AU – 2479

First Semester B. Tech. (FPOPC) Examination

APPLIED INORGANIC CHEMISTRY

Paper – 1 SCT 1

(USC – 11700)

P. Pages : 4

Time : Three Hours] [Max. Marks : 80

Note : (1) Separate answer book must be used for each section in the subject Geology, Engineering material of civil branch and Separate answer book must be used for Section A and B in Pharmacy and Cosmetic Tech.
(2) Answer **Three** questions from Section A and **Three** questions from Section B.
(3) Diagrams and Chemical equations should be given wherever necessary.
(4) Discuss the reaction, mechanism wherever necessary.
(5) Use pen of Blue/Black ink/refill only for writing the answer book..

SECTION A

1. (a) What is deBroglie's principle ? State the equation. 3

   (b) What are the quantum numbers ? Discuss the distribution of electrons in various shells and orbitals. 5

   (c) What is electron affinity ? How it differs from electronegativity ? How does electron affinity vary in a group and period ? Why ? 5

OR

2. (a) What is ionization energy ? What are the factors affecting ionization energy ? Why the I.P. of 'Mg' is more than that of 'Na' ? 5

   (b) Discuss the quantum theory of atom with respect to various series/spectra. 4

   (c) Discuss Hunds rule and Pauli's exclusion principle. 4

3. (a) What is the valence bond theory of covalent bonding. State it's postulates? 4

(b) How will you define lattice energy ? How it is calculated by Born Haber cycle ? 5

(c) Discuss the structure of NH_3 molecule. 4

OR

4. (a) What is ionic bonding ? State the properties of ionic compounds ? 4

(b) Discuss the following :—

(i) Odd electron bond

(ii) Vander waals forces

(iii) Coordinate bond. 9

5. (a) What do you mean by softening of water ? Discuss Demineralization process for softening of water. 6

(b) Compare lime soda process with zeolite method. 3

(c) Calculate the lime and soda required for softening 50,000 lit. of water having following salts in mg/*l*.

$Ca(HCO_3)_2 = 64.8$, $Mg(HCO_3)_2 = 58.4$

$CaCl_2 = 33.3$, $MgSO_4 = 40$

$NaCl = 5$. 5

OR

6. (a) What is the principle of soap solution method ? Discuss soap solution method for determination of hardness of water. 5

(b) What are zeolites ? Discuss the process with neat diagram and with softening and regeneration reactions. 5

(c) If a zeolite requires 200 lit of brine solution containing 150 g/*l* of NaCl for regeneration after complete exhaustion by passing water having 250 ppm hardness. How many lit. of water is softened by this zeolite softener? 4

SECTION B

7. (a) What is bronze ? Discuss the properties of bronze. 5

(b) Discuss the froth floatation and magnetic separation methods of concentration of ore. 5

(c) What is stainless steel ? What is it's composition ? What are it's properties and uses ? 3

OR

8. (a) What is the difference between stainless steel and carbon steel ? What are the uses of high carbon steel ? What are it's advantages ? 5

(b) Discuss the purification of Aluminium by electrolytic method with neat diagram. 5

(c) What is Brass ? Give it's properties and uses. 3

9. (a) What is corrosion ? What is it's basic cause? What are the consequences of corrosion ? 4

(b) What is electrochemical corrosion ? Discuss oxygen absorption mechanism of wet corrosion in acidic and neutral medium. 5

(c) What are protective coatings to minimize corrosion ? Discuss tinning. 5

OR

10. (a) What is cathodic protection ? Discuss impressed current cathodic protection. 5

(b) Discuss the following :—

(i) Galvanic corrosion

(ii) Waterline corrosion 5

(c) What are corrosion inhibitors ? How they prevent corrosion? 4

11. (a) What are the raw materials for cement manufacture ? Discuss wet process. 6

(b) What is silica glass ? How it is prepared ? 3

(c) Give two specific properties and two specific uses of refractories. 4

OR

12. (a) What is setting and hardening of cement ? Discuss with reactions. Why gypsum is added to cement ? 5

(b) What are the basic raw materials for glass manufacture ? Discuss different manufacturing steps. 5

(c) What are refractories ? Classify. 3