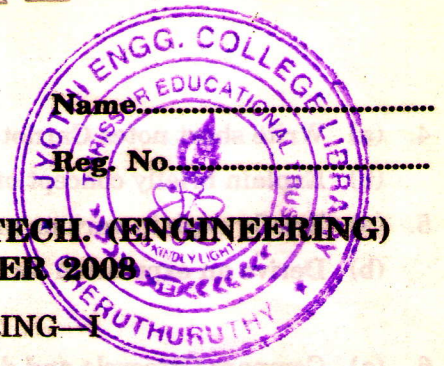


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**COMBINED FIRST AND SECOND SEMESTER B.TECH. (ENGINEERING)
DEGREE EXAMINATION, DECEMBER 2008**

EE 04-108—MECHANICAL ENGINEERING—I

(2004 admissions)

Time : Three Hours

Maximum : 100 Marks

Answer all questions.

Part A

Each question carries 5 marks.

1. What is meant by microscopic and macroscopic approaches in thermodynamics ?
2. What is meant by internal energy and enthalpy of a system ?
3. Explain various factors based on which IC engines are classified.
4. What is meant by entropy of a system ?
5. What is meant by Mollier diagram for steam ?
6. What is meant by vapour power cycle ?
7. What are various safety measures to be taken for a nuclear power plant ?
8. What are the advantages of solar energy ?

(8 × 5 = 40 marks)

Part B

1. (a) What is meant by Zeroth law of thermodynamics ? What is its importance ? (6 marks)
(b) A system consists of 2 kg. of air expands in adiabatic process from initial conditions 1MPa, 200° C to final state of 0.1 MPa. Calculate work done in process.

(9 marks)

Or

2. (a) What is meant by thermodynamic temperature scales ? (5 marks)
(b) The properties of a fluid is given :

$$u = 196 + 0.718 t.$$

$$P/P_0 = 0.287 (t + 273)$$

where u = internal energy in kJ/kgK P is pressure in KPa. Determine C_p and C_v for fluid.

(10 marks)

3. (a) What is meant by heat pump ? (5 marks)
(b) A cyclic heat engine operates between a source of 800° C and sink of 30° C. What is the least rate of heat rejected for 1 kW power output by engine.

(10 marks)

Or

Turn over

4. (a) Write short notes Carnot cycle. (6 marks)
 (b) Explain briefly concept of entropy. (9 marks)
5. (a) Briefly explain various processes in Ottocycle. (7 marks)
 (b) Derive an expression for thermal efficiency of Ottocycle. (8 marks)

Or

6. (a) Compare Ottocycle and diesel cycle. (6 marks)
 (b) With a neat sketch explain the working of Rankine cycle. (9 marks)
7. With a neat sketch explain the working of diesel power plant. (15 marks)

Or

8. (a) What are the plant safety measures to be adopted for nuclear power plants? (7 marks)
 (b) What are the advantages of solar energy? (8 marks)

[4 × 15 = 60 marks]

(8 × 5 = 40 marks)

Part B

1. (a) What is meant by Zeroth law of thermodynamics? What is its importance? (6 marks)
 (b) A system consists of 2 kg of air expands in adiabatic process from initial conditions 1 MPa, 300°C to final state of 0.1 MPa. Calculate work done in process. (9 marks)

Or

2. (a) What is meant by thermodynamic temperature scales? (6 marks)
 (b) The properties of a fluid is given:
 $u = 196 + 0.718 t$
 $P = 0.287 (t + 273)$

3. (a) What is meant by heat pump? (6 marks)
 (b) A cyclic heat engine operates between a source of 800°C and sink of 30°C. What is the least rate of heat rejected for 1 kW power output by engine. (10 marks)

Turn over