



**F.E. (Semester – II) Examination, 2011**  
**BASIC MECHANICAL ENGINEERING**  
**(2008 Pattern)**

Time : 3 Hours

Max. Marks : 100

**Instructions :** 1) Answers to the **two** Sections should be written in **separate** books.

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

3) Use of Logarithmic Tables, Slide Rule, Mollier Charts, Electronic Pocket Calculator and Steam Tables is **allowed**.

4) Assume suitable data, if **necessary**.

**SECTION – I**

1. A) Represent constant pressure process on P–V diagram. Mark work done in the diagram. Derive equation for work done and prove that 'heat supplied' is equal to 'change in enthalpy'. (1+1+2+2)

B) Explain Carnot cycle using P-V diagram. 5

C) Define :

i) Adiabatic Index

ii) Zeroth Law

iii) Thermal Equilibrium

iv) Intensive properties

v) Heat Pump. 5

**OR**

2. A) State and explain Second Law of Thermodynamics. (2+3)

B) Explain reversibility and irreversibility with example. (3+2)

C) A certain gas occupies space of  $0.3 \text{ m}^3$  at a 2 bar and temperature  $77^\circ\text{C}$ . It is heated at constant volume until its pressure 'P' is 7 bar. Find change in enthalpy during the process.

$$C_p = 1.005 \text{ kJ/kg.K}$$

$$C_v = 0.712 \text{ kJ/kg.K}$$

$$R = 287 \text{ J/kg.K.}$$

6

P.T.O.



3. A) Draw sketch and explain package boiler. (3+3)  
B) Explain reciprocating compressor with neat sketch. (2+3)  
C) State any three application of refrigeration system. Define COP and Refrigerant. (3+1+1)

OR

4. A) Explain working of four stroke SI Engine. 6  
B) Explain single acting reciprocating pump with sketch. (2+3)  
C) State any five criteria for boiler classification. (5×1=5)  
5. A) Explain any one hybrid power plant with block diagram. (3+3)  
B) State Fourier's Law of conduction. Derive unit of conductivity. Explain insulating material with two examples. (2+1+3)  
C) Explain concept of series and parallel thermal resistances in composite slab. (3+3)

OR

6. A) Draw and explain thermal power plant. (3+3)  
B) State advantages and disadvantages of hydroelectric plant. (3+3)  
C) Heat is conducted through composite plate of two different parallel materials A and B, of conductivities 134 and 60 watt/mK., each of them with thickness 36 and 42 mm respectively. If temperature of outer face of A and B are found to be steady at 96°C and 8°C respectively, find temperature of interface of plate A and B. 6

## SECTION - II

7. A) Explain with neat sketch working of centrifugal governor. State its application. (4+3+1)  
B) Describe Ratchet Pawl mechanism with neat sketch. State its application. (3+3+2)

OR



8. A) How gears are classified ? What are the functions of gears ? State applications of different types of gears. (3+2+3)
- B) Compare sliding contact bearing and rolling contact bearing, with figure. (4×2=8)
9. A) Explain aesthetic and ergonomics considerations in product design. (4+5)
- B) State any six factors to be considered for selecting materials. Explain any two. (3+3+3)

OR

10. A) What do you understand by Fabrication ? Explain any three operations in sheet metal work. (3+6)
- B) Draw only sketches of :
- i) Stress-strain diagram of cast-iron
  - ii) Wire drawing process
  - iii) Spot welding. (3+3+3)
11. A) Draw neat sketch of CNC machine tool showing basic element. Explain its working and state applications. (6+2)
- B) Explain any four operations performed on drilling machine with neat sketches. (4×2=8)

OR

12. A) Explain with neat sketch horizontal milling machine. (4+4)
- B) Describe principle of working for
- i) Centreless grinding
  - ii) Surface grinding. (4+4)
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