

2019
3rd Sem.

**B.Tech. Food Technology III semester
Semester-III Examination – 2019
Paper Title: Thermodynamics
Paper Code: BFTC-304**

Time Allowed: 3 hr

Maximum marks: 70

(Write your Roll No. at the top immediately on receipt of this question paper)
Section A is Compulsory. Answer any four questions from Section B.

Section A (5x6=30)

- Q1.** How many independent intensive properties are required to fix the state of a system of following types?
- Single component single phase system
 - Single component two phase system
 - Single component three phase system
- Q2.** State First Law of Thermodynamics for a process and show that energy is a property of the system.
- Q3.** What do you mean by 'Thermodynamic equilibrium' of a system?
- Q4.** How do you define enthalpy? Is enthalpy an extensive or intensive property? Does enthalpy represents energy stored in a system?
- Q5.** Distinguish between the following
- Heat and Work in thermodynamics.
 - Macroscopic and Microscopic approaches of thermodynamics
 - Point function and Path function

Section B (4x10=40)

- Q1.** Derive the steady flow energy equation. Also consider the cases for work interacting device and heat interacting device.
- Q2.** State the thermodynamics definition of work. How it is superior to mechanics definition of work? List the different forms of work.
- Q3.** A piston cylinder arrangement as shown in figure contains air at 250kPa, 300°C. The 50kg piston has a diameter of 0.1m and initially pushes against the stops. The atmospheric pressure is 100 kPa and the temperature is 20°C. The cylinder cools as heat is transferred to the ambient.
- At what temperature does the piston begin to move down?
 - How far has the piston dropped when the temperature reaches ambient?
- Q4.** State and describe the Kelvin-Planck Statement of the Second Law.
- Q5.** Define under what circumstances, the first law for a process executed by a system can be written in the following form:
- $\delta Q = dE + \delta W$
 - $\delta Q = dE + p dV$
 - $\delta Q = dU + \delta W$
- Q6.** What is a heat engine? Write a note of efficiency of heat engines.

