



Date:

Registration number:

ST. JOSEPH'S COLLEGE (AUTONOMOUS), BENGALURU-27  
M.SC Chemistry - IV SEMESTER  
SEMESTER EXAMINATION: APRIL 2022  
(Examination conducted in July 2022)  
**CH 0118 – APPLIED ANALYSIS**

Time- 2 ½ hrs

Max Marks-70

This question paper contains TWO printed pages and THREE parts.

**Part A**

**Answer any 6 out of 8 questions. Each question carries 2 marks.** [ 6 x 2 = 12]

1. State any two applications of viscosity in the study of biomolecules.
2. What information can one obtain from western blotting?
3. What is the reaction of phenyl isothiocyanate with threonine?
4. What do you mean by a random coil conformation?
5. Name and draw the structure of a sedative.
6. What is the disease caused due to the deficiency of copper and iron in the diet?
7. Define octane number of a liquid fuel? What is its significance?
8. What is meant by photochemical smog?

**Part B**

**Answer any 4 out of 6 questions. Each question carries 12 marks.** [4 x 12 = 48]

9. (a) Explain briefly a method used to determine molecular mass of a protein.  
(b) Give the principle and explain what characteristics of a biomolecule one would obtain from (i) Differential Scanning Calorimetry  
(ii) Nuclear Magnetic Resonance (6+6)
10. (a) Discuss the principle and procedure of any three methods of sampling air pollutants.  
(b) How would you analyse the following parameters in a water sample  
(i) Total solids  
(ii) Total hardness  
(iii) Total phosphates (6+6)
11. (a) How is caffeine estimated in coffee products?  
(b) What is a food preservative? Give a brief description of the method used for the estimation of Sodium benzoate in food products?  
(c) Describe a method for the estimation of added water in milk. (3+6+3)
12. (a) Write the structures and the characteristic reactions involved in the spot test detection of: (i) Cocaine  
(ii) Barbiturates  
(b) How is the antibiotic, chloramphenicol, estimated in a formulation? (6+6)

13. (a) What is meant by the hyperchromic shift of double stranded DNA? What is the cause for this shift? Draw the melting curve and explain any two factors that would affect the melting temperature?  
 (b) Explain how finger print development is carried out in a forensic lab. (6+6)
14. (a) What is cation exchange capacity? How would you determine cation exchange capacity of a soil sample?  
 (b) What are the different methods used for the safe disposal of radioactive waste? (6+6)

**Part C**

**Answer any 2 out of 3 questions. Each question carries 5 marks.** [ 2 x 5 = 10]

- 15.(a)The following peptide sequence was sequentially treated with CNBr, and trypsin.  
 Phe- Trp – Lys – Tyr – Met – Gly – Ala – Cys – Cys – Pro – Met – Asp –  
 Gly – Arg – Phe – Ala – Gly – Trp – Gly – Val – Glu – Ile – Arg - Gly  
 Calculate the total number of fragments, expected at the end of complete digestion of the polypeptide.
- (b) A protein was purified to homogeneity. Determination of the molecular weight by molecular exclusion chromatography yields 60 kd. Chromatography in the presence of 6 M urea yields a 30-kd species. When the chromatography is repeated in the presence of 6 M urea and 10 mM β-mercaptoethanol, a single molecular species of 15 kd results. Describe the structure of the molecule. (2+3)
- 16.(a) What would the expected effect be on a PCR reaction if the primers used were slightly shorter and more variable than the intended oligonucleotide sequence?  
 (b) Can only one primer be used in PCR? If yes, justify.  
 (c) Tropomyosin, a 93-kd muscle protein, sediments more slowly than does haemoglobin (65kd). Their sedimentation coefficients are 2.6S and 4.31S, respectively. Which structural feature of tropomyosin accounts for its slow sedimentation? (1.5 +1.5 +2)

17. (a) Match the following:

1) Zn and Mg deficiency	a) Heart and RBC
2) LDH 3	b) Low levels of alkaline phosphatase
3) LDH 1	c) Fatigue, muscle pain and cramps

(b) A sample was counted in a scintillation counter and was found to give 52, 211cpm. After this 0.1ml of standard toluene ( $1.85 \times 10^6$  dpm/ml) was added as an internal standard. Upon recounting, the sample gave 142,111cpm. Calculate the efficiency of counting for this sample.

(3+2)

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