Set-1

(Students are requested to write down the SET No. in their Answer sheet)

Time allotted: 30 minutes   **Full marks: 15**

Answer any **three** of the following **six** questions

1. (a) Define heat of Neutralization?

    (b) Show that "Joule Thomson experiment" is an isenthalpic process

    (c) The heat engine operating between 227°C and 27°C absorbs 1Kcal of heat from 227°C

    reservoir per cycle. Calculate the efficiency of the engine   1+2+2 = 5

2. (a) Define Entropy and it's mathematical expression

    (b) Prove that, Isothermal reversible work done is more than irreversible work done

    (c) 10 liters of a gas expands adiabatically from 5 to 1 atmosphere. The final volume is

    23.6 liters. Calculate the work done.   1+2+2 = 5

3. (a) Methyl group in toluene is ortho/para orienting - Justify.

    (b) What is peroxide effect? Explain with mechanism.   2+3 = 5

4. (a) State the differences between Thermoplastic and Thermosetting polymers

    (b) Equal number of polymer molecules with $M_1 = 1,00,000$ and $M_2 = 10,000$ are mixed.

    Calculate the Poly dispersity index (PDI).   2+3 = 5

5. (a) What is Carbonization of Coal & its Objectives?

    (b) Write the difference between High Temperature & Low Temperature Carbonization of

    Coal   2+3 = 5

6. (a) What are Reference Electrodes? Write the name of three Reference electrodes

    (b) For a Daniel Cell Zn / Zn^{+2} (conc. C_1) // Cu^{+2} (conc. C_2) / Cu , the standard
    potentials are : $+ 0.35V$ for $Cu^{+2} + 2e \rightarrow Cu$ and $+ 0.75V$ for $Zn \rightarrow Zn^{+2} + 2e$

    (i) Write down the cell reaction (ii) Calculate the EMF of the cell and (iii) is the cell

    reaction spontaneous or not?   2+3 = 5

Set-2

(Students are requested to write down the SET No. in their Answer sheet)

Time allotted: 30 minutes   **Full marks: 15**

Answer any **three** of the following **six** questions

1. (a) Define heat of Formation?

   (b) Prove that change in Gibb's Free Energy for reversible process is zero and less than zero for irreversible process.

   (c) Available heat from burning a fuel is 8000 cal/g. What will be the efficiency of the engine if it works between boiling point of water and 30ºC   1+2+2 = 5

2. (a) What are Joule Thomson Co-efficient and Inversion Temperature?

   (b) Prove that for an adiabatic process $TV^{\gamma-1}$ = Constant

   (c) A gas expands isothermally against a constant external pressure of 4 atm. from a volume of 5 dm^3 to a volume of 25 dm^3. In this process it absorbs 500 J of thermal energy from its surroundings. Calculate change in Internal Energy for the process.   1+2+2 = 5

3. (a) Why C-Cl bond length of vinyl chloride is shorter than ethyl chloride?

   (b) What is solvolysis reaction? Explain the mechanism when the solvent is MeOH

                                                 2+3 = 5

4. (a) State the synthesis , properties and applications of Vulcanized Rubber

   (b) The molecular weight of polystyrene is 1.04×10^5. Find the degree of polymerization of Polystyrene   3+2 = 5

5. (a) Write the name & usage of Major Fractions obtained by Distillation of Petroleum Crude Oil.

   (b) What is cracking? Write the differences between thermal & catalytic Cracking   3+2 = 5

6. (a)What is Nernst Equation? Derive the expression for ΔG & ΔS in terms of EMF of a cell.

   (b)Write down the cell equations for the following cells : (i) Fe/Fe^{+2} // Sn^{+2}/Sn (ii) Ag/Ag^+ // Cu^{+2}/Cu and (iii)$Zn/Zn^{+2}//Cu^{+2}/Cu$ 3+2 = 5