

Time: 2:30 Hours

Marks: 70

Instructions:

1. All questions are compulsory.
 2. Figures to the right indicate marks.
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Q.1 (A): Answer any one of the following questions [7]

1. Describe Beer's and Lambert's laws of light absorption and write their limitations. Discuss extinction coefficients.
2. Explain diffraction gratings monochromators and write its advantages in comparison to prism monochromators in spectrophotometers.

(B) Answer any one of the following questions..... [4]

1. Discuss how spectrophotometers can be useful in qualitative and quantitative analysis of wide variety of compounds encountered in biochemistry.
2. Describe photoelectric effect and write a short note on photomultiplier tube (PMT).

(C) Answer any three of the following questions..... [3]

1. Which lamp is used as source of visible light?
2. Give the relationship between the grooves and wavelength in diffraction grating.
3. Write the wavelength ranges for visible and UV light.
4. Why UV radiation has higher energy compared to visible light? Justify your answer.
5. Draw the kind of graphs you would get when you plot: (A) Concentration V/S absorbance and (B) Concentration V/S percent transmittance,

Q.2 (A): Answer any one of the following questions [7]

1. Write the principle of RCF.
2. Give the idea about analytical ultra centrifuge.

(B) Answer any one of the following questions..... [4]

1. Explain experiment on isolation of sub cellular organelles.
2. Write about high speed centrifuge.

(C) Answer any three of the following questions..... [3]

1. Draw the diagram and show the positions of different lipoproteins as per their densities within a tube after separation of lipoproteins from plasma by density gradient centrifugation
2. What is the effect of radius of rotation on relative centrifugal force (RCF)?
3. What is centrifugation?
4. Why we need to maintain the lower temperature during centrifugation of cell homogenate?
5. Which type of rotor is used in table-top centrifuge ?

Q.3 (A): Answer any one of the following questions [7]

1. Explain radioactive decay with example.
2. Give the application of radioisotopes in biological field.

(B) Answer any one of the following questions..... [4]

1. The half-life of Palladium-100 is 4 days. After 12 days a sample of Pd-100 has been reduced to a mass of 4.00 mg. (a) Determine the starting mass. (b) What is the mass 8 weeks after the start?
2. Write a note on Gieger-Muller Counter.

(C) Answer any three of the following questions..... [3]

1. Explain radioactive decay with example.
2. Give the application of radioisotopes in biological field.
3. Define isotopes and write examples of isotopes of carbon or hydrogen.
4. 1 Gray is equal to how many RADs?
5. State the name of the heaviest of the radioactive particles emitted.

Q.4 (A): Answer any one of the following questions [7]

1. Discuss principle of affinity chromatography and explain how it is different from other conventional chromatographic techniques, write applications of affinity chromatography.
2. Write a detailed description of principle and procedure of TLC.

(B) Answer any one of the following questions..... [4]

1. Define chromatography. Describe brief history of chromatography and discuss basic common principle of chromatography.
2. Write advantages of TLC in comparison to paper chromatography.

(C) Answer any three of the following questions..... [3]

1. Define K_d value in chromatography.
2. Name the chromatographic technique you would use to separate and quantify volatile hydrocarbons from the crude petroleum sample.
3. In thin layer chromatography of sugars, the distance travelled by solvent front from the origin was 5 cm while the distance travelled by glucose and ribose from the origin were 2cm and 4cm respectively. Calculate the R_f values for glucose and ribose.
4. Which chromatographic technique would you use to separate proteins having differences in their molecular size from their sample mixture?
5. Give full form of HPLC.

Q.5 (A): Answer any one of the following questions [7]

1. Explain the use of various methods and materials for the detection of the compound on electrophoretogram.
2. Derive an equation which shows the relationship of various factors affecting electrophoretic mobility of the compound.

(B) Answer any one of the following questions..... [4]

1. Briefly define the role of buffer solution and its effects on the electrophoretic mobility of the compound.
2. Draw the electrophoretogram showing the bands pattern of hemoglobin on native, SDS-PAGE and red. SDS-PAGE.

(C) Answer any three of the following questions..... [3]

1. Write the name of chemical used as a cross linking agent in SDS PAGE.
2. Write the names of material used to stain proteins in electrophoretogram.
3. When we use buffer of alkaline pH (pH:8) to carry out electrophoresis of proteins from a sample, proteins would migrate in which direction : towards cathode or anode? And why?
4. Which dye is commonly used for detection of DNA bands in gel electrophoresis?
5. Give full form of SDS-PAGE.
