

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-III • EXAMINATION – SUMMER 2013

Subject Code: 131404

Date: 29-05-2013

Subject Name: Food Engineering 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. Discuss zeroth law of thermo dynamics and concept of temperature measurement. **07**
b. Explain first law of thermodynamics. Discuss its applications **07**
- Q.2** a. Describe second law of thermodynamics along with its applicability? **07**
b. Explain various definitions related to thermodynamics. **07**
- OR**
- b. Write short notes - Any Two: **07**
1. Psychometric chart 2. Properties of pure substances 3. Types of equilibrium.
- Q.3** a. Define / Explain the following (Any Four): **04**
1. Moisture balance 2. Relative humidity
3. Heat Degree of saturation 4. Dry bulb temperature
b. Answer the following (Any Five) **10**
1. What is diffuser? 2. Explain Carnot cycle?
3. What is heat engine? 4. Explain Joule – Kelvin effect
5. Explain Maxwell's equation 6. Explain Gibbs phase rule.
- OR**
- Q.3** a. (i) A pump deliver a fluid in the tank at the rate of $0.032 \text{ m}^3/\text{sec}$. The tank has size of 1.5 metre diameter and 4.2 metre height can hold a maximum of 3000 kg fluid. Calculate the mass flow rate of fluid in kg / sec. and its density -04 **07**
(ii) Describe heat engine-03
b. Explain SI system of measurement write dimension of specific heat enthalpy, electrical resistance and frequency. **07**
- Q.4** a. Discuss properties of pure substance, steam and water table and charts. **07**
b. Discuss the following: 1. Thermal reservoir 2. COP of heat pump and refrigerator **07**
3. Application of SFEE to open channel.
- OR**
- Q.4** a. 10 moles of an ideal gas with $\gamma = 1.4$ is compressed reversibly and adiabatically from 100 Kpa & 27°C to 1 Mpa. Determined the work done on the gas, the change in internal energy and final temperature of the gas. **07**
b. Discuss steady flow energy equations (SFEE) **07**
- Q.5** a. Answer the following (Any Seven) **07**
1. State types of equilibrium 2. What is steam table?
3. What is unavailable energy? 4. What is dehumidification process?
5. What is thermodynamics? 6. What is entropy?
7. What is dew point temperature? 8. What is steady flow process?
b. 1. Explain reversible and irreversible process. -03 **07**
2. Explain equation of state -04

OR

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|------------|-----------|--|-----------|
| Q.5 | a. | (i) Discuss deviation of real gas from ideal gas behavior - 05 | 07 |
| | | (ii) Explain adiabatic process-02 | |
| | b. | (i) Discuss mixing of air stream-04 | 07 |
| | | (ii) Explain characteristic equation of gas-03 | |
