Reg. No. :

Question Paper Code: 51104

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

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. How many sigma and pi bonds are present in C-C atoms of acetylene (CH≡CH) molecule?

    (a) 1 sigma and 2 pi bonds   (b) 2 sigma and 1 pi bond
    (c) 3 sigma and 2 pi bond   (d) 2 sigma and 3 pi bond

2. Intermolecular hydrogen bonding is present in _____

    (a) o-Nitrophenol   (b) p-Nitrophenol
    (c) o-Chlorophenol   (d) All of the above

3. The constituents of a paint includes _____

    (a) Pigment   (b) Vehicle   (c) Thinner   (d) All of the above

4. Which is not associated with Sacrificial anode?

    (a) Zn   (b) Al   (c) Mg   (d) Hg

5. Entropy of the universe is _____

    (a) increasing   (b) decreasing
    (c) constant   (d) both increasing and decreasing

6. The number of degree of freedom at triple point of one component water system is

    (a) 0   (b) 1   (c) 2   (d) 3

7. Producer gas is a mixture of

    (a) Coal and O_2 (b) Petrol and H_2 (c) CO and N_2 (d) CO and H_2

8. The best anti knocking agent is _____

    (a) Naphtha   (b) TEL   (c) n-Heptane   (d) Pure Pb

9. Bronze is an alloy of

    (a) Cu and Sn   (b) Cu and Zn   (c) Cu and Pb   (d) Cu and Ni

10. The analysis of flue gases is carried out by using _____ apparatus.

    (a) Fischer-Tropsch   (b) Orsat's
    (c) Thermal   (d) Bergius

PART - B (5 x 2 = 10 Marks)

11. State the Pauli's exclusion principle.

12. State Pilling-Bedworth rule.

13. What is reduced phase rule?

14. What is octane number?

15. Give the composition of Nichrome.

PART - C (5 x 16 = 80 Marks)

16. (a) (i) Explain sp^2 hybridization with suitable example.   (8)

    (ii) Draw and explain the molecular orbital diagram of O_2 molecule.   (8)

Or

    (b) (i) Explain the postulates and limitations of Valence bond theory.   (8)

    (ii) Explain in detail about Born-Haber cycle.   (8)

17. (a) (i) Derive Nernst equation for electrode potential.   (8)

    (ii) What is paint? Explain the constituents and functions of it.   (8)

Or

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(b) (i) Explain the important factors which influence the rate of corrosion with respect to nature of the metal. (10)

(ii) Write short notes on correction inhibitors. (6)

18. (a) (i) With a neat phase diagram and explain the phase rule for one component water system. (8)

(ii) Derive Gibb's-Helmholtz equation. (8)

Or

(b) (i) Explain the application of Clapeyron-Clausius equation. (8)

(ii) Draw a neat phase diagram and explain the lead-silver system. Briefly write about Pattinson's process. (8)

19. (a) (i) Explain the proximate analysis and its significance. (8)

(ii) With a neat diagram, explain the manufacture of synthetic petrol by Fischer Tropsch method. (8)

Or

(b) (i) How the flue gas analysis is carried out? Explain it with a neat diagram. (10)

(ii) What is cracking? How is it done by moving bed catalytic crackers? (6)

20. (a) (i) Discuss the various types of heat treatment of steel. (10)

(ii) Explain the various surface treatment methods. (6)

Or

(b) (i) Explain various types of fibre-reinforced composites. (10)

(ii) Write any six physical properties of metals. (6)

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