P1966

F.E. (*All*) (Semester - II)
BASIC MACHANICAL ENGINEERING (102013)
(2008 Pattern)

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

Instructions to the Condidates:

   1)   *Answers to the two sections should be written in separate answer books.*

   2)   *Neat diagrams must be drawn wherever necessary.*

   3)   *Figures to the right side indicate full marks.*

   4)   *Use of Calculator allowed.*

   5)   *Assume suitable data if necessary.*

   6)   *Solve Q1 or Q2, Q3 or Q4 and Q5 or Q6 from section-I.*

   7)   *Solve Q7 or Q8, Q9 or Q10 and Q11 or Q12 from section-II.*

SECTION - I

Q1) a) State the limitations of first law of thermodynamics. Give Kelvin - Planck's and Clausius statement of second law of thermodynamics.

                                                                                         [4+2+2=8]

    b) A house is maintained at temperature 20°C by means of a heat pump in the winter by pumping heat from atmosphere. Heat losses through the walls of the house are estimated at 0.65 kJ/k temperature difference between inside of the house and outside atmosphere.   **[4+4=8]**

       i) If the atmospheric temperature is - 10°C, what is the minimum power required to drive the heat pump.

       ii) It is proposed to use the same heat pump to cool the house in summer. If same power is supplied to heat pump, what is maximum permissible atmospheric temperature?

OR

Q2) a) Represent the following processes on p - V diagram and also write down the equation for work done.   **[2×4=8]**

       i) Isobaric process

       ii) Isothermal pocess

       iii) Adiabatic process

       iv) Polytropic process

    b) What is thermodynamic system? Explain all thermodynamic systems with suitable example.   **[2×4=8]**

P.T.O.

Q3) a) Explain with a neat sketch working of window air conditioning system showing VCR cycle in figure. **[4+4=8]**

b) With a neat sketch explain working of reciprocating air compressor. **[4+4=8]**

OR

Q4) a) Differentiate between impulse and reaction turbines. Explain Pelton wheel turbine with neat sketch. **[4+4=8]**

b) Explain with a neat sketch Package boiler. **[4+4=8]**

Q5) a) Explain Thermal power plant with block diagram. **[4+4=8]**

b) What is composite wall? Derive equation for heat flow through composite wall in series and parallel. **[2+3+3=8]**

c) Write Four examples of Insulating materials. **[2]**

OR

Q6) a) Explain Hydroelectric power plant with neat sketch. **[4+4=8]**

b) Hot air at a temperature of 65°C is flowing through a steel pipe of 120 mm diameter. The pipe is covered with two layers of different insulating materials of thickness 60 mm and 40 mm, and their corresponding thermal conductivities are 0.24 and 0.4 W/m°C. The inside and out side heat transfer coefficients are 60 and 12 w/m°C. The atmosphere is at 20°C. Find the rate of heat loss from 60 m length of pipe. **[8]**

c) State Fourier's law of heat conduction. **[2]**

SECTION - II

Q7) a) Differentiate between open and cross belt drive with neat sketch. **[2×4=8]**

b) What is inversion? Explain any one inversion with neat sketch and its application. **[2+4+2=8]**

OR

Q8) a) State function of brake? Explain shoe brake system with neat sketch. **[2+3+3=8]**

b) Explain in brief with neat sketch any 4 types of keys. **[2×4=8]**

Q9) a) Explain material selection criteria for engineering applications.**[1×8=8]**

b) Explain casting process with neat sketch. **[4+4=8]**

OR

Q10) a) Expalin aesthetic and ergonomics. **[8]**

b) Explain various types of welding joints (Any Four) with neat sketch.
[2×4=8]

Q11) a) Explain following operations on lathe with neat sketch: **[4+4=8]**

i) Straight turning

ii) Chamfering

iii) Knurling

iv) Threading

b) Draw a neat labeled sketch of milling machine and list components.
[6+2=8]

c) State working principle of lathe machine. **[2]**

OR

Q12) a) Explain any four operations performed on drilling machines. **[4+4=8]**

b) Differentiate between surface and center less grinding with neat sketch.
[8]

c) State working principle of CNC. **[2]**