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Total No. of Questions : 09] [Total No. of Pages : 02

Paper ID [A0115]

(Please fill this Paper ID in OMR Sheet)

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 at least **Two** questions from Section - B & C.

Section - A

Q1) *(Marks: 2 each)*

a) What do you mean by phase of a system?
b) What is meant by thermodynamic equillibrium?
c) Define enthalpy.
d) What do you understand by open system?
e) What is isothermal process?
f) Define third law of thermodynamics.
g) What do you understand by a four stroke engine?
h) Where do we use Diesel Cycle?
i) Define ductility.
j) What is meant by mechanism?

Section - B

(Marks: 8 each)

Q2) What are state functions and how do they differ from path functions? Give examples of each.

Q3) A blower handles 1 kg/s of air at 20°C and consumes a power of 15kW. The inlet and outlet velocities of air are 100 m/s and 150 m/s respectively. Find the exit air temperature, assuming adiabatic conditions. Take c_p of air as 1.005 kJ/kg-K.

Q4) Derive an expression for 1st law of thermodynamics applied to a closed system. Define the internal energy of a system.

Q5) If a refrigerator is used for heating purpose in winter so that the atmosphere becomes the cold body and the room to be heated becomes hot body how much heat would be available for heating for each kW input to the driving motor? The COP of the refrigerator is 5 and the electro mechanical efficiency of the motor is 90%. How does this compare with resistance heating.

Section - C

(Marks: 8 each)

Q6) Show that the efficiency of Otto cycle depends only on compression ratio.

Q7) Explain lateral strain, young's modulus of elasticity and stress - strain curve.

Q8) Write notes on:

(a) Worm and worm wheel.

(b) Oldham's coupling.

Q9) In an air standard Otto cycle the compression ratio 10, the compression begins at 37.8°C, 1 bar and maximum temperature of the cycle is 1060°C. Determine.

(a) The heat supplied per kg of air

(b) The work done per kg of air

(c) The maximum pressure of the cycle and

(d) The thermal efficiency.