SHIVAJI COLLEGE,

UNIVERSITY OF DELHI

DEPARTMENT OF CHEMISTRY

INTERNAL TEST (Academic Year 2023 -24)

Name of the Course : B. Sc. (H) Chemistry
Semester: VI
Name of the Paper: DSE, Analytical Methods in Chemistry
Duration: 60 Minutes
Maximum Marks: 20
Date of Test: 25 April 2024
Faculty Name: Dr Seema
Instructions for students:

- Attempt all questions.
- Question 1 to 5 are compulsory, carry one mark each.
- Q 6 to Q8 carry 2 mark each.
- Q9 to Q11 carry 3 mark each.

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1. What is the energy of a transition if the absorbed frequency is 3.1×10^{10} Hz?
   (a) 2.0×10^{-23} J (b) 2.1×10^{-44} J (c) 2.0×10^{-23} J (d) 2.1×10^{-44} J

2. Which of the following statements is correct?
(a) Microwave radiation possesses more energy than IR radiation
(b) IR has a shorter wavelength than visible light
(c) UV radiation has a longer wavelength than IR radiation
(d) IR radiation has a lower wavenumber than visible light

3. The representation of Beer Lambert's law is given as A = abc. If "b" represents distance, "c' represents concentration and 'A' represents absorbance, what does "a' represent?
   (a) Intensity (b) Transmittance (c) Absorptivity (d) Power

4. The purpose of the beam splitter in double beam spectrophotometer is
   (a) It splits the source beam into two equal intensity beams
   (b) It splits the source beam in such a way that sample beam has higher intensity
   (c) It splits the source beam in such a way that a reference beam has higher intensity
   (d)To merge two equal intensity beams into a single beam

5. Which of the following statements is false about single beam absorption instruments?
   (a) Tungsten bulb is used as a source
   (b) Beam splitter is used to get parallel beam
   (c) Test tube is used as sample holder
   (d) Photovoltaic cell as detector

6. Calculate the molar absorptivity of 0.4×10^{-3} M solution which has an absorbance of 0.15 when the path length is 1.3 cm.
7. A sample solution has an absorbance at 280 nm is 0.54 recorded in a 0.5 cm long cuvette. Given the molar extinction coefficient value is 6.4×10^3 L $mol^{-1}cm^{-1}$ then find the concentration of the solution.
8. Distinguish between (**any two**)
   a. Hydrogen and deuterium discharge lamp
   b. Filters and gratings as wavelength selectors
   c. Accuracy and precision
9. State and derive Beer-Lambert's Law. What are its limitations?
10. Differentiate between single beam and double beam spectrophotometers with the help of systematic diagram and discuss their working principal.
11. Define the following terms (**any three**)
    a. Absolute error b. Standard deviations
    d. Variance d. Mean and Median