[This question paper contains 6 printed pages.]

1370 *Your Roll No.* .....

B.Sc. (Hons.)/II **A**

BIOCHEMISTRY – Paper VI

(Biochemical and Biophysical Techniques)

(Admissions of 2000 and onwards)

Time : 3 Hours *Maximum Marks : 60*

(Write your Roll No. on the top immediately on receipt of this question paper.)

Attempt **Five** *questions in all, including Q. No.* **1** *which is compulsory.*

1. (a) Explain briefly

(i) Proteins show a very strong absorbance at a wavelength close to 200 nm.

(ii) Affinity elution can be used to elute a glycoprotein from an affinity column in two alternative ways.

(iii) Fluorescent light has a longer wavelength than incident light.

(iv) α-emitters are not used in Biological samples.

(v) The molecular weight of a glycoprotein is overestimated by gel electrophoresis.

P.T.O.

(b) Define the following :

(i) Limit of resolution of a microscope

(ii) Chromophore

(iii) Sedimentation coefficient

(iv) Exclusion limit

(c) You wish to centrifuge a sample at an RCF of 100,000 g. At what rpm must you set the centrifuge assuming an average r value of 4 cm. (10,4,2)

2. (a) Out of Sephadex G-50 and Sephadex G-150 which one

(i) Is used to remove salts from protein solution

(ii) Takes more time to swell

(iii) Is used to separate proteins

(iv) Has more cross linking

(b) Differentiate between prism and diffraction grating. Which one is more useful as a monochromator ?

(c) Describe three methods of coupling a ligand to affinity matrix. (4,4,3)

3. (a) Which of the following is true of the protein estimation method

(i) Biuret method

1. Response is dependent on amino acid composition
2. Non destructive
3. Rapid
4. Has high sensitivity

(ii) Lowry's method

1. Response is independent of amino acid composition
2. Time consuming
3. Has high sensitivity
4. Non destructive

(iii) Bradford's method

1. Response is independent of ammo acid composition
2. Time consuming
3. Has high sensitivity
4. Non destructive

(iv) Spectrophotometric (A_{280})

1. Response is independent of amino acid composition

2. Time consuming
3. Has high sensitivity
4. Non destructive

(b) Describe how gel permeation chromatography can be used to determine the molecular weight of a protein.

(c) How are proteins and nucleic acids detected on the gels after electrophoresis. (4,4,3)

4. (a) Give the terms for the following

(i) The process of precipitating proteins using inorganic salts

(ii) The wavelength dependence of the absorbance of a compound

(iii) A sample peak in GLC is identified by this quantity

(iv) An ion electrostatically bound to the ion exchanger (4)

(b) (i) What are the limitations of electron microscopy ?

(ii) Describe two applications of fluorescence microscopy. (4)

(c) Define a pure culture. How do you obtain a pure culture of a soil bacteria. (3)

5. (a) What do you understand by

(i) Quenching of fluorescence

(ii) Scintillation

(iii) Spectral purity of light

(iv) Extrinsic fluorescence

(b) The following proteins were eluted from a DEAE-Cellulose ion exchanger by an increasing salt gradient (pH 8.0). What is the order of elution

Egg albumin (pI 4.6) Pepsinogen (pI 1.0)

Serum albumin (pI 4.9) Cytochrome c (pI 10.6)

Myoglobin (pI 6.8)

(c) Compare paper chromatography and thin layer chromatography. (4,4,3)

6. (a) Mention the role of the following :

(i) Guard column in HPLC

(ii) Peptone and Fetal calf serum in culture medium

(iii) POPOP in liquid scintillation counting

(iv) Vacuum pump in an ultracentrifuge (4)

P.T.O.

(b) Describe how components are detected in GLC. (4)

(c) Discuss the method of density gradient centrifugation. (3)

7. (a) Give an example for the following :

(i) A stationary phase used in hydrophobic chromatography

(ii) A substance used to form density gradient

(iii) A gas used in GLC as the mobile phase

(iv) An extrinsic flour used for proteins

(b) Discuss applications of radioactivity in biology.

(c) Write a short note on equilibrium dialysis. (4,4,3)

8. Write short notes on the following :

(a) Hydrophobic chromatography

(b) Ion-exchange chromatography

(c) Isoelectric focusing (4,4,3)