St.Joseph's College of Engineering , Chennai – 119.
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Department of Science (Chemistry)

UNIT- II CHEMICAL THERMODYNAMICS

PART – A

1. What are extensive and intensive properties of a system?
2. State second law of thermodynamics?
3. What are the limitations of first law of thermodynamics?
4. Define entropy. Give the mathematical expression for entropy. What is its unit?
5. Define the terms (a) free energy (b) work function.
6. At absolute zero (0 K), the entropy of a pure crystal is zero. Comment this statement (or) Under what condition the entropy of a substance does becomes zero?
7. Predict whether the following reaction is spontaneous or not at 25 $^{\circ}$C.

$C_{(s)} + H_2O_{(l)} \rightarrow CO_{(g)} + H_{2(g)}$

ΔH = 31.4 kcal/mol and ΔS = 32 cal/deg at 25 $^{\circ}$C.

8. Calculate the entropy change for the reversible isothermal expansion of 10 moles of an ideal gas to 50 times its original volume at 298 K.

PART – B

1. Derive Maxwell relations.
2. (a) Derive the Clausius - Clapeyron equation both in the differential as well as integrated forms.
   (b) Derive Vant Hoff's isotherm equation.
3. (a) Derive Gibbs-Helmholtz equation and mention its applications.
   (b) Derive Vant Hoff's isochore.
4. (a) Derive the expression of entropy change for an ideal gas.
   (b) Discuss the criteria for chemical reaction to be spontaneous.