

May 2012

**P/ID 40132/PCHM**

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Time : Three hours

Maximum : 100 marks

PART A — (10 × 2 = 20 marks)

Answer ALL questions.

All questions carry equal marks.

Each answer should not exceed 50 words.

1. What do you mean by current density?
2. What is referred to as deposition potential?
3. What is called overvoltage?
4. State the stirling's approximation.
5. State the Dulong and Petit's law.
6. What is called total partition function?
7. Give an example on each of distinguishable and indistinguishable particles?
8. What is called zero point energy?
9. Define the quantum yield of phosphorescence.
10. Give the photolysis products of liquid benzene under excitation  $\lambda$  160–200 nm.

PART B — (4 × 20 = 80 marks)

Answer ALL questions.

All questions carry equal marks.

11. (a) (i) Derive Butler-Volmer equation. (10)  
(ii) Write a detailed notes on electrochemical inorganic reactions of technological interest. (10)

Or

- (b) (i) Give the principles involved in a fuel cell and explain. (10)  
(ii) Write notes on symmetry factor and Evan's diagram. (10)

12. (a) (i) Derive Maxwell Boltzmann statistics.(10)  
(ii) Derive expressions for translational and vibrational partition functions. (10)

Or

- (b) (i) Compare MB, BE and FD statistics.(10)  
(ii) Give a detailed account of Debye model of specific heat of solid. (10)

13. (a) (i) Explain the Franck-condon principle. (10)  
(ii) Write a detailed notes on stern volmer analysis. (10)

Or

- (b) (i) Write notes on fluorescence and phosphorescence. (10)  
(ii) What are called excimers? Give the mechanism of delayed excimer emission. (10)
14. (a) (i) How will you determine the quantum yields of reactions? (10)  
(ii) Give an account of electron energy transfer mechanisms. (10)

Or

- (b) (i) Write notes on photo-oxidation-reduction. (10)  
(ii) Give a detailed account of solar energy conversion and storage. (10)