Sem - VI (CBSGS) PA - II 04/11/15

QP Code : 21705

(3 Hours) [Total Marks : 70

N.B. : (1) All questions are **compulsary**
(2) Figures to the **right** indicate **full** marks
(3) **Draw** neat labelled **diagram** wherever **necessary**

1. (a) Answer the following (any **five**) 10
   (i) What is wavelength range of UV - visible spectroscopy ? Write relationship between wavelength, wavenumber and frequency.
   (ii) Enlist sources & detectors used in IR spectroscopy
   (iii) Explain Radioactive decay.
   (iv) Write any two differentiating points of Fluorimetry and UV - visible spectroscopy
   (v) Define chromophore and what is meaning of cut off wavelength of solvents used in UV visible spectroscopy
   (vi) Describe anionic interference in flame photometry

   (b) Answer the following (any **five**) 5
   (i) Enlist bending vibrations in IR spectroscopy
   (ii) Define the term curie in radiochemistry
   (iii) Enlist solvents used in IR spectroscopy
   (iv) Write role of primary and secondary filter used in photofluorimeter
   (v) Define quantum yield
   (vi) What is specific absorbance ?

2. (a) Answer the following (any **two**) 8
   (i) Enlist sources used in UV - visible spectrophotometer and explain any one source in detail
   (ii) What is Raman Spectra ? Write two advantages of Raman Spectroscopy over Infrared spectroscpy
   (iii) Explain the terms Linear regression and correlation coefficient.

   (b) Explain isotope dilution analysis 3

3. (a) Answer the following (any **two**) 8
   (i) Draw a neat labelled diagram of atomic absorption spectrophotometer and discuss its working
   (ii) What are thermal methods of analysis ? Give instrumentation of thermogravimetric analysis
   (iii) Write principle involved in Flame Photometry and write any two applications of the same

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(b) With the help of energy level diagram depict fundamental and overtone absorptions in IR spectroscopy. 3

4. (a) Answer the following (any **two**) 8
   (i) State Beer - Lambert's law and discuss conditions wherein deviations from Beer - Lambert's law are observed
   (ii) Describe the principle and applications of DTA.
   (iii) With the help of diagram explain Attenuated total reflectance [ATR]

   (b) The following values are obtained for the determination of Cadmium in a sample of dust 4.3, 4.1, 4.0, 3.2 μg / gram. Should the value 3.2 be rejected [critical value of Q for sample size 4 is 0.831] 3

5. (a) Answer the following (any **two**) 8
   (i) Enlist different methods for determining the concetration of a single component using UV - visible spectroscopy and discuss any one method in detail.
   (ii) With the help of energy level diagram depict various deactivation process in fluorescence spectroscopy.
   (iii) Discuss Stokes, anti-Stokes and Rayleigh Scattering with reference to Raman Spectroscopy. Support your answer with energy level diagram.

   (b) Give Bragg's law and its mathematical derivation. 3

6. (a) Answer the following (any **two**) 8
   (i) Write a note in handling of solid samples in IR spectroscopy
   (ii) Draw block diagram of double beam UV - Visible spectrophotometer and explain working of same
   (iii) Discuss measurement of rate constant using UV - Visible spectroscopy

   (b) $A^{1\%}_{1cm}$ of a drug at its wavelength maximum (λmax) is 700. 1ml of an injection containing the drug when diluted to 1 liter for analysis, gave an absorbance of 0.68 at λmax when measured in 1 cm cell. Calculate the concentration of drug in the injection in mg/ml. 3
