



HDA-003-001326

Seat No. _____

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

November / December - 2017

Biochemistry : Paper - 301

(Biophysical & 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 used to check the rate of sedimentation rate of ribosomes.
 - (2) Write the formula showing relationship between Centrifugal Force (F) and Relative Centrifugal Force (RCF).
 - (3) In an angle head rotor, top diameter was measured as 10 cm and bottom diameter was 20 cm. Calculate the average radius of rotor.
 - (4) Which organelle from liver homogenate would sediment first when centrifugation is carried out at 1000 X g for 10 minutes ?
 - (5) In thin layer chromatography of amino acids, the distance travelled by solvent front from the origin was 10 cm while the distance travelled by tryptophan and histidine from the origin were 2 cm and 4 cm respectively. Calculate the R_f values for these amino acids.
 - (6) Name the chromatographic technique that can be used to separate proteins from their mixture based on differences in their molecular weights or size.
 - (7) In which chromatography, the stationary phase used is immobilized liquid and inert gas is being used as a mobile phase.
 - (8) How affinity chromatography can be useful in isolation of mRNA from the total cellular RNA mixture ?

- (9) Name the radiation produced by decay of radioisotopes that has got maximum penetration power and do not get influenced and deviated by an electrical field.
- (10) Name the device that can be used to detect the spillage of the radioisotopes during radioactivity experiments.
- (11) Which radio isotope is being used in radiation therapy of the treatment of the cancer patients ?
- (12) Name the naturally occurring isotope of carbon that is useful for carbon dating of any biological fossils.
- (13) Define electrohoresis.
- (14) List the chemical constituents used to make polyacrylamide gel.
- (15) During electrophoresis, if voltage is increased then what would be its effect on electrophoretic separation ?
- (16) Name the electrophoresis technique that separates proteins from their mixture based on their isoelectric pH.
- (17) Write the wavelength range of visible radiation in nano meters.
- (18) Which coloured filter would you use to read the absorbance of a blue coloured solution using colorimeter ?
- (19) Name the light sources used for visible light and UV light in spectrophotometers.
- (20) Write the names of the amino acids present in the proteins that contribute to the absorption of UV light at 280 nm in spectrophotometer ?

- 2** (a) Answer briefly any three of the following questions : **6**
- (1) Define absorption spectra and draw typical absorption spectra for a coloured dye in visible range and label absorption maxima.
 - (2) What are radioisotopes ? Write one example of radioisotope that liberates lots of energy by nuclear fission reaction and being used in atomic bombs.
 - (3) On what basis proteins are separated in SDS PAGE ?
 - (4) Name two examples of materials being used to prepare density gradients in density gradient centrifugation.

- (5) How pH of the buffer could affect the electrophoretic mobility of protein sample ?
- (6) Describe Void volume (V_0) in molecular sieve chromatography.

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

- (1) Write advantages of diffraction gratings in comparison to prism monochromators.
- (2) If half life of a radio isotope is 365 days, after two years what percentage of the original radio activity will remain in the isotope sample ?
- (3) Write advantages of thin layer chromatography in comparison to paper chromatography.
- (4) List different spot detection techniques used in TLC.
- (5) What is Agarose ? How pore size can be varied in making of agarose gels ?
- (6) Why differential centrifugation and separation of cell organelles is carried out using refrigerated centrifuge, at temperature in the range of 0 to 4°C ?

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

- (1) Draw a labelled diagram of double beam spectrophotometer and write its advantages in comparison to single beam spectrophotometers.
- (2) Write a short note on Ion Exchange Chromatography.
- (3) Explain different types of radioactive decays using suitable examples.
- (4) Write a short note on design and applications of analytical ultracentrifuge.
- (5) Explain basic principle of 2D gel electrophoresis and write its applications.

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

- (1) Write Beer and Lamberts laws of light absorption.
- (2) Which of the following electromagnetic radiations would have highest energy ? Why ? Visible light, UV light, Gamma rays, Microwaves, Infra-red radiation.

- (3) Write two applications of SDS PAGE.
 - (4) You are having two centrifuge having rotors of different sizes. One rotor have diameter of 10 cm and other had diameter of 20 cm. If both are used for centrifugation at 1000 rpm for 10 minutes, which one of the two would generate higher centrifugal force and why ?
 - (5) During agarose gel electrophoresis, why DNA sample is mixed with glycerol and bromophenol blue dye before loading it on the wells ?
 - (6) Explain the terms K_d , V_o , V_i and V_e in Gel permeation chromatography.
- (b) Answer any three of the following questions : **9**
- (1) Describe how spectrophotometers are useful in studying DNA denaturation ?
 - (2) Explain the effect of alpha emission and gamma emission on change in atomic number and mass number of a radio isotope.
 - (3) Write advantages of ascending paper chromatography in comparison to descending paper chromatography.
 - (4) What is the use of glass wool in column chromatography ?
 - (5) Write the use of beta mercaptoethanol in SDS PAGE.
 - (6) Name the optics systems used in analytical ultracentrifuges.
- (c) Answer any two of the following questions in detail : **10**
- (1) Discuss photomultiplier tube as photodetector.
 - (2) Describe principle and applications of Affinity chromatography.
 - (3) Write the medical applications of radioisotopes.
 - (4) Describe sub cellular fractionation scheme for isolation of cell organelles from liver homogenate by differential centrifugation.
 - (5) Discuss factors affecting electrophoresis.