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Question Paper Code: 50004

B.E. / B.Tech. DEGREE EXAMINATION, MAY 2017

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)

- How many sigma and pi bonds are present in C-C atoms of acetylene ($\text{CH}\equiv\text{CH}$) 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
- Predict the molecule with Sp^2 hybridisation
(a) CH_4 (b) C_2H_4 (c) C_2H_2 (d) C_2H_6
- Daniel cell is an example of
(a) primary cell
(b) secondary cell
(c) Constant cell
(d) fuel cell
- Which is not associated with Sacrificial anode?
(a) Zn (b) Al (c) Mg (d) Hg
- How many degrees of freedom are present in the boundary lines of the water system?
(a) 2 (b) 3 (c) 1 (d) 0
- _____ is an example for intensive property.
(a) volume (b) total mass (c) energy (d) pressure

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. What is the jelly-like substance in the first stage of coalification of wood named as
(a) Bituminous (b) lignite
(c) anthracite (d) peat
9. Bronze is an alloy of
(a) Cu and Sn (b) Cu and Zn
(c) Cu and Pb (d) Cu and Ni
10. Cermet is
(a) Metal bonded with metal (b) Ceramic bonded with metal
(c) polymer bonded with metal (d) composite bonded with metal

PART - B (5 x 2 = 10 Marks)

11. How do bonding and anti - bonding molecular orbitals differ with respect to energies the spatial distribution of electron-density?
12. State Pilling-Bedworth rule.
13. Mention the limitations of phase rule.
14. What is octane number?
15. What are composites?

PART - C (5 x 16 = 80 Marks)

16. (a) With the help of M.O. theory, explain the paramagnetic character of oxygen and diamagnetic character of nitrogen. Calculate the bond order of N_2^- , CO, NO and O_2^+ . (16)
- Or
- (b) Explain in detail about Born-Haber cycle. (16)
17. (a) What is paint? Give their constituents and functions with suitable examples. (16)
- Or
- (b) Explain the important factors which influence the rate of corrosion with respect to nature of the metal. (16)

18. (a) Derive the various forms of Maxwell's relations. (16)

Or

(b) Draw a neat phase diagram and explain the lead-silver system. Briefly write about Pattinson's process. (16)

19. (a) Explain the process of flue gas analysis by using Orsat's gas apparatus. What is the significance of this analysis. (16)

Or

(b) How the flue gas analysis is carried out? Explain it with a neat diagram. (16)

20. (a) Discuss the various types of heat treatment of steel. (16)

Or

(b) What is meant by the term alloying? State the purposes of alloying with suitable examples. (16)
