (Biochemistry) (CBCS)
Examination**

March / April - 2018

Paper - 401 : Biophysical & Biochemical Techniques

Faculty Code : 003

Subject Code : 001014022

Time : $2\frac{1}{2}$ Hours]

[Total Marks : 70

- 1 (A) Answer the following questions : 4
- (1) Define Centrifugation.
 - (2) What is RCF?
 - (3) Name the different types of rotors used in centrifuges.
 - (4) List the gradient materials used in density gradient centrifugation.
- (B) Answer Any **one** of the following questions : 2
- (1) Write applications of high speed centrifuge.
 - (2) List the factors affecting on rate of sedimentation.
- (C) Answer Any **one** of the following questions : 3
- (1) Describe the relationship between RCF and rpm.
 - (2) Write a note on density gradient centrifugation and its applications.
- (D) Answer any **one** of the following questions : 5
- (1) Define homogenization. Write a detailed note on separation of cell organelles from animal tissue homogenate by differential centrifugation.
 - (2) Write short note on analytical ultracentrifuges.
- 2 (A) Answer the following questions : 4
- (1) Why glass or plastic cuvettes can not be used and only quartz cuvettes are being used to record absorbance of DNA solution at 260 nm in spectrophotometers?

- (2) Write the formula showing relationship between absorbance (A) and percent transmittance.
- (3) Write the differences between colorimeters and spectrophotometers.
- (4) Define the term wavelength using suitable diagram.
- (B) Answer Any **one** of the following questions : **2**
- (1) Define Beer's and Lambert's laws of light absorption.
- (2) Explain absorption spectra and absorption maxima using suitable diagram.
- (C) Answer any **one** of the following questions : **3**
- (1) Discuss basic and advanced applications spectrophotometers .
- (2) Write a brief note on diffraction grating monochromators and discuss why they are the best monochromators?
- (D) Answer any **one** of the following questions : **5**
- (1) Draw a labelled diagram of double beam spectrophotometer and discuss how one beam of monochromatic light is chopped in to two beams of monochromatic light?
- (2) Write a detailed note on photomultiplier tube and explain why its is the detector of choice in sophisticated spectrophotometers?
- 3** (A) Answer the following questions : **4**
- (1) What is Chromatography? Write its importance.
- (2) Define analyte.
- (3) What is Distribution coefficient K_d in chromatography?
- (4) What type of paper is used in paper chromatography? Why can't we use ordinary writing paper to carry out paper chromatography?
- (B) Answer any **one** of the following questions : **2**
- (1) What are the applications of Gas Liquid Chromatography (GLC)?
- (2) Write the differences between stationary phase and mobile phase using suitable examples.

- (C) Answer any **one** of the following questions : **3**
- (1) Write short note on basic principle of Affinity Chromatography.
 - (2) State applications of Size exclusion (molecular sieve) Chromatography
- (D) Answer any **one** of the following questions : **5**
- (1) Write advantages of HPLC over conventional chromatographic techniques and write a brief note on applications of HPLC.
 - (2) Write a short note on principle and applications of ion exchange chromatography.
- 4 (A) Answer the following questions : **4**
- (1) What is the net charge of DNA molecules? Why?
 - (2) What is isoelectric point?
 - (3) How buffer would affect electrophoretic mobility of proteins on gel electrophoresis?
 - (4) Write the names of materials used as a supporting medium in gel electrophoresis
- (B) Answer Any **one** of the following questions : **2**
- (1) Write applications of Gel Electrophoresis in biochemistry and molecular biology.
 - (2) What is 2D electrophoresis? Write its applications. Why do we perform IEF first and then the SDS PAGE and not the other way round?
- (C) Answer any **one** of the following questions : **3**
- (1) Write a brief note about making of Polyacrylamide gel and describe how the pore size can be controlled during making of polyacrylamide gel?
 - (2) How properties of sample itself like ; charge quantity, quality and molecular weight of the sample can affect its electrophoretic mobility?
- (D) Answer any **one** of the following questions : **5**
- (1) Define electrophoresis and write a brief note about principle and applications of SDS PAGE.
 - (2) Write a short note on agarose gel electrophoresis of nucleic acids.

- 5 (A) Answer the following questions : 4
- (1) Define radiation
 - (2) If a half life of the radioisotope is 10 days, after 30 days of radioactive decay, what percentage of the original radioactivity would remain in the sample?
 - (3) Write the different types of isotopes of hydrogen with their atomic number and mass numbers.
 - (4) Write the differences between CPM and DPM.
- (B) Answer any **one** of the following questions : 2
- (1) Explain negatron emission by radioactive decay with one suitable example.
 - (2) Write the important properties of gamma radiation.
- (C) Answer any **one** of the following questions : 3
- (1) Enlist units of radioactivity and explain atleast three units in short.
 - (2) Write a short note on Gieger Muller counter and its applications in laboratory.
- (D) Answer Any **one** of the following questions : 5
- (1) How can you measure radioactivity by liquid scintillation counting?
 - (2) Discuss applications of radioisotopes, in the field of biology and medical sciences.
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