Reg. No. :

Question Paper Code: 51106

B.E. / B.Tech. DEGREE EXAMINATION, DECEMBER 2015

First Semester

Civil Engineering

15UCY106 - CHEMISTRY FOR CIVIL ENGINEERING

(Regulation 2015)

Duration: Three hours   Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. Find the type of hybridization of carbon atom in $HC \equiv CH$ molecule

   (a) sp^2 (b) sp^3 (c) sp   (d) sp^3d

2. The bond order in molecular oxygen (O_2) is

   (a) 2.0   (b) 1.5   (c) 0.0   (d) 1.0

3. Hardness is expressed in terms of an equivalent amount of

   (a) $CaCl_2$ (b) $CaSO_4$ (c) $CaCO_3$ (d) $CaHCO_3$

4. The gas which is dissolved in water cause boiler corrosion is

   (a) O_2 (b) CO   (c) SO_2 (d) NO_2

5. Standard electrode potential of hydrogen (SHE) is

   (a) 1.00 V   (b) 0.05 V   (c) 0.00 V   (d) 1.11 V

6. EMF of a cell is determined by using

   (a) potentiometer   (b) ammeter   (c) voltmeter   (d) galvanometer

7. Sodic soil (or) Saline soil contains high concentration of

    (a) $K^{\oplus}$ (b) $Na^{\oplus}$ (c) Ca^{2+} (d) none

8. The term Buffering Capacity (β) is calculated as

    (a) $\beta = \dfrac{\Delta B}{\Delta pH}$ (b) $\beta = \dfrac{B}{\Delta H}$ (c) $\beta = \Delta B . \Delta pH$ (d) $\beta = \dfrac{\Delta pH}{\Delta B . C}$

9. An example of neutral refractories is

    (a) Zirconia   (b) Silica   (c) Alumina   (d) Magnesite

10. Quartz is a form of

    (a) Fullers earth   (b) China clay
    (c) Crystalline silica   (d) Kaolin

<div align="center">PART - B (5 x 2 = 10 Marks)</div>

11. State Pauli's Exclusion principle.

12. Differentiate hard water and soft water.

13. What is meant by single electrode potential?

14. What are the factors affecting sorption of soil?

15. List any two causes of thermal spalling.

<div align="center">PART - C (5 x 16 = 80 Marks)</div>

16. (a) (i) Prove molecule of N_2 is diamagnetic with the help of molecular orbital theory. (8)

    (ii) Give a note on hydrogen bonding with example. (8)

<div align="center">Or</div>

    (b) (i) Draw the molecular orbital diagram of O_2 and find out the bond order. (8)

    (ii) Explain the determination of lattice enthalpy with help of Born-Haber's cycle. (8)

17. (a) (i) Discuss the principle and method used for the estimation of hardness of water by EDTA method. (10)

    (ii) Discuss the principle and working process of reverse osmosis process. (6)

<div align="center">Or</div>

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(b) (i) Briefly discuss the various stages of domestic water treatment. (10)

(ii) Write short notes on

(1) Phosphate conditioning (3)

(2) Caustic embrittlement. (3)

18. (a) (i) Discuss in detail the various factors influencing the rate of corrosion. (10)

(ii) Describe the cathodic protection by sacrificial anode method. (6)

Or

(b) (i) Derive Nernst equation for electrode potential. (8)

(ii) Briefly describe electroplating of gold. (8)

19. (a) (i) Enumerate different types of clay minerals. (10)

(ii) Illustrate the ion – exchange capacity of soil. (6)

Or

(b) (i) Explain the various sources of oxidation and reduction in soil. (10)

(ii) Write short notes on Buffering capacity. (6)

20. (a) (i) Explain the chemistry involved in setting and hardening of cement. (10)

(ii) What are refractories? How are they classified? Give examples for each type. (6)

Or

(b) (i) What are the raw materials used for the manufacture of Portland cement? Describe the manufacture of cement by wet process. (12)

(ii) Write short notes on glazed white wares. (4)

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