May-June 2009

Total No. of Questions : 12] [Total No. of Printed Pages : 4

[3561]-205

F. E. (Semester - II) Examination - 2009

BASIC MECHANICAL ENGINEERING

(June 2008 Course)

Time : 3 Hours] **[Max. Marks : 100**

Instructions :

*(1) Answer to the **two sections** should be written in **separate books.***

(2) Black figures to the right indicate full marks.

(3) Neat diagrams must be drawn wherever necessary.

(4) Your answers will be valued as a whole.

(5) Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and stream tables is allowed.

(6) Assume suitable data, if necessary.

SECTION - I

UNIT - I

Q.1) (A) Prove that Internal Energy is a property of the System. **[04]**

(B) What do you understand by Reversible and Irreversible Process. State the causes which make any process Irreversible. **[06]**

(C) A system contains 0.15 m^3 of air at 5 bar and 350 K. A reversible adiabatic expansion takes place till the pressure falls to 1 bar. The gas is then heated at constant pressure till enthalpy increases by 70 kJ.

Calculate :

(1) Work done in individual process

(2) Index of expansion if the above processes are replaced by a single reversible polytropic process giving the same initial and final states.

Take for air

Cp = 1.005 kJ/kgk

Cv = 0.718 kJ/kgk

R = 0.287 kJ/kgk **[08]**

OR

Q.2) (A) State similarities and differences between Work Transfer and Heat Transfer. [04]

(B) State the limitations of first Law of Thermodynamics. Give Kelvin-Plank and Claussius Statement of Second Law of Thermodynamics.

Also show that efficiency of Heat Engine is always less than untiy. [08]

(C) A household refrigerator with a COP of 1.8 removes heat from the refrigerated space at a rate of 90 kJ/min.

Determine :

(1) The electric power consumed by the refrigerator.

(2) The rate of heat transfer to the kitchen air. [06]

UNIT - II

Q.3) (A) Explain the principle of Impulse and Reaction Turbine with neat sketches.

Give examples of :

(1) Impulse Turbine

(2) Reaction Turbine [08]

(B) What is meant by following terms related to compressors ? [04]

(1) Single Acting

(2) Double Acting

(3) Pressure Ratio

(4) Free Air delivery

(C) Give differences between Petrol and Diesel Engines. [04]

OR

Q.4) (A) Explain with neat sketch working of Window Air Conditioning System. How does Split Air Conditioner differ from Window Air Conditioner ? [08]

(B) Give functions of any four mountings in relation with boiler. [04]

(C) Write a short note on Air Motor alongwith sketch. [04]

UNIT - III

Q.5) (A) What is Thermal Resistance ? Explain electrical analogy for heat transfer through two layer composite slab. [04]

(B) Explain Hydroelectric Power Plant with neat sketch. [06]