

Total No. of Questions : 12]

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

BASIC MECHANICAL ENGINEERING

(June 2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions :

- (1) Solve questions 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 answer-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) Explain with definition : Internal Energy, Irreversible Process, Enthalpy, Pure Substance. [2x4=08]
- (B) A 'closed vessel' contains 2 kg of carbondioxide at temperature 20°C and pressure 0.7 bar. Heat is supplied to the vessel till the gas acquires a pressure of 1.4 bar. Calculate final temperature, work done on or by gas, Heat added, change in internal energy. [$C_v = 0.657$ kJ/kg.K.] [2x4=08]

OR

- Q.2) (A) Define with example : System, Surrounding, Isolated System, Throttling. [2x4=08]
- (B) Draw sketch of Heat Engine and Refrigerator using source and sink concepts. Also state relations for efficiency and COP. What is PMMII ? [4+2+2=08]

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- Q.3) (A) Give classification of I.C. Engine with applications. [09]
(B) Explain Split Air Conditioner with sketch. [09]

OR

- Q.4) (A) How Boilers are classified ? State any four mounting and their functions. [5+4=09]
(B) Explain Double Acting Reciprocating Pump and Impulse Turbine with sketches. [09]

- Q.5) (A) Explain working of 'Solar-wind Hybrid Power Plant' with sketch. [08]
(B) State Fourier's Law and Newton's Law of Cooling with their equations and units of each term.

A 60W incandescent lamp has coil surface temperature 2500K and room temperature 300 K. Estimate surface area of coil. [4+4=08]

OR

- Q.6) (A) Compare Thermal and Nuclear Power Plants on any four parameters. Draw sketch of Nuclear Power Plant. [4+4=08]
(B) Explain concept of Thermal Resistance with Electrical Analogy for two slabs.

The glass windows of a room has total area of 10 m² and glass is 4 mm thick. Calculate quantity of heat leaving from room through glass, when inside surface of windows are at 25°C and outside surface is at 10°C. The value of thermal conductivity for a glass is 0.84 W/mK. [5+3=08]

SECTION - II

- Q.7) (A) Describe Geneva Mechanism with sketch. State its applications. [4+3+1=08]
(B) Draw sketches of Open Belt, Cross Belt and state their uses. What is velocity ratio in case of belts ? State advantages of belt compared to chain. [4+2+2=08]

OR

Q.8) Explain following with sketches and applications : **[4x4=16]**

- (a) Worm and Worm Wheel
- (b) Single Plate Clutch
- (c) Internal Expanding Brake
- (d) Gib Headed Key

Q.9) (A) Describe Gas Welding with sketch, applications, advantages and disadvantages. **[4+2+2=08]**

(B) What are steps to be followed for designing a component ? Explain with a flow chart and example. **[08]**

OR

Q.10) (A) Explain various ergonomic considerations in design with an industrial example. **[08]**

(B) State and explain (any eight) material selection criteria used for designing a component. **[08]**

Q.11) (A) Draw a neat sketch of Column and Knee Type Milling Machine and explain its working. **[5+4=09]**

(B) Describe Cylindrical Grinding, Centerless Grinding and Surface Grinding with sketch. **[3x3=09]**

OR

Q.12) (A) How Lathe Machine is specified ? Explain any three operations on lathe with sketch. **[3+6=09]**

(B) How Drilling Machine is classified ? Explain reaming, tapping and counter sinking on Drilling Machine. **[3+6=09]**