

Roll No. ....

Total No. of Questions : 09]

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## Paper ID [A0204]

(Please fill this Paper ID in OMR Sheet)

B.Tech. (Sem. - 3<sup>rd</sup>)

THERMAL ENGINEERING (PE - 205)

Time : 03 Hours

Maximum Marks : 60

Instruction to Candidates:

- 1) Section - A is **Compulsory**.
- 2) Attempt any **Four** questions from Section - B.
- 3) Attempt any **Two** questions from Section - C.

### Section - A

Q1)

(10 × 2 = 20)

- a) What is a closed system?
- b) Define path function.
- c) Define zeroth law of thermodynamics.
- d) What do you understand by isothermal process?
- e) Define reversible process.
- f) Define enthalpy.
- g) What is meant by a four stroke engine?
- h) What is the function of an injector?
- i) What do you understand by relative humidity?
- j) Define wet bulb temperature.



## Section - B

(4 × 5 = 20)

- Q2) What is thermodynamic equilibrium and how does it differ from thermal equilibrium? Discuss.
- Q3) An Otto cycle takes in air at 1 bar and 15°C the compression ratio is 8 to 1 and 2000 kJ/kg of energy released to air in each cycle. To what value must the compression ratio be raised to increase the network per cycle by 20 percent?
- Q4) Explain the concept of Clausius inequality.
- Q5) Differentiate between a two stroke and a four stroke engine.
- Q6) Explain the working of a vapour absorption refrigeration system.

## Section - C

(2 × 10 = 20)

- Q7) One kg of air is expanded slowly in a piston cylinder arrangement from 6 bar and 0.015 m<sup>3</sup> to a final volume of 0.1 m<sup>3</sup>. During the process, heat is exchanged with the surroundings at a rate sufficient to make the process isothermal. Make calculations for final pressure, work done and change in internal energy.
- Q8) A pure substance is initially at 5 bar pressure and 0.25 m<sup>3</sup>. It undergoes reversible adiabatic compression according to the law  $p v^{1.3} = \text{constant}$  till pressure becomes 30 bar. Determine change in enthalpy, internal energy and entropy.
- Q9) What are mountings and accessories of a boiler? Discuss any two mountings of the boiler.