Reg. No. : | | | | | | | | | | |

Question Paper Code: 51104

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2016

First Semester

Mechanical Engineering

15UCY104 - ENGINEERING CHEMISTRY

(Common to Chemical Engineering)

(Regulation 2015)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. Which pair of elements would be most likely to form an ionic compound?

   (a) Al and K (b) Cl and I (c) Cl and Na (d) C and S

2. The bonding order of hydrogen molecule is

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

3. In differential aeration corrosion, the metal part above the solution is more aerated and it act as

   (a) anode (b) cathode (c) catalyst (d) none of these

4. Electrochemical corrosion takes place on

   (a) anodic area (b) cathodic area
   (c) near cathode (d) near anode

5. According to first law of thermodynamics dE is equal to

   (a) q+pdv (b) q-pdv (c) q (d) q+w

6. Which of the following is condensed phase rule equation

(a) F'= C-P+3 (b) F= C-P+2 (c) F'= C-P+1 (d) F'= C+P+2

7. Producer gas is the mixture of

(a) CO and H_2 (b) CO and O_2 (c) CO and Cl (d) CO and N_2

8. Iso-octane and n-heptane has assigned its octane number rating is

(a) 0, 100 (b) 50, 50 (c) 100, 0 (d) 20, 80

9. Brass is an alloy of

(a) Cu and Zn (b) Cu and Fe (c) Cu and Mn (d) Cu and Sn

10. Nichrome is an alloy of

(a) nickel, zinc, iron (b) nickel, copper, iron
(c) nickel, cadmium, iron (d) nickel, chromium, manganese, iron

PART - B (5 x 2 = 10 Marks)

11. What is an octet rule?

12. What is differential aeration corrosion?

13. Define second law of thermodynamics.

14. Define octane number.

15. What is an alloy? Give example.

PART - C (5 x 16 = 80 Marks)

16. (a) (i) Draw and explain the molecular orbital diagram of O_2 molecule. (8)

(ii) Explain ionic bond with example. (8)

Or

(b) (i) Explain the lattice enthalpy of NaCl using Born-Haber cycle. (8)

(ii) What is Pauli's exclusion principle? Explain in detail. (8)

17. (a) (i) What are the factors influencing the rate of corrosion? (8)

(ii) What is paint? Give their constituents and functions with suitable examples. (8)

Or

(b) (i) Explain Electro plating with suitable example. (8)

(ii) Derive Nernst equation and give its significance. (8)

18. (a) (i) Derive the Gibbs-Helmholtz equation and mention its significance. (10)

(ii) State the phase rule. Explain the terms involved in it with suitable examples. (6)

Or

(b) (i) Derive Clausius-Clapeyron equation. (8)

(ii) With a neat diagram, explain the one component water system. (8)

19. (a) (i) Describe the manufacture of Petrol by Bergius process. (8)

(ii) Describe the manufacture of water gas with neat diagram. (8)

Or

(b) (i) How cracking is carried out by fixed bed catalytic cracking method? (6)

(ii) What are flue gas? How are they analyzed by Orsat Apparatus? (10)

20. (a) (i) What are non-ferrous alloys? Explain the compositions, properties and uses of any two alloys in detail. (10)

(ii) Explain fibre reinforced composites. (6)

Or

(b) (i) What are the objectives of heat treatment of alloys? Explain their types. (10)

(ii) Write short notes on " Nichrome". (6)

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