

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-III • EXAMINATION – WINTER 2013****Subject Code: 130405****Date: 26-11-2013****Subject Name: Thermodynamics****Time: 02.30 pm - 05.00 pm****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1 (a) What is reversible process? Give an example of reversible process. 07
 (b) Define Thermodynamics system, surrounding, state and process. Provide examples of the same also. 07

- Q.2 (a) Write a note on Standard heat of reaction, Standard heat of formation, Standard heat of combustion 07
 (b) Define and discuss thermodynamics. Describe its importance in your engineering field. 07

OR

- (b) Derive the following thermodynamic relationship: 07

$$\left(\frac{\partial T}{\partial P}\right)_s = \left(\frac{\partial v}{\partial s}\right)_P$$

- Q.3 (a) Define the first law of thermodynamics in its various forms. What are its limitations? 07
 (b) Obtain an expression relating T and V in an adiabatic reversible expansion of a gas obeying the equation of state $PV = nRT$. 07

OR

- Q.3 (a) Give the comparison of work of expansion of an ideal Gas and a van der Waals Gas. 07
 (b) What is phase of system? How many phases are present in each of the following systems? 07
 a) Mixture of N_2 , H_2 and O_2 .
 b) A piece of molten ice.
 c) mixture of monoclinic and rhombic sulphur.

- Q.4 (a) Explain the concept of entropy change in detail. 07
 (b) Write a short note on Reaction coordinate with Diagram. 07

OR

- Q.4 (a) Derive equation of COP (Coefficient of performance) of carnot refrigerator with neat sketch. 07
 (b) With neat sketch explain the Vapor compression cycle 07

- Q.5 (a) Give various statements of the second law of thermodynamics. 07
 (b) Derive steady flow energy equation for systems: 1. Pump and 2. Boiler 07

OR

- Q.5 (a) Define third law of thermodynamics. Discuss the importance of third law of thermodynamics. 07
 (b) Explain Raoult's law with its deviations. 07
