

TME-302

1164

Odd Semester Examination 2017-18

B.TECH (SEMESTER-III)

ENGINEERING THERMODYNAMICS

Time: 02:00 Hours

Max Marks: 50

Note: Attempt all questions.

1. Attempt any two questions: [5x2=10]
- (a) Define thermodynamics system. Differentiate between open system, closed system and an isolated system.
 - (b) Define thermodynamics equilibrium and also show that energy is a property of a system.
 - (c) Define the following :
 - i. Quasi-static process
 - ii. Free expansion process
2. Attempt any two questions: [5x2=10]
- (a) Show that violation of Kelvin Planck statement of second law of thermodynamics implies a violation of Clausius statement.
 - (b) A nozzle is a device for increasing the velocity of a steadily flowing stream. At the inlet to a certain nozzle, the enthalpy of the fluid passing is 3000KJ/Kg and the velocity is 60m/sec. At the discharge end, the enthalpy is 2762KJ/Kg. The nozzle is horizontal and there is negligible heat loss from it.
 - i. Find velocity at exit from the nozzle.
 - ii. If inlet area is 0.1 m² and the specific volume at inlet is 0.187m³/kg. Find the main flow rate.
 - iii. If the specific volume at nozzle exit is 0.498m³/kg find exit area of the nozzle.
 - (c) Explain Joule Thompson coefficient and inversion curve.

3. Attempt **any two** questions: [5x2=10]

- (a) How does homogeneous system differ from a heterogeneous system? Also discuss the conditions of equilibrium of a heterogeneous system.
- (b) Define availability. Obtain an expression for availability of a closed system.
- (c) Derive the steady flow energy equation applied to compressor, turbine and centrifugal pump.

4. Attempt **any two** questions: [5x2=10]

- (a) Discuss the effect of pressure of steam at inlet to turbine, temperature at inlet to turbine and pressure at exit from turbine upon Rankine cycle performance.
- (b) Explain Stirling cycle with neat schematic diagram and also show different processes involved in it on T-S diagram and P-V diagram.
- (c) Derive expression for mean effective pressure of otto cycle with P-V and T-S diagram.

5. Attempt **any two** questions: [5x2=10]

Write short note on **any two**:

- (a) Aircraft propulsion
- (b) Multi stage compression
- (c) Dual cycle
- (d) Blowers
- (e) Brayton cycle
