F.E. (Semester – II) (Revised in 2007-08) Examination, May/June 2012
BASIC MECHANICAL ENGINEERING

Duration : 3 Hours Total Marks : 100

Instructions : *1) Answer **five** questions, selecting **one** from **each** Module.*
*2) Illustrate your answers with **neat** sketches, **if** required.*

MODULE – I

1. a) An engine having 20 cm bore and 30 cm stroke works on Otto cycle. The clearance volume is 1600 cm^3. The initial pressure and temperature are 1 bar and 60°C. If the maximum pressure is limited to 24 bar, find the air standard efficiency of the cycle. 8

   b) Derive the expression for the first law of thermodynamics applied to a boiler. 5

   c) Describe the ideal gas temperature scale. 5

   d) Explain the terms : 2

      i) System

      ii) Process.

2. a) Derive the expression for the first law of thermodynamics applied to a turbine. 5

   b) One kg of air at 1 bar and 300 k is compressed adiabatically till its pressure becomes 5 times the original pressure. Then it is expanded at constant pressure and finally cooled at constant volume to return to its original conditions. Calculate the heat transfer and work transfer. 10

   c) State and explain the $zero^{th}$ law of thermodynamics. 5

MODULE – II

3. a) Describe the multi-point fuel injection system with a neat sketch. 6

   b) With a neat sketch, describe the various components of an internal combustion engine. 10

   c) Explain the terms : 4

      i) Latent heat

      ii) Dryness fraction

4. a) Describe the lubrication system of an internal combustion engine with the help of a neat sketch. 6

   b) Write a short note on vapour compression refrigeration system. 6

   c) Describe the various components of a thermal power plant. 6

   d) Define ton of refrigeration. 2

MODULE – III

5. a) What is the need of a clutch in the transmission system ? What are the requirements of a good clutch ? 8

   b) With a neat sketch, explain the construction and working of constant mesh gear box. 8

   c) What factors influence the braking efficiency and the stopping distance of a moving vehicle ? 4

6. a) Explain the principle of power steering and draw its constructional layout. 6

   b) With a neat sketch, explain the working of differential in an automobile. 8

   c) Explain the function of the following : 6

      i) Constant velocity universal joint

      ii) Slip joint

      iii) Pressure plate.

MODULE – IV

7. a) Compare between : 6

   i) Direct and indirect extrusion process.

   ii) Open die and closed die forging.

   b) State the advantages and applications of soldering. 4

   c) State the common troubles encountered in welding. 4

   d) State the advantages and disadvantages of sand casting. 6

8. a) What factors affect the performance of grinding wheel ? 4

   b) Explain the following lathe operations : 6

   i) Threading

   ii) Taper turning

   c) Show by a neat sketch, the various roll arrangements used in rolling mills. 4

   d) Write short notes on the following : 6

   i) Mechanical fastening

   ii) Sheet metal spinning.
