MAULANA ABUL KALAM AZAD UNIVERSITY OF TECHNOLOGY, WEST BENGAL

Paper Code : PC-ME401 Applied Thermodynamics

UPID : 004476

Time Allotted : 3 Hours *Full Marks :70*

The Figures in the margin indicate full marks.

Candidate are required to give their answers in their own words as far as practicable

Group-A (Very Short Answer Type Question)

1. Answer *any ten* of the following : [1 x 10 = 10]

(i) Curtis turbine is _____.

(ii) What do you understand by combustion?

(iii) What is the function of the evaporator in a Vapour Compression Refrigeration system?

(iv) What do you understand by the term "specific humidity"?

(v) The Mach number is defined as the square root of the ratio of _____ to the elastic force.

(vi) In reciprocating air compressors, the clearance ratio is given by _____.

(vii) Why compounding is necessary in a steam turbine?

(viii) What is the purpose of reheating in the Brayton cycle?

(ix) Define the term work ratio for the Brayton cycle.

(x) During sensible heating of moist air, enthalpy _____.

(xi) For compressible fluid flow, the area-velocity relationship in terms of Mach number is given by _____

(xii) For perfect intercooling conditions in a two-stage reciprocating air compressor, the inlet temperature of the low-pressure cylinder is _____ high-pressure cylinder.

Group-B (Short Answer Type Question)

Answer *any three* of the following : [5 x 3 = 15]

2. Explain briefly with a neat sketch a 'sling psychrometer'. [5]
3. Explain the working of the Vapour Compressor Refrigerator system with a help of schematic diagram. [5]
4. Describe Cooling and dehumidification process on the psychrometric chart. [5]
5. Write a short note on normal shock. [5]
6. Obtain an expression in differential form for continuity equation in one-dimensional compressible flow. [5]

Group-C (Long Answer Type Question)

Answer *any three* of the following : [15 x 3 = 45]

7. Derive an expression for equation of work in a single-stage compressor neglecting the clearance volume. [15]
8. Explain with the help of a neat sketch a single-stage impulse turbine. Also, explain the pressure and velocity variations along the axis of the turbine. [15]
9. Derive an expression for efficiency of the Rankine cycle with the help of a schematic and T-s diagrams. [15]
10. Derive an expression for the area-velocity relationship for compressible fluid flow. [15]
11. Calculate the percentage loss in the ideal efficiency of a diesel engine with a compression ratio of 14, if the fuel cut-off is delayed from 5% to 8%. [15]

*** END OF PAPER ***