BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI1
(END SEMESTER EXAMINATION)

CLASS: B. Pharmacy **SEMESTER: VII**
BRANCH: PHARMACY **SESSION: MO2024**

SUBJECT: BP701T INSTRUMENTAL METHODS OF ANALYSIS

TIME: 3.00 Hours **FULL MARK: 75**

INSTRUCTIONS:

1. **The missing data, if any, may be assumed suitably.**
2. **Before attempting the question paper, be sure that you have got the correct question paper.**
3. **Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.**
4. **This question paper consists of (03) three parts. Read the part wise instructions before attempting the questions.**

PART-I
Objective types questions (Instruction: Answer all questions)

Q1. (10 x 2 = 20 Marks)

A. Define molar extinction coefficient.

B. Define fluorescence life-time.

C. List various methods available for countering anionic interference in flame emission spectrometry.

D. Name two detectors for Infrared Spectroscope.

E. Define finger print region of IR spectra.

F. Define fermi resonance.

G. What is capacity factor in planar chromatography and how it is related with retardation factor.

H. How the detection of protein, DNA and RNA are named in electrophoresis?

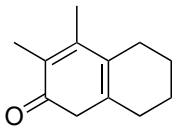
I. Write the mathematical expression for Kovat's retention index in gas chromatography and explain the terms in it.

J. List the five reference compounds commonly used to model interactions for calculating McReynolds' constants in gas chromatography. Briefly describe the type of interactions each compound represents.

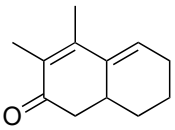
PART-II
Short Answers
(Instruction: Answer seven out of nine questions
Q2-Q6 are compulsory Q7-Q10 have options)

(7 x 5 = 35 Marks)

Q2. Calculate the λmax for the following compounds using Woodward-Fieser rule



A



B

Q3. With a neat and labelled diagram elaborate on the working principle of photomultiplier.
Q4. Explain the working principle of reciprocating pump with a neat and labelled diagram
Q5. Discuss the construction and working principle of Thermal conductivity detector.
Q6. Write a note on various fundamental modes of vibrations in polyatomic molecules.
Q7. Discuss various factors affecting the fundamental modes of vibrations.

(OR)

Q8. Discuss the factors that influence electrophoretic mobility in a sample. Include an explanation of how the different variables impact the mobility during electrophoresis.
Q9. Describe how different types of adsorption isotherms contribute to band broadening and affect peak shapes during chromatographic separation.

(OR)

Q10. Discuss the principle and various steps (with neat diagram) of cation exchange chromatography.

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PART-III
Long Answers
(Instruction: Answer two out of three questions
Q13 is compulsory & Q11-Q12 have option)

(2 x 10 = 20 marks)

Q11. Derive the equation for determining the concentration of compound X in the presence of compound Y using UV-visible spectrophotometer by absorbance ratio method.

(OR)

Q12. Derive the Stern-Volmer equation that describes the relationship between fluorescence intensity and the concentration of a quencher molecule.

Q13. Using the Van Deemter equation, explain how the height equivalent to a theoretical plate (HETP) in chromatography can be minimized. Discuss the roles of each term in the equation and provide strategies to optimize them for achieving the best column efficiency.

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