



FACULTY OF ENGINEERING AND INFORMATICS
B.E. 1 Year (New) (Common to All Branches) (Suppl.)
Examination, January 2012
ENGINEERING CHEMISTRY

Time: 3 Hours]

[Max. Marks: 75

Note : Answer *all* questions from Part A. Answer *any five* questions from Part B.

PART- A**(25 Marks)**

1. Define standard electrode potential. What is its significance ? 3
2. Distinguish between primary and secondary batteries. 2
3. Why the work done in isothermal reversible process is more than the adiabatic reversible process ? 3
4. Explain the physical significance of entropy. 2
5. Write a note on Galvanic corrosion. 3
6. What is paint ? What are its constituents ? 2
7. Explain Homo and Co-polymers with an example. 2
8. What are composites ? Give their advantages. 3
9. Define Octane number. What is its significance ? 2
10. Give the characteristics of a good propellant. 3

PART B**(5x10=50 Marks)**

11. a) What is Nernst equation ? Derive it for Metal-Metal ion electrode. 4
- b) Write the cell reaction and calculate the emf of the following all at 25°C : 4
 $\text{Zn(s)} | \text{Zn}^{2+} (0.2 \text{ M}) || \text{Ag}^{+} (0.02 \text{ M}) | \text{Ag(s)}$
Given that $E^\circ_{\text{Ag}^+/\text{Ag}} = +0.76 \text{ V}$, and $E^\circ_{\text{Zn}^{2+}/\text{Zn}} = -0.80 \text{ V}$.
- c) What are the advantages of fuel cells ? 2

(This paper contains 2 pages)



12. a) What are the limitations of first law of thermodynamics ? State the different statements of second law of thermodynamics. 6
- b) One mole of an ideal gas absorbs 400 J of heat from its surroundings and expands against a constant external pressure of 1 atm from a volume of 5 litres to 10 litres. Calculate work done and the change in internal energy for the process. 4
13. a) Define corrosion of metals. Explain the mechanism of electrochemical theory of wet corrosion. 4
- b) What is cathodic protection ? Explain sacrificial anodic protection method. 3
- c) Calculate the temporary and permanent hardness of sample of water containing : 3
 $\text{Ca}(\text{HCO}_3)_2 = 32.4 \text{ mg/L}$, $\text{Mg}(\text{HCO}_3)_2 = 29.2 \text{ mg/L}$
 $\text{CaSO}_4 = 27.2 \text{ mg/L}$, $\text{MgCl}_2 = 9.5 \text{ mg/L}$ and $\text{NaCl} = 40 \text{ mg/L}$.
14. a) Explain addition, condensation and copolymerization with an example. 6
- b) Give the preparation and uses of the following : 4
i) Bakelite ii) Buna-S rubber.
15. a) What are chemical fuels ? Give their classification with examples. 4
- b) What is cracking of petroleum ? Describe with a neat diagram the fixed Bed Catalytic Cracking method. 6
16. a) Explain the principle and procedure involved in conductometric acid-base titrations. 5
- b) What is Gibb's phase rule ? Apply it to Pb Ag system by drawing a well labelled phase diagram. 5
17. a) Describe the determination of hardness of water by EDTA method. 5
- b) Write a short note on the following : 5
i) Conducting polymers
ii) Ultimate analysis of coal.