

OCTOBER 2013

P/ID 40125/PCHE

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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 are one-electron wave functions?
2. Identify the significance of  $t$ ,  $l$ ,  $u$  in the notation  $t_{ju}$  set of orbital.
3. What is the criterion for observing dynamic Jahn—Teller distortion?
4. What is the meaning of the term ‘entatic’?
5. Mention two important roles of magnesium in chlorophyll.
6. What is the geometry of the interstitial site occupied by nickel in nickel arsenide?

7. State the general formula of ferrites. What is the nature of its magnetic property?
8. What is Fermi level?
9. What is retention volume?
10. List the advantages and disadvantages of AAS.

PART B — (4 × 20 = 80 marks)

Answer ALL questions.

All questions carry equal marks.

11. (a) (i) Draw an Orgel diagram for  $d^7$  configuration. (6)
- (ii) Charge transfer bands are normally of high intensity-why? (7)
- (iii) Sketch the MO diagram of  $[Mn(H_2O)_6]^{2+}$ . Explain. (7)

Or

- (b) (i) Tetrahedral nickel(II) complexes show magnetic moments higher than the spin only values.- Explain (6)
- (ii) Explain nephelauxetic effect. (7)
- (iii) Write on Jahn-Teller distortion in copper complexes. (7)

12. (a) (i) Explain the role of carbonic anhydrase as an enzyme. (6)
- (ii) Discuss nitrogen cycle. (7)
- (iii) Differentiate between chlorophyll a and chlorophyll b in terms of their absorption spectra. (7)

Or

- (b) (i) Explain the roles of PSI and PSII in photosynthesis. (6)
- (ii) Discuss the physiology of hemoglobin (7)
- (iii) Explain the role of molybdenum in-vivo nitrogen fixation. (7)

13. (a) (i) With a suitable diagram describe the structure of ZnS. (6)
- (ii) What are Perovskites? Explain with an example. (7)
- (iii) Write on solid state lasers. (7)

Or

- (b) (i) What are spinels and inverse spinels? Give an example for each one. (6)
- (ii) Write on inorganic phosphors. (7)
- (iii) Discuss the theory of low temperature super conductivity. (7)

14. (a) (i) Give an account of thermal conductivity and electron capture detectors in GLC. (6)
- (ii) Write on a) Atomizers b) interferences in AAS. (7)
- (iii) With a schematic diagram explain the working of HPLC. (7)

Or

- (b) (i) Write on the nature of column packing and the applications HPLC. (6)
- (ii) Explain the principle and applications of TG analysis. (7)
- (iii) Write on isotope dilution analysis. (7)