Q. P. Code: 26264

3 Hours Total marks 75

N.B (1) All questions are compulsory
(2) Figures to the right indicate full marks
(3) Answer all sub questions together
(4) Draw neat labeled diagrams wherever necessary

Q.1 A) Name the following (any six) 6M

i. One interface used in LC-MS
ii. Two functional groups having exchangeable protons in ^{1}H NMR
iii. Two ion pairing reagents
iv. One visualizing agent used in Gel electrophoresis technique
v. One UV multi-component analysis technique where absorbance is taken at λmax of one component and at isobestic point
vi. Two supercritical fluids used in supercritical fluid chromatography
vii. One lanthanide shift reagent used in NMR spectroscopy

Q.1 B) Explain the following (any four) 8M

i. UPLC
ii. Base peak
iii. Head Space analysis
iv. HETCOR
v. MALDI

Q.1 C) Answer the following (any three) 6M

i. A mixture of compounds X, Y and Z was separated on 10 cm silica gel HPTLC plate. Solvent front was allowed to run up to 9 cm. If X, Y and Z travelled distances of 2cm, 7cm and 5cm respectively, arrange them in increasing order of polarity. Justify your answer.
ii. Draw a diagram to depict anisotropic effect of benzene protons
iii. Give characteristic I.R. bands for aniline
iv. If A is more polar than B then what would be eluted first in reverse phase chromatography and why?

Q2 A) Answer the following (any two) 8M

i. Explain Time of Flight mass analyzer in detail
ii. Explain the term HPTLC fingerprint analysis? Give its application
iii. What is non first order spectra? Give two examples of the same.

Q2 B) Give two points of differentiation between gradient elution and isocratic elution 3M

TURN OVER

Q3	**A)**	**Answer the following (any two)**	8M
	i.	Explain principle involved in Chiral chromatography.	
	ii.	Write a note on LC-NMR	
	iii.	Discuss absorbance ratio method for multicomponent analysis by UV spectroscopy	
Q3	**B)**	Assign IR vibrations for the following wave numbers 3300, 2200, 1100, 1720 $^{cm-1}$	3M
Q4	**A)**	**Answer the following (any two)**	8M
	i.	What is tandem mass spectrometry? State its one application.	
	ii.	Write a note on FTIR	
	iii.	Explain the term spin spin splitting with suitable example	
Q4	**B)**	Draw a thermogravimetric curve. Enlist any two factors affecting the same	3M
Q5	**A)**	**Answer the following (any two)**	8M
	i.	Discuss the principle and sample preparation of scanning electron microscopy	
	ii.	Distinguish between ^{13}C NMR spectroscopy and ^{1}H NMR spectroscopy? (Give 4 points)	
	iii.	What are residual solvents? Explain the analytical method used in the analysis of the same.	
Q5	**B)**	Depict Mc Laffarty rearrangement for n-butylbenzene	3M
Q6	**A)**	**Answer the following (any two)**	8M
	i.	With respect to DSC explain the term glass transition state. Explain any one pharmaceutical application of DSC.	
	ii.	With respect to PDA detector in HPLC give 1) Two advantages 2) One application.	
	iii.	Write a short note on GC-MS	
Q6	**B)**	Draw chromatogram to indicate retention time and dead time	3M