Exam. Code: 0940
Sub. Code: 33855

2055

B.E. (Mechanical Engineering)

Fourth Semester

MEC-401: Engineering 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) Indicate the changes in thrust equation during jet propulsion for subsonic flows.
2) Differentiate between Stirling and Otto cycle.
3) Give all the components of Gibbs phase rule.
4) Derive expression for entropy change in an ideal gas in terms of volume or pressure ratio.
5) What is meant by compressor turbine?

(5x2=10)

PART A

Q-2)

1) A food compartment is maintained at 4^0C by removing heat from it at 360kJ/min. If the required power input to refrigerator is 2kW. Find out the rate of heat rejection to the room that houses the refrigerator and COP of the refrigerator.
2) How can irreversibility be equivalent to exergy destroyed?

(5,5)

Q-3)

1) Derive the general exergy balance relation for a closed system, starting with energy and entropy balances.
2) A 200m^3 rigid tank contains compressed air at 1MPa and 300K. Determine how much work can be obtained from this air if the environment conditions are 100kPa and 300K

(5,5)

Q-4)

1) Explain Clausius Inequality with mathematical expressions to obtain relations of entropy with type of processes.

2) What is meant by the increase of entropy principle?

(5,5)

P.T.O.

PART B

Q-5)

1) What are the various conclusions of Equilibrium constant of ideal gas mixtures?
2) Determine ideal efficiency of a diesel engine having cylinder bore 250mm, stroke 375mm, clearance volume 1500cc, with fuel cut-off occurring at 5% of stroke.

(5,5)

Q-6)

1) What is the maximum Brayton cycle efficiency when maximum and minimum cycle temperatures are given?
2) What are the advantages and disadvantages of a turboprop jet propulsion engine?

(5,5)

Q-7)

Write short notes on any 2 of the following:-

1) Raoult's law
2) Kay's Rule
3) Compressibility factor of gas mixtures

(5,5)

x-x-x