

GOVERNMENT COLLEGE (A), RAJAMAHENDRAVARAM
II B.Sc. ANALYTICAL CHEMISTRY, SEMESTER-IV

COURSE-9: SPECTROSCOPY

MODEL QUESTION PAPER

TIME: 2½ hrs.

MAX. MARKS: 50

PART – A

Answer **ALL** the following questions.

5x7 = 35

1a Define Absorbance, transmittance, and molar absorptivity. State and explain Beer-Lambert law.

OR

1b Give the experimental procedure of simultaneous determination of chromium in potassium dichromate and manganese in Manganous Sulphate using Beer-Lambert's law.

2a Classify molecular spectra and selection rules for the formation of spectra.

OR

2b Define Chromophore and auxochrome. How does the conjugation, affect the affect the λ_{\max} .

3a Explain the Fingerprint region. Explain its significance with an example. Write IR spectral data for any one alcohol, aldehyde and ketone.

OR

3b Discuss different modes of vibrations in IR spectroscopy.

4a Give a detailed explanation on the principle of NMR spectroscopy. What is a chemical shift equivalence?

OR

4b Describe the role of equivalent and non-equivalent protons in NMR spectroscopy.

Marks	BL	CLO	PLO	PI
7	2	2	1	
7	2	2	2	
7	2	1	2	
7	2	3	2	
7	5	1	7	
7	2	2	5	
7	4	1	3	
7	3	4	2	

5a How many different NMR signals you will see in the following molecules? Ethanol, Ethyl Acetate, toluene and Acetophenone.

OR

5b Describe the applications of UV – Vis and IR spectroscopies in structure determination of organic compounds.

7	6	5	5	
7	3	3	4	

PART – B

Answer any **FIVE** of the following questions.

5x3 = 15 M

	Marks	BL	CLO	PLO	PI
6. Discuss single and double-beam spectrophotometers.	3	1	1	1	
7. Illustrate different shifts in UV – Vis Spectroscopy.	3	2	1	2	
8. Write a short note on different regions in IR.	3	2	1	3	
9. Explain about spin-spin coupling in NMR.	3	6	3	5	
10. Write any two applications of UV-Vis spectroscopy with examples	3	5	3	7	
11. Explain types of electronic transitions in UV – Vis Spectroscopy.	3	2	5	2	
12. Write IR stretching frequencies of alkanes and amines.	3	4	4	3	
13. Define coupling constant with examples.	3	5	4	3	

GOVERNMENT COLLEGE (A), RAJAHMUNDRY
II B.Sc. ANALYTICAL CHEMISTRY (H) SEMESTER-IV
MODEL PAPER (From 2024-25) Course - 10:
PHYSICAL CHEMISTRY-II

Time: 2½ hrs.

Maximum Marks: 50

PART- A

Answer ALL the questions. Each carry SEVEN marks

5 x 7 = 35 M

1. What is elevation in boiling point and derive the relation between molecular weight of solute and elevation in boiling point? BT2 CO1 PO1
- (OR)**
2. Define osmotic pressure and explain their experimental determination? BT2 CO1 PO1
3. Explain Arrhenius theory of dissociation and its limitations BT2 CO2 PO2
- (OR)**
4. Define the transport number and determine the transport number by Hittorf's method BT1 CO2 PO2
5. Derive the Nernst equation BT2 CO3 PO3
- (OR)**
6. Describe the following electrodes (a) Calomel electrode (b) Indicator electrode BT2 CO3 PO3
7. Derive the Gibbs phase rule? BT1 CO4 PO4
- (OR)**
8. Explain phase diagram of Pb-Ag System BT3 CO4 PO4
9. Describe the laws of photochemistry BT2 CO5 PO5
- (OR)**
10. Derive the quantum yield of Hydrogen chloride photochemical reaction through mechanism BT3 CO5 PO5

PART- B

Answer any FIVE of the following questions. Each carry THREE marks 5 x 3 = 15 M

11. Why ethylene glycol used as an antifreeze explain? BT1 CO1 PO1
12. Explain the Kohlrausch law BT2 CO2 PO2
13. How does dilution effect the conductivity of electrolyte solution? BT2 CO2 PO2
14. How does the standard hydrogen electrode (SHE) serve as reference point for measuring electrode potentials? BT3 CO3 PO3
15. Explain how a metal-metal ion electrode works? BT1 CO3 PO3
16. How does pressure influence the phase equilibrium of water? BT3 CO4 PO4
17. How is the eutectic point utilized in the desilverisation process? BT2 CO4 PO5
18. Define fluorescence and phosphorescence? BT1 CO5 PO5