TME-302 1309

Odd Semester Examination 2018-19

B.TECH. (AE) (SEMESTER-I)

ENGINEERING THERMODYNAMICS

Time: 02:00 Hours **Max Marks : 50**

Note: Attempt **ALL** the questions. Marks are shown against each question. Assume any missing data suitably.

1. Attempt any **FOUR** of the following : (2.5x4=10)

   (a) What is Heat engine? Explain with the help of diagram.

   (b) What do you understand by Thermodynamic path, process and cycle?

   (c) What is the principle of entropy increase?

   (d) A Carnot engine works between temperature limits of 825^0 C and 125^0 C. The engine receives 3600 kJ of heat per minute. Determine the work output and amount of heat rejected to the sink per second.

   (e) What is Helmholtz and Gibb's function?

   (f) What are the limitations of first law of thermodynamics?

2. Attempt **any One** of the following : (10x1=10)

   (a) In a steam power plant the turbine receives 60 kg/minute steam at a speed of 5 m/s and 840 kJ/kg enthalpy. The steam leaves with a velocity of 3000 m/minute and 2640 kJ/kg enthalpy. The heat losses from turbine are 1260 kJ/min. Calculate the power output of turbine.

   (b) What is Clausius statement? Prove that violation of Clausius statement leads to violation of Kelvin-Plank statement.

3. Attempt **any TWO** of the following : (5x2=10 Marks)

(a) What do you understand by Carnot Theorem and its corollaries? Explain with the help of suitable diagrams.

(b) What is Clausius inequality?

(c) Explain :

(i) Thermodynamic systems,

(ii) Macroscopic approach,

(iii) Control volume.

4. Attempt **any TWO** of the following : (5x2=10 Marks)

(a) A heat engine is supplied with 2512 kJ/min of heat at 650^0 C. Heat rejection takes place at 100^0 C. Specify which of the following heat rejections represent a reversible, irreversible and impossible result :

(i) 867 kJ/min

(ii) 1494 kJ/min

(iii) 1015 kJ/min.

(b) Explain :

(i) Internal Energy,

(ii) Enthalpy,

(iii) First law of thermodynamics.

(c) Explain available energy and unavailable energy for a heat engine with the help of suitable diagram.

5. Write short notes on **any FOUR** of the following : (2.5x4=10 Marks)

(a) Thermal Reservoir.

(b) Quasi static process.

(c) Tds equation.

(d) Refrigerator and its C.O.P.

(e) Concept of Continuum.

(f). Reversible and irreversible process

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