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

[3761]-110

F. E. (Semester - II) Examination - 2010

BASIC MECHANICAL ENGINEERING

(June 2008 Pattern)

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

Instructions :

(1) Solve Q. No. 1 or 2, Q. No. 3, or 4, Q. No. 5 or 6 from section I and Q. No. 7 or 8, Q. No. 9 or 10, Q. No. 11 or 12 from section II.

*(2) Answers to the **two sections** should be written in **separate books.***

(3) Neat diagrams must be drawn wherever necessary.

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

(5) Assume suitable data, if necessary.

SECTION - I

Q.1) (A) Draw sketch and explain Joule's experiment with its conclusion. **[3+3+2=08]**

(B) State :

(1) Zeroth Law

(2) Second law of thermodynamics

(3) Law of Energy Conservation

(4) Ideal Gas Equation **[2×4=08]**

OR

Q.2) (A) Differentiate between Heat Pump and Refrigerator. Also prove that $(COP)_{Heat\ Pump} - (COP)_{Refrigerator} = 1$ **[4+4=08]**

(B) Define and write equations for the following : **[2×4=08]**

(1) Adiabatic Index

(2) Enthalpy

(3) Polytropic process

(4) Isothermal process

Q.3) (A) Define Tons of Refrigeration. Draw sketch and explain Household Refrigerator. **[2+3+3=08]**

(B) Draw block diagram and state applications of : **[4+4=08]**

(1) Reciprocating Compressor

(2) Impulse Turbine

OR

Q.4) (A) Draw and label two stroke petrol engine. Compare four stroke engine with two stroke engine. **[4+4=08]**

(B) Draw block diagram and explain : **[4+4=08]**

(1) Water Tube Boiler

(2) Air Motor

Q.5) (A) Describe Thermal Power Plant with block diagram. **[4+5=09]**

(B) What is composite wall ? Derive equation for heat flow through composite wall in series and parallel. **[3+3+3=09]**

OR

Q.6) (A) What is hybrid power plant ? State its advantages. Explain use of Solar Energy with block diagram. **[2+2+5=09]**

(B) State Newton's Law of Cooling and Stefan Bottzmann's Law with their equations. Calculate rate of heat transfer by convection between roof of area 20×20 (m^2) and ambient air, if roof temperature is 10^oC and air temperature is 40^oC. Assume average heat transfer coefficient for convection as 10 W/m^2K. Comment about heat flow. **[3+3+3=09]**

SECTION - II

Q.7) (A) Draw diagrams and state applications of : **[4+4=08]**

(1) Single Plate Clutch

(2) Flange Coupling

(B) Compare flat belt and V belt. Draw and explain open and cross belt drive. **[4+4=08]**

OR

Q.8) (A) List different types of Brakes and explain any two with neat sketch. **[2+3+3=08]**

(B) Describe with neat sketch : **[4+4=08]**

(1) Woodruff Key

(2) Governor

Q.9) (A) Explain any four operations on Drilling Machine with suitable sketch. **[2×4=08]**

(B) Explain Lathe Machine with block diagram. State various operations performed on it. **[3+3+2=08]**

OR

Q.10) (A) Explain NC and CNC Machine with neat sketch. **[4+4=08]**

(B) Draw block diagram of Horizontal Column and Knee Milling Machine. Explain its working. **[4+4=08]**

Q.11) (A) Explain different mechanical properties of a material. **[4×2=08]**

(B) Explain different steps in design process. **[05]**

(C) Explain soldering and brazing in brief. **[05]**

OR

Q.12) (A) Draw sketch and explain shearing, bending, squeezing and drawing operations on sheet metal. **[2×4=08]**

(B) Write short note an plastic materials. **[05]**

(C) What do you mean by engineering design ? Why there is need of design ? **[2+3=05]**
