St.Joseph's College of Engineering , Chennai – 119.
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Department of Science (Chemistry)

UNIT – III PHOTOCHEMISTRY AND SPECTROSCOPY

PART – A

1. Differentiate photochemical reactions and thermal reaction.
2. Mention the causes for high quantum yield.
3. A solution of thickness 2 cm transmits 40% incident light. Calculate the concentration of the solution given $\varepsilon = 6000\ dm^3mol^{-1}cm^{-1}$
4. What is chemiluminescence?
5. Draw the energy level diagram. Give the order of energy required for electronic transitions in organic molecules.
6. What are chromophores and auxochromes? Give some examples.
7. Calculate the number of modes of vibrations for the following molecules .i. CH_4 ii. CO_2
8. What is meant by absorption of radiation?

PART – B

1. (a) Derive the mathematical expression for Beer - Lamberts law.
   (b) Explain fluorescence and photosensitization with mechanism.
2. (a) Explain the various components and working of UV – Visible spectrophotometer. Write the principle of UV spectroscopy.
   (b) State and explain the following laws of photochemistry in detail.
   i) Grotthus - Draper Law ii) Stark – Einstein Law
3. (a) Discuss the principle and instrumentation of IR spectrometer.
   (b) Explain various electronic transitions occur in the spectroscopy.
4. (a) Sketch a Jablonski diagram and show the terms absorption, fluorescence, phosphorescence, internal conversion and inter-system crossing with it.
   (b) What do you understand by the term quantum yield of a photochemical reaction? How is it determined experimentally?