



Date: 04-04-2019  
Time: 09:00-12:00

Dept. No.

Max. : 100 Marks

**Part-A**

Answer **ALL** the questions:

(10 x 2 = 20)

1. What are operators?
2. Calculate the frequency of the energy of the Photon associated with light of wavelength  $6057.8 \text{ \AA}$ . ( $1 \text{ \AA} = 10^{-8} \text{ cm}$ ).
3. Write the symmetry elements for the point group  $C_{2v}$ .
4. Give two examples for  $C_{2h}$  point group.
5. State Grothus Draper's law.
6. What are Photosensitizer's? Give examples.
7. Define Quantum efficiency.
8. What is Quenching?
9. Write the BET equation.
10. What is Tyndall effect?

**Part-B**

Answer any **EIGHT** questions:

(8 x 5 = 40)

11. According to Wein's and Stefan's law, the objects of different temperature give off spectra at different wavelength. Justify.
- 12(a) What is the minimum energy that photons must possess in order to produce photoelectric effect with Platinum metal? The threshold frequency for Platinum is  $1.3 \times 10^{15} \text{ sec}^{-1}$ .
- (b) What are the assumptions of Classical mechanics?
13. Explain the theory of photoelectric effect.
14. Write down the Symmetry elements and symmetry operations with examples.
15. List out the properties of groups.
16. Write a note on Photosynthesis.
17. State the different laws of Photochemistry.
18. What is low and high Quantum yield? Give examples.
19. Write a note on Biomolecular Quenching.
20. Give the differences between Chemisorption and Physisorption.
21. Discuss Freundlich adsorption isotherm of a gas on a solid surface.
22. Explain the stability of Colloids using Schulze-Hardy rule for Coagulation.

**Part-C**

Answer any **FOUR** questions:

**(4 x10 =40)**

23.(a) Derive the wave function and wave energy for a particle in one dimension box. **(6)**

(b) Give the postulates of Quantum mechanics. **(4)**

24.(a) Obtain the group multiplication table for Water molecule. **(7)**

(b) What is an abelian group? Give example. **(3)**

25. Discuss the Jablonski diagram for radiative and non radiative processes.

26(a) Write short notes on Bioluminescence. **(4)**

(b) Derive Stern Volmer equation. **(6)**

27. What are Chemical actinometers ? Explain ferric oxalate and Malachite green actinometer.

28(a) Derive Langmuir adsorption isotherm. **(5)**

(b) Discuss the Phenomenon of Micelles and reverse micelles. **(5)**

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