

Roll No.

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Paper ID [ME101]

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B.Tech. (Sem. - 1st&2nd)**ELEMENTS OF MECHANICAL ENGINEERING (ME-101)****Time : 03 Hours****Maximum Marks : 60****Instruction to Candidates:**

- 1) Section - A is **Compulsory**.
- 2) Attempt any **Five** questions from Section - B & C.
- 3) Select atleast **Two** questions from Section - B & C.

Section - A**Q1)****(10 × 2 = 20)**

- a) Explain thermodynamic system.
- b) What is zeroth law of thermodynamics?
- c) Define internal energy.
- d) What do you understand by closed system?
- e) What is isobaric process?
- f) What is the concept of heat pump?
- g) What do you mean by air standard cycles?
- h) Define mean effective pressure.
- i) What is the elastic limit?
- j) What is the use of oldham's coupling?

Section - B**(Marks : 8 each)****Q2)** Differentiate between reversible and irreversible processes.**Q3)** Define enthalpy, why does the enthalpy of an ideal gas depends only on temperature? Discuss.**R-699[2058]****P.T.O.**

- Q4)** 1 kg of air at 3.5 bar and occupying 0.35 m^3 is heated at constant volume until its temperature has risen to 316°C . Find
- initial temperature of air,
 - the final pressure of air,
 - heat added
 - gain in internal energy per kg. Take $C_v = 0.715 \text{ kJ/kgK}$.
- Q5)** What is Carnot cycle? What are the four processes which constitute the cycle? Explain.

Section - C

(Marks : 8 each)

- Q6)** An air standard Otto cycle operates with a compression ratio of 8 : 5. At the beginning of the compression the air is at 1 bar and 32°C and during the heat addition process the pressure is tripled. Calculate
- the thermal efficiency of the cycle and
 - the efficiency of the Carnot engine operating between the same overall temperature limits.
- Q7)** Explain longitudinal strain. Poisson's ratio, yield point and bulk modulus.
- Q8)** Compare the Otto Diesel and Dual cycle.
- Q9)** Write notes on:
- Differential wheel and axle.
 - Lifting machines.

