5193

B. Sc. EXAMINATION

(Third Semester)

CHEMISTRY

CH-202

Physical Chemistry

: *Three Hours* *Maximum Marks :* 26

: Candidates are required to attempt *five* questions in all, selecting at least *two* questions from each Section.

Section A

a) Differentiate between Homogeneous and Heterogeneous systems. Explain with examples. 2

(b) What do you understand by a true Thermodynamically Reversible Process ? 2

(c) What is Pressure-Volume work ? 1

2. (a) How do you express the First Law of thermodynamics mathematically ? Calculate the internal energy change when a gas absorbs 150 Joules of heat and expands from 2 L to 5 L against a constant external pressure of 836 mm of mercury. 1+2

(b) Derive a relationship between molar heat capacity at constant pressure and at constant volume. 2

3. (a) Derive an expression for Work Done in an Isothermal and Reversible expansion of an ideal gas. What heat change occurs during such a process ? 2+1

(b) What do you understand by the term Inversion Temperature ? 2

4. (a) Derive a relationship which explains the variation of Enthalpy change of a reaction with change in temperature. 3

(b) The molar heat capacity at constant pressure for ice and liquid water are 37.7 and 75.3 JK^{-1} mol^{-1} respectively assuming that these heat capacities remain constant in a particular phase. The enthalpy of fusion of ice at $-10°C$ is 5.63 kJ mol^{-1}. Calculate the enthalpy of fusion of ice at 0°C. 2

Section B

5. (a) Write a short note on chemical potential. 2

(b) The standard free energy change for combustion of 2 moles of H_2 with 1 mol O_2 to form 2 moles of water vapours (all at 1 atm) is –228.6 kJ. Calculate its free energy change at 298 K if pressures of H_2, O_2 and H_2O are 0.1, 0.2 and 0.3 atm respectively. 3