3 Hours **80 Marks**

N.B:

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

Q.1. A. **Do as directed (Answer any EIGHT questions)** **8 M**

i. Give two examples of auxochromes.
ii. Name any two agents used for chemical derivatization to convert non fluorescent compounds to fluorescent ones.
iii. Name recent sample handling technique used in IR spectroscopy
iv. Name one source used in Raman spectrophotometer
v. Name two types of plasma sources used in atomic spectroscopy
vi. Write one application of X ray diffraction technique
vii. Name any one radionuclide used for diagnostic purposes
viii. Name one reference electrode used in potentiometric measurements
ix. Define the term glass transition temperature

Q.1.B. **Do as directed (Answer any THREE)** **6 M**

i Define wavelength maxima? How is it determined?
Ii Explain the term correlation coefficient
Iii Define the term 'singlet state'. Give formula for quantum yield.
iv Glass cuvettes cannot be used for UV spectrophotometric analysis, State whether true or false. Justify

Q.1.C **Solve the following: (Answer any TWO)** **6 M**

i Give IR frequencies for following functional groups

1. Carbonyl stretch of aliphatic aldehyde
2. Hydroxyl group of alcohols
3. CΞC stretch of alkenes

ii A (1%, 1cm) value for drug A at λ max of 290 nm is 680. An injection of this drug when diluted by a factor of 2000 gave an absorbance of 0.682 when measured in 1 cm cell at λ max of 290 nm. Calculate the concentration of drug A in the original injection.

Iii Calculate concentration in microgram per ml of solution of drug X (Molecular weight=202.4) in 0.1 M NaOH, giving as absorbance of 0.723 in a 2 cm path length cell at λ max of 310 nm. Reported molar absorptivity of drug X at λ max 310 nm is 4352.

Q.2 **Answer the following: (Answer any THREE)** **12 M**

A Enlist three methods for quantitative UV spectrophotometric assay of single component formulation. Explain any one in detail.
B With the help of suitable diagram explain construction and working of a photon multiplier tube use in Uv-Visible spectrophotometer.
C Choice of solvent and concentration of analyse play an important role in UV Visible spectrophotometric analysis. Justify
D Draw block diagram of a double bean UV spectrophotometer. Explain its working.

Q.3 Answer the following: (Answer any THREE) **12 M**

A Explain any four factors that affect the fluorescence of a compound

B How many filters are employed in a photofluorimeter? What are they called as? Write role of each of them in fluorimetric analysis.

C Differentiate between atomic absorption and atomic emission spectroscopy based on principle and components of instrumentation. Give one advantage and one disadvantage of atomic absorption spectroscopic technique over atomic emission technique.

D Discuss various types of interferences encountered in flame photometry

Q.4 Answer the following: (Answer any THREE) **12 M**

A Explain the term overtones with reference to near IR with suitable diagram. Discuss any one application of near IR spectroscopy.

B Enlist any four detectors in IR spectroscopy. Discuss any one in detail

C With the help of suitable diagram explain various types of scattering studies in Raman spectroscopy

D Give any four points of differentiation between IR spectroscopy and Raman spectroscopy

Q.5 Answer the following: (Answer any THREE): **12 M**

A Give Braggs Law and its mathematical derivation

B Discuss construction and working of glass electrode with suitable diagram

C Give principle involved in differential scanning calorimetry. Enlist any two pharmaceutical applications of the same.

D Draw a typical thermogravimetric curve. Discuss factors affecting the same

Q.6 Answer the following: (Answer any THREE): **12 M**

A Discuss any one instrument used in measurement of radioactivity

B Write a note on isotope dilution analysis

C Nine paracetamol tablets were analysed. The mean of paracetamol content was found to be 508 mg with a standard deviation of 4.5 mg. Calculate the 95% confidence interval for the true paracetanol content in the tablet. [Tabulated 't value' for 8 degrees of freedom is 2.306]

D Quantitative estimation of paracetamol tablets was to be performed by UV spectrophotometric analysis. Absorbance values obtained with increasing concentration of paracetamol are as follows

Concentration (µg/ml)	Absorbance at 257nm
20	0.251
40	0.550
60	0.759
80	1.080
100	1.200

Give the equation of line that best fit the data. What could be the concentration of the solution in µg/ml giving an absorbance of 0.748 at 257 nm