CLASS: BE   SEMESTER: III
BRANCH: BIOTECH   SESSION : MO/2018

SUBJECT : BT3025-BIO-ANALYTICAL TECHNIQUES

TIME: 1.5 HOURS   FULL MARKS: 25

INSTRUCTIONS:
1. The total marks of the questions are 30.
2. Candidates may attempt for all 30 marks.
3. In those cases where the marks obtained exceed 25 marks, the excess will be ignored.
4. Before attempting the question paper, be sure that you have got the correct question paper.
5. The missing data, if any, may be assumed suitably.

Q1 (a) What is relative centrifugal force? Calculate relative centrifugal force of a fixed angle type rotor with rpm of 160,000 and r_{min} of 20 mm and r_{max} of 80 mm.   [2]
    (b) What are Analytical zonal-sedimentation, Sedimentation equilibrium, Equilibrium density-gradient centrifugation and isopycinc centrifugation process?   [3]

Q2 (a) Derive Svedberg equation in terms of molecular weight of the macromolecule, density of solvent and partial volume particle.   [2]
    (b) An RNA molecule is centrifuged at a rotor speed of 14,000 rpm to equilibrium at 4°C in a dilute aqueous buffer (density is the same as that of water). The measured absorbance profile over part of the cell (assume that the absorbance is suitably blanked, so that A $\propto$ [protein]) over part of the cell is tabulated below. If the partial specific volume of the RNA molecule is 0.80 cm^3 g^{-1}, what is the molecular weight of the protein?   [3]

r (cm)	5.00	5.05	5.10	5.15	5.20	5.25	5.30	5.35
A_{230}	0.263	0.341	0.442	0.576	0.752	0.985	1.292	1.700

Q3 (a) Compare the Van-Deemeter and Halasz Equation related to chromatography?   [2]
    (b) Compose different components of affinity chromatography system with working flow diagram and elution graph (mobile phase buffer, ligands design and elution).   [3]

Q4 (a) For Ion Exchange Chromatography (IOE) provide working principle with example of different ion exchange matrix.   [2]
    (b) For any chromatogram define the following terms with mathematical equation, retention factor, Theoretical Plates number (N), Resolution (RS), Separation factor, distribution Constant (K_c), column's Phase Ratio (ß).   [3]

Q5 (a) Compare packed columns, WCOT, SCOT and FSOT used for Gas Chromatography.   [2]
    (b) Compose different components of Gas Chromatography system with proper diagram including different detectors.   [3]

Q6 (a) What are different types of detectors used in HPLC system?   [2]
    (b) In a thin layer choromatography (TLC), if a compound travels 3.4 cm and the and solvent front travels 2.6 cm, calculate the retention factor? Schematically represent HPLC system.   [3]

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