Exam.Code:0939
Sub. Code: 33841

2124

B.E. (Mechanical Engineering)
Third Semester
MEC-301: Basic Thermodynamics

Time allowed: 3 Hours

Max. Marks: 50

NOTE: Attempt <u>five</u> questions in all, including Question No. I which is compulsory and selecting two questions from each Part. Use of property, Steam and gas tables is permitted.

x-x-x

Q-1)

1) What is displacement work?
2) Differentiate between adiabatic and diathermic walls.
3) Why is PMM1 impossible?
4) What is meant by saturation state?
5) Differentiate between external and internal irreversibility.

(5x2=10)

<u>PART A</u>

Q-2)

1) Air expands from 340kPa and 0.0425m^3 to a final pressure of 136kPa. If PV^2=constant, find the work for the process.
2) A pump discharges a liquid into a drum at 0.032m^3/s. The drum is 1.5m in diameter and 4.2m in length, with a holding capacity of 3000kg of this liquid. Find density of liquid and mass flow rate of the liquid handled by the pump

Q-3) (5,5)

A steam boiler initially contains 5m^3 of steam and 5m^3 of water at 1 MPa. Steam is taken out at constant pressure until 4m^3 of water is left. What is the heat transferred during the process?

Q-4) (10)

1) Explain control volume technique in a variable flow process.
2) Show that enthalpy of a fluid before throttling is same as after throttling.

(5,5)

P.T.O.

PART B

Q-5)

1) A heat engine receives half of its heat supply at 1000K and half at 500K while rejecting heat to a sink at 300K. What is the maximum thermal efficiency of the engine?
2) Explain Clausius Inequality with mathematical expressions to obtain relations of entropy with type of processes.

(5,5)

Q-6)

A steam power station uses the following cycle- Steam at boiler outlet 150 bar, 550^{0}C, Reheat at 40 bar to 550^{0}C, Condenser at 0.1 bar. Assuming ideal process, find cycle efficiency and steam rate.

(5,5)

Q-7)

Write short notes on any 2 of the following:-

1) Flow work and non-flow work
2) Reversed Carnot Cycle
3) Ideal Reheat Rankine Cycle

(5,5)

x-x-x