

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 Boltzmann's Law with their equations. Calculate rate of heat transfer by convection between roof of area  $20 \times 20$  (m<sup>2</sup>) 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/m<sup>2</sup>K. 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**

