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PBG-003-001326 Seat No. _____

B. Sc. (Sem. III) (CBCS) Examination

November / December - 2018

Biochemistry : Paper - 301

(Biophysical And Biochemical Techniques)

(Old Course)

Faculty Code : 003

Subject Code : 001326

Time : $2\frac{1}{2}$ Hours] [Total Marks : **70**

1 Answer the following questions in just one or two lines : **20**

(1) Name the centrifugation technique that is being used to sediment viruses.

(2) Which organelle from liver homogenate can't be separated using high speed centrifuge but requires preparative ultra-centrifuge?

(3) If the average diameter of an angle head rotor is 10 cm, calculate the average radius (r) of the rotor.

(4) Define RCF in centrifugation.

(5) In thin layer chromatography experiment for separation of organic acids, the distance travelled by solvent front from the origin was 10cm while the distance travelled by pyruvic acid and citric acidfrom the origin were 4cm and 6 cm respectively. Calculate the Rf values for these two organic acids.

(6) Which chromatographic technique would you use to separate acidic proteins based on their charges?

(7) Write the full form of HPLC.

(8) Name the chromatographic technique that can purify biological macromolecules based on their biological specificity and not on the basis on differences in their physicochemical properties.

(9) Name the three different radio isotopes of Hydrogen with their atomic numbers and mass numbers.

(10) What is carbon dating? Write one use of this technique.
(11) Define radioisotopes.
(12) What is autoradiography?
(13) Can we separate carbohydrates by electrophoresis? Why? Justify your answer.
(14) How you could vary pore size in making of polyacrylamide gel?
(15) Write the name of electrophoresis that is used to separate proteins as per differences in their isoelectric pH.
(16) In SDS PAGE, when electrical field is applied, proteins would migrate towards cathode or anode?
(17) What is the wavelength range of UV radiation?
(18) Define absorption maxima.
(19) Why we can't use glass cuvettes for taking absorbance readings in UV spectrophotometer?
(20) What coloured filter would you use to record that absorbance of methylene blue? Why?

2 (a) Answer briefly any **three** of the following questions : **6**

(1) Which among the following electromagnetic radiation would have highest wavelength?: UV radiation, Infrared, Gamma rays, Microwaves.
(2) Describe the units of radioactivity.
(3) On what basis proteins are separated in SDS PAGE?
(4) Why differential centrifugation of cell organelles is carried out using 0.25 M sucrose as an isotonic medium?
(5) When mixture of three DNA fragments having sizes: 10 kb, 20 kb and 200 kb are separated by gel electrophoresis. Draw the labelled diagram showing their mobility from the well.
(6) List the constituents of polyacrylamide gel and describe the process of polymerization of polyacrylamide gel.

(b) Answer any **three** of the following questions : **9**

(1) Define Beer's and Lambert's Laws of light absorption and write their limitations.

(2) Describe Liquid Scintillation Counting.

(3) Justify why TLC gives better sensitivity and high resolution compared to paper chromatography

(4) Write advantages of ascendingpaper chromatography in comparison to descending paper chromatography.

(5) Discuss effect of ionic strength and pH of buffers on electrophoretic mobility of proteins.

(6) Write applications of clinical centrifuge in laboratory.

(c) Answer any **two** of the following questions in detail : **10**

(1) Describe photoelectric effect and write a short note on photomultiplier tube,

(2) Write a short note on principle and applications of HPLC.

(3) Discuss GM counter and its applications:

(4) Describe the process of differential centrifugation and separation of cell organelles from liver homogenate.

(5) Define electrophoresis and discuss various factors affecting electrophoretic mobility of sample.

3 (a) Answer briefly any three of the following questions : **6**

(1) Define absorption spectra and absorption maxima. Draw a typical absorption spectra for a coloured dye.

(2) Define molar extinction coefficient.

(3) What is the role of ampholytes mixture in Isoelectric focusing?

(4) Describe different types of rotors used in centrifuges.

(5) Why separation of proteins in electrophoresis is always carried out using a buffer of alkaline pH?

(6) Discuss how molecular sieve chromatography is used in determination of molecular weight of globular proteins.

(b) Answer any **three** of the following questions : **9**

(1) Define chromophores and write examples of chromophoric groups that contribute to absorption of light?

(2) Describe nuclear fission with suitable example,

(3) Name different adsorbents used in adsorption chromatography and write the principle of adsorption chromatography.

(4) Why ordinary writing paper can't be used in paper chromatography?

(5) A Protein is giving single band in native PAGE at 200,000 Dalton. In SDS- PAGE, same protein gives two bands at 100,000 Dalton and 50,000 Daltons. What information you can derive from this data about quaternary (subunit) structure of the protein?

(6) Write a brief note on density gradient centrifugation and write its applications.

(c) Answer any **two** of the following questions in detail : **10**

(1) Discuss Diffraction gratings monochromators and explain why they are better than prism monochromators.

(2) Describe principle and applications of ion exchange chromatography.

(3) Write the applications of radioisotopes in Biochemistry.

(4) Describe the design and applications of analytical ultracentrifuge.

(5) Write a short note on 2D-PAGE.