Q. Relationship of entropy (S) and free energy (G) with the equilibrium constant k.

- **Free energy**

Gibbs or free energy used in thermodynamic chemistry for calculating the reversible work at stable temperature and pressure or free energy is equal to the change in enthalpy that subtract with change in entropy and temperature in kelvin.

$$\Delta G = \Delta H - T\Delta S$$

ΔG is equal to the change in free energy

ΔH is equivalent to the change in enthalpy

T is equivalent to the temperature at kelvin

ΔS is equivalent to the change in entropy

- **Free energy relation with equilibrium constant K**

ΔH and ΔS is used in measuring the magnitude of the ΔG and the K is used for measuring the ratio of the amounts of the products to the amounts of reactants, so K represent as the in terms of ΔG.free energy means the maximum work done of the system which is performed by the surroundings that underwent in the spontaneous changes. Free energy for the reversible work represented as the volume, entropy, temperature and also with pressure that express as;

$$\Delta G = V\Delta P - S\Delta T$$

When the reaction undergoing at constant temperature then the equation will be;

$$\Delta G = V\Delta P$$

Under usual state, pressure dependence of Gibbs energy have no significant for the solids and liquids while for the gases it have great importance.

In ideal gases, V is changed via the nRT/p is equivalent to the free energy and the final and initial pressures are also involved;

$$\Delta G = (nRT/P)\Delta P$$