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Following Paper ID and Roll No. to be filled in your Answer Book.

PAPER ID : 33504 Roll No. 1 2 2 0 4 3 2 3 0 9

B. Tech Examination 2022-23

(Even Semester)

BASIC MECHANICAL ENGINEERING

Time : Three Hours] *[Maximum Marks : 60*

Note :– Attempt all questions.

SECTION–A

1. Attempt all parts of the following : $1 \times 8 = 8$

   (a) What is the thermodynamics? Classify thermodynamics system.

   (b) Define the point function and path function. Also state the difference between them.

   (c) Define Zevoth law of thermodynamics.

   (d) Define the first law of thermodynamics and its application.

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(e) Define the expression of Carnot efficiency and its assumptions.

(f) Define PMM-II..

(g) What is the difference between SI and CI engines?

(h) State the term boiler mountings and accessories.

SECTION – B

2. Attempt any two parts of the following : $2 \times 6 = 12$

(a) Derive the steady flow energy equation and hence apply it on a heat exchange with different inlet mass flow rates and exit mass flow rates.

(b) Prove that energy is a property of the system.

(c) Derive clausius inequality and hence prove that entropy is a property of system.

(d) Derive the expression of otto cycle by drawing a neat sketch of P-V and T-S diagram of the same.

SECTION – C

Note:- Attempt any two parts from each question. Each part carry equal marks. $8 \times 5 = 40$

(a) Explain the quasie-static process. Also explain the application of it on the Carnot cycle.

(b) In a nozzle air at 627° and thrice atmospheric pressure enters with negligible velocity and leaves at temprature of 27°c. Determine velocity of air at exit assuming no heat loss and nozzle being horizontal. Take Cp = 1.00519 Kj/Kgk for air.

(c) Derive the expression for heat transfer in a poly tropic process?

4. (a) A closed system contains 1 kg of gas which under goes a reversible constant pressure. In this system there is decrease in interval energy of 38kj. Determine the work done during the process. Assume Cp = 850 J/kg and Cv = 620 J/kgk.

(b) Discuss the carnot cycle in details with the help of P-V and T-S diagram.

(c) A reversible heat source operates between two reservior at 927C and 27°C. Engine drives a carnot refrigerator maintaining a temperature of -13°C and rejecting heat to reservoir at 27°C. Heat input to engine is 3000kJ and network done available is 400 KJ. How much heat is transfered to refrigerant and total heat rejected to reservoir at 27 °C.

5. (a) What is the difference between two stroke engine and four stroke engine?

   (b) Explain the working of four stroke engine.

   (c) Write the classification of IC engine and explain the various terminology used in internal combustion engine.

6. (a) Explain the two stroke engine with the help of neat sketch.

   (b) What is the expression of COP in heat pump and refrigerator and also give the relation of both systems COP.

   (c) Explain the following terms :

   (i) Surrounding and universe

   (ii) Macroscopic and microscopic property

   (iii) Concept of continuum

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