[Total No. of Questions : 8]

F.E. (Semester - II) (RC) Examination, Nov. - 2011
BASIC MECHANICAL ENGINEERING
(Revised in 2007-08)

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

Q1) a) Derive an expression for the first law of thermodynamics applied to turbine. **[5]**

b) An ideal gas is heated at constant volume until it's temperature is doubled and then cooled at constant pressure to the original temperature. Finally the gas is allowed to expand isothermally to the initial state. Derive a relation to estimate the net work done. **[8]**

c) Explain the terms : **[3]**
i) Thermal reservoir
ii) Source
iii) Sink

d) Differentiate between work transfer and heat transfer. **[4]**

Q2) a) In an air standard otto cycle, the conditions of air at the start of the compression stroke are 1 bar and 300 K. The maximum pressure and temperature in the cycle are 60 bar and 2000 K, respectively. Calculate the compression ratio and thermal efficiency of the cycle. **[8]**

b) Derive an expression for the first law of thermodynamics applied to boiler. **[5]**

c) What is an ideal gas? What is the necessity in devising an ideal gas temperature scale? **[7]**

MODULE - II

Q3) a) Describe the multi - point Fuel Injection system with a neat sketch. **[6]**

b) Explain the working of vapour compression refrigeration system with a neat diagram. **[8]**

c) With a neat sketch, explain the working of a thermal power plant. **[6]**

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Q4) a) Explain with a neat sketch, the working of a four stroke petrol engine. Also sketch the P-V diagram. [8]

b) State the desirable properties of refrigerants. [6]

c) Find the brake thermal efficiency of an engine which consumes 8 kg of fuel in 22 minutes and develops a brake power of 60kW. The fuel has a heating valve of 42000 kJ/kg. [6]

MODULE - III

Q5) a) Describe the construction and working of a constant Mesh Gear Box. [8]

b) Explain the necessity of a differential in an automobile. [6]

c) Describe the construction and working of hydraulic steering systems. [6]

Q6) a) With a neat sketch, explain the working of air - brake system. [6]

b) What are the main components of an automobile? Describe them briefly. [8]

c) Write a short note on automotive emissions and it's control [6]

MODULE - IV

Q7) a) How is brazing different from welding. [6]

b) What are the advantages of adhesive bonding. [5]

c) Discuss the role of Mechanical Fasteners in metal joining process. [5]

d) What is a fillev metal? Explain it's importance in welding. [4]

Q8) a) Differentiate between Direct and Indirect Extrusion process. [6]

b) Describe the relative motion between work piece and machine tool for the following processes :- [6]

i) Turning

ii) Drilling

iii) Milling

c) With a neat sketch, describe the closed die forging operation. [8]

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