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Your Roll No

B.Sc. Prog./III

J

AC-302 Instrumental Methods of Analysis

(NC – Admissions of 2005 & onwards)

Time 3 Hours

Maximum Marks 75

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

*Attempt any six questions in all
Question No 1 is compulsory*

- 1 (a) Why is radiation source in Atomic Absorption Spectrophotometer usually modulated ? (3)
- (b) Explain, a sample tube is placed after monochromators in UV but placed before monochromators in IR spectrophotometers (3)
- (c) Which of the following molecules are IR active and why ?
- CH₄, CO₂, HCN and N₂O (3)

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(d) Why is it necessary to add NaF at the time of collection of blood, used for the estimation of blood glucose ? (3)

(e) Differentiate between plane polarised radiations and electromagnetic radiations (1½)

(f) Explain, Deshielding due to Hydrogen bonding (1½)

2 (a) What are the different electronic-transitions possible in UV region ? What are their relative energies and which of these is the most intense and why ? (4)

(b) Define the following

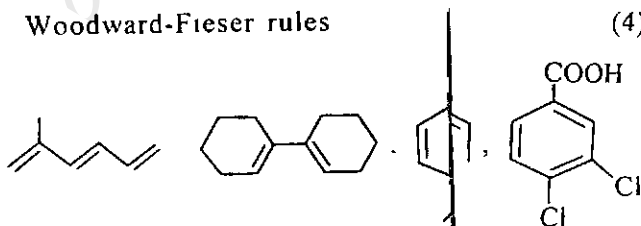
(i) Chromophore

(ii) Auxochrome

(iii) Hypochromic shift

(iv) Hyperchromic shift (4)

(c) Find out the probable absorption position of the most intense band of these compounds using Woodward-Fieser rules (4)

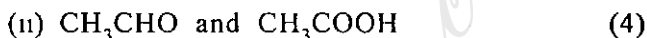
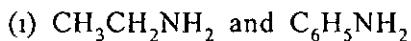


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- 3 (a) What is the necessary criterion for a molecule to give IR absorption bands ?

How would you distinguish between the following pairs of organic compounds by using IR spectroscopy ?



- (b) Sketch the optical path of a double beam IR spectrophotometer and explain why double beam spectrophotometer is preferred over single beam spectrophotometer (4)

- (c) Explain, the various types of molecular vibrations associated with IR absorption (2)

- (d) How does IR spectroscopy helps in distinguishing between intermolecular and intramolecular hydrogen bonding (2)

- 4 Write short notes on any **three** of the following

(i) Relaxation process (as applied in NMR spectroscopy)

(ii) Total consumption burner and premix burner

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(iii) Limitations of Lambert-Beers Law

(iv) Saponification value of fats (4,4,4)

- 5 (a) What are magnetically active and inactive nuclei ?
Explain with suitable examples (3)
- (b) A compound having molecular formula $C_4H_8O_2$, shows three peaks in PMR spectrum at $\delta = 1.2$ (triplet), $\delta = 2.1$ (singlet) and $\delta = 4.4$ (quartet) respectively. Identify the compound (3)
- (c) Why is TMS selected as a reference compound in NMR spectroscopy ? (3)
- (d) What are the various factors that influence the magnitude of chemical-shift in NMR spectroscopy ? (3)
- 6 (a) Explain in brief, the light source used in atomic Absorption Spectroscopy (4)
- (b) Under what circumstances N_2O - acetylene flame would be preferred over oxyacetylene flame in atomic absorption spectroscopy ? Explain with examples (4)

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(c) Give an account of various interferences that may effect flame emission or flame absorption analysis (4)

7 (a) A reagent X-cleaves selectively those peptide bonds whose carbonyl function is donated by methionene. Predict the action of this reagent on the following peptide

Gly-Tyr-Ser-Ala-Met-Gly-His-Val-His-Met-Pro-Phe-Met-Asp (4)

(b) Describe Sanger's method for determination of N-terminal amino acid (3)

(c) Suggest qualitative test to detect the following and give chemical equations wherever possible

(i) Blood glucose

(ii) Ketonuria

(iii) Bilirubin in blood (5)

8 (a) Explain Renal threshold value and explain their biological significance (3)

(b) Write short notes on

Coagulation of blood (3)

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- (c) Define specific rotation. On what factors does it depend? (3)
- (d) Sketch the optical-path of a polarimeter and precisely describe its functioning. (3)

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