

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

CLASS: M.PHARM  
BRANCH: PHARMACY

SEMESTER: SECOND  
SESSION: SP'2023

SUBJECT: MPC201T ADVANCED SPECTRAL ANALYSIS

TIME: 3.00 Hours

FULL MARK: 75

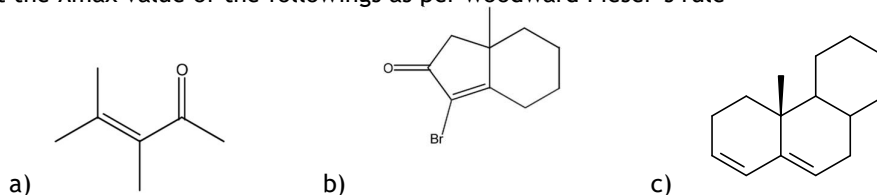
INSTRUCTIONS:

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.
5. Answer any five questions.

- 1a. Describe the strengths & limitations of Mass Spectroscopy and enumerate general rules for predicting prominent peaks in Mass Spectrum with suitable examples. [7]
- 1b. Predict the Mass Spectra of following compounds with probable characteristic mass fragment ions' structure(s) and corresponding m/e : [8]  
(a) 3-Methyl pentane (b) Phenyl acetylene (c) Benzyl alcohol (d) 2-Hexanone

- 2a. How do you measure Chemical Shifts in NMR spectroscopy? Discuss the different scales employed in case of  $^1\text{H-NMR}$  and  $^{13}\text{C-NMR}$  spectra. [7]
- 2b. After drawing the structures of following compounds, assign the different protons and predict their splitting pattern/no. of signals. [8]  
(a) Methyl propionate (b) Methyl ethyl ketone (c) 2-Chloropropane (d) Ethyl bromide

- 3a. Find out the  $\lambda_{\text{max}}$  value of the followings as per Woodward Fieser's rule [7]



- 3b. Justify the role of finger print region in IR spectroscopy. Explain the significance of solvent effect observed in UV-Visible spectroscopy. [8]

- 4a. Define & differentiate between ATR-IR & FTIR. Discuss about ATR-IR spectroscopy and write it's significance. [7]

- 4b. What do you mean by finger print region? An organic compound(A) with molecular formula,  $\text{C}_3\text{H}_9\text{N}$  shows the following peaks in IR spectrum(I)3012  $\text{cm}^{-1}$  (II)3243  $\text{cm}^{-1}$  (III)3236  $\text{cm}^{-1}$  (IV)1615  $\text{cm}^{-1}$ . When the compound A is treated with nitrous acid, we get a compound B which shows a strong peak at 3430  $\text{cm}^{-1}$ . What are A & B and explain the reaction involved. [8]

- 5a. Discuss in detail about principle, interpretation and applications of DTA [7]

- 5b. How do you differentiate between DSC & DTA? Justify the role of DSC in thermal analysis. [8]

- 6a. Write a detail note on ELISA and it's significance. Give a brief discussion on RIA on drug analysis. [7]

- 6b. Differentiate between Raman spectroscopy and IR Spectroscopy. Give a note on various aspects of Raman spectroscopy with respect to instrumentation & application. [8]

- 7a. State the working principle of Atmospheric pressure chemical ionization & Electro spray ionization technique used in LC-MS (use schematic representation) [7]

- 7b. Mention the characteristics of super critical fluid over liquid or gas as mobile phase in chromatographic separations. Why carbon dioxide is preferred super critical fluid over others [8]