

Total No. of Questions : 12]

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[3561]-205

F. E. (Semester - II) Examination - 2009

BASIC MECHANICAL ENGINEERING

(June 2008 Course)

Time : 3 Hours]

[Max. Marks : 100

Instructions :

- (1) Answer to the two sections should be written in separate books.
- (2) Black figures to the right indicate full marks.
- (3) Neat diagrams must be drawn wherever necessary.
- (4) Your answers will be valued as a whole.
- (5) Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.
- (6) Assume suitable data, if necessary.

SECTION - I

UNIT - I

- Q.1) (A) Prove that Internal Energy is a property of the System. [04]
- (B) What do you understand by Reversible and Irreversible Process. State the causes which make any process Irreversible. [06]
- (C) A system contains 0.15 m^3 of air at 5 bar and 350 K. A reversible adiabatic expansion takes place till the pressure falls to 1 bar. The gas is then heated at constant pressure till enthalpy increases by 70 kJ.

Calculate :

- (1) Work done in individual process
- (2) Index of expansion if the above processes are replaced by a single reversible polytropic process giving the same initial and final states.

Take for air

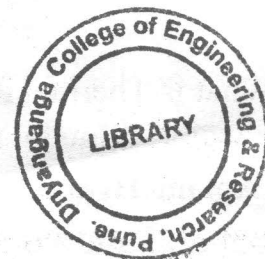
$$C_p = 1.005 \text{ kJ/kgk}$$

$$C_v = 0.718 \text{ kJ/kgk}$$

$$R = 0.287 \text{ kJ/kgk}$$

OR

1



[08]

P.T.O.

- Q.2) (A) State similarities and differences between Work Transfer and Heat Transfer. [04]
- (B) State the limitations of first Law of Thermodynamics. Give Kelvin-Plank and Claussius Statement of Second Law of Thermodynamics.
- Also show that efficiency of Heat Engine is always less than unity. [08]
- (C) A household refrigerator with a COP of 1.8 removes heat from the refrigerated space at a rate of 90 kJ/min.

Determine :

- (1) The electric power consumed by the refrigerator.
- (2) The rate of heat transfer to the kitchen air. [06]

UNIT - II

- Q.3) (A) Explain the principle of Impulse and Reaction Turbine with neat sketches.
- Give examples of :
- (1) Impulse Turbine
- (2) Reaction Turbine [08]
- (B) What is meant by following terms related to compressors ? [04]
- (1) Single Acting
- (2) Double Acting
- (3) Pressure Ratio
- (4) Free Air delivery
- (C) Give differences between Petrol and Diesel Engines. [04]

OR

- Q.4) (A) Explain with neat sketch working of Window Air Conditioning System. How does Split Air Conditioner differ from Window Air Conditioner ? [08]
- (B) Give functions of any four mountings in relation with boiler. [04]
- (C) Write a short note on Air Motor alongwith sketch. [04]

UNIT - III

- Q.5) (A) What is Thermal Resistance ? Explain electrical analogy for heat transfer through two layer composite slab. [04]
- (B) Explain Hydroelectric Power Plant with neat sketch. [06]

