

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 steam 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

[2x4=08]

OR

Q.2) (A) Differentiate between Heat Pump and Refrigerator. Also prove that $(COP)_{\text{Heat Pump}} - (COP)_{\text{Refrigerator}} = 1$

[4+4=08]

(B) Define and write equations for the following : [2x4=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 (m²) and ambient air, if roof temperature is 10°C and air temperature is 40°C. Assume average heat transfer coefficient for convection as 10 W/m²K. 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. **[2x4=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. **[4x2=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 on plastic materials. **[05]**
- (C)** What do you mean by engineering design ? Why there is need of design ? **[2+3=05]**
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