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SEM 2 – 4 (RC 07-08)**F.E. Semester – II Examination, May/June 2010****BASIC MECHANICAL ENGINEERING****(RC in 2007-08)**

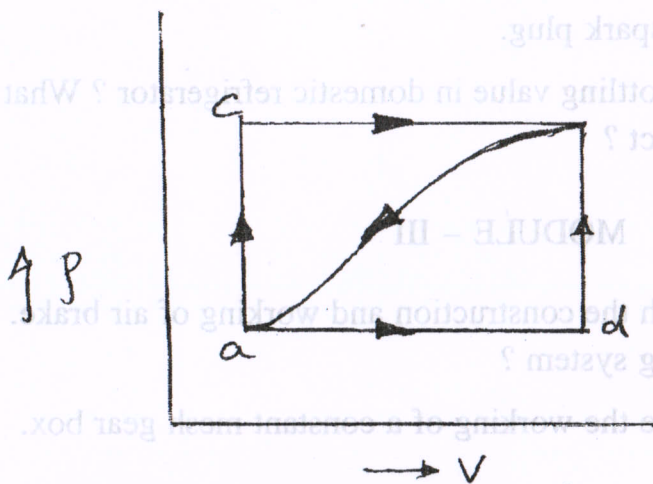
Duration : 3 Hours

Total Marks : 100

Instruction : Attempt five questions by taking at least one question from each Module.

MODULE – I

1. a) What is the difference between otto and diesel cycle ? 5
b) Air undergoes a cyclic process in a cylinder and piston arrangement. First the atmospheric air at 1 bar and 27°C is compressed adiabatically to 10 bar, then expanded isothermally upto initial pressure, then brought to initial conditions under constant pressure. Find
1) Change in internal energy
2) Work transfer. 10
c) Derive the expression for first law of thermodynamics applied to a turbine. 5
2. a) Discuss the application of first law of thermodynamics to a non-flow process. 4
b) Differentiate between heat pump and a refrigerator. 4
c) Explain with an example the concept of reversible cycle. 4
d) When a system is taken from state a to state b as shown in the fig. (I) along path acb, 84 kJ of heat flows into the system, and the system does 32 kJ or work.

**Fig. I****P.T.O.**



- i) Find the amount of heat that flows into the system along path adb, if work done is 10.5 kJ.
- ii) When the system is returned from b to a along the curved path, the work done on the system is 21 kJ. Does the system absorb or liberate heat, and how much heat is liberated or absorbed ?
- iii) If $U_a = 0$ and $U_d = 42$ kJ, find the heat absorbed in the processes ad and db. 8

MODULE – II

3. a) Compare spark ignition with compression ignition engines. 10
- b) What is meant by scavenging of IC engines ? 2
- c) An air standard otto cycle has a compression ratio of 8. At the start of compression process the temperature is 26°C and the pressure is 1 bar. If the maximum temperature of the cycle is 1080 K, calculate
 - 1) Net output
 - 2) Thermal efficiency. Take $C_v = 0.718$. 8
4. a) With a neat sketch describe the working of a cooling system of IC engine in detail. What are the demerits of overcooling ? 10
- b) A four cylinder 4 stroke engine running at 1000 rpm develops an indicated power of 15 kW. The mean effective pressure is $5 \times 10^5 \text{ N/m}^2$. Find the diameter of the cylinder and the stroke of the piston when the ratio of diameter to stroke is 0.8. 5
- c) Explain the function of a spark plug. 2
- d) What is the function of throttling valve in domestic refrigerator ? What is meant by refrigerating effect ? 3

MODULE – III

5. a) Describe with a neat sketch the construction and working of air brake. What are the functions of braking system ? 10
- b) With a neat sketch describe the working of a constant mesh gear box. 10



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6. a) What is the function of pressure-plate assembly and friction disc in a typical clutch ? 4
- b) Describe the working principle of a propeller shaft with a neat sketch. 6
- c) Write a note on recent trends in automobile engineering. 4
- d) What is meant by a differential ? What are its applications ? 6

Instruction : Attempt five questions by taking at least one question from each Module.

MODULE – IV

7. a) Describe any one type of centrifugal casting in detail. What are the advantages of centrifugal casting ? 10
- b) Write short notes on : 10
- i) Brazing
- ii) Soldering.
8. a) Differentiate between : 5
- i) Die casting and sand casting. 5
- ii) Open die and closed die forging.
- b) Explain with a neat sketch the laser beam welding process. What are its advantages ? 7
- c) What are the defects developed in extruded products ? 3

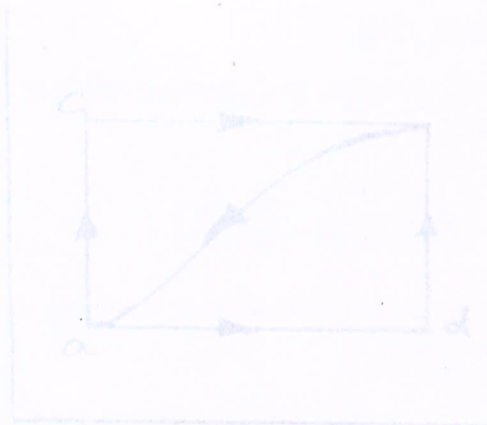


Fig. 1