

MAY 2013

Roll No.

Total No. of Pages : 02

Total No. of Questions : 09

B.Tech. (2005-2010 Batches) (Sem.-1st & 2nd)

ELEMENTS OF MECH. ENGG.

Subject Code : ME-101

Paper ID : [A0123]

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTION TO CANDIDATES :

- SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
- SECTION - B & C. have FOUR questions each.
- Attempt any FIVE questions from SECTION B & C carrying EIGHT marks each.
- Select atleast TWO questions from SECTION - B & C.

SECTION-A**I. Answer briefly :**

- Distinguish between path function and point function.
- Explain the concept of thermodynamic equilibrium.
- Differentiate between flow work and non flow work.
- What is a steady flow process ?
- What is the throttling process and give its salient features.
- What are the differences between Refrigerator and Heat Pump ?
- Draw P-V and T-S plot for dual cycle.
- Define link, kinematic chain with example.
- What is inversion of Mechanism
- Differentiate between Creep and Fatigue.

**SECTION-B**

- Define the characteristic gas constant. How does it differ from universal gas constant ? Write the units for these constants. 4
 - Set up an expression for the displacement work done during any arbitrary process. 4
- What is the essence of first law of thermodynamics ? Write down expression for the first law applied to (i) cycle (ii) process. 4
 - Define an adiabatic process. Show that for a reversible adiabatic process of a given mass of perfect gas $P_{vg} = \text{Constant}$. 4
- A steady flow of water at enthalpy 250 kJ/kg enters a section of heating plant of a building in which there are no pumps. The water leaves the section at enthalpy 200 kJ/kg. The exit pipe is 25 m above the inlet pipe. Neglecting changes in kinetic energy, make calculations for the heat transfer from the water. 8
- Three carnot engines E_1, E_2, E_3 operate between temperature of 1000 K and 300 K. Make calculations for the intermediate temperature if the work produced by the engines are in the ratio of 4 : 3 : 2. 8

SECTION-C

- Derive an expression for the air standard efficiency and mean effective pressure of a Diesel cycle. State the assumptions made. 8
- Discuss briefly the working of a 4 Stroke Petrol engine. 4
 - Make a labelled sketch of Oldham Coupling. 4
- What is Pulley ? State the working of a third system of Pulleys. Derive the relation of its velocity ratio. 8
- Show that the volumetric strain of a body is the algebraic sum of the linear strains in three mutually perpendicular directions. 6
 - Define factor of safety. Poisson's ratio and strain energy. 2