ME 224 (R-20)

Total No. of Questions : 10] [Total No.of Pages : 02

II/IV B. Tech. DEGREE EXAMINATIONS, AUGUST - 2024

Second Semester

MECHANICAL ENGINEERING

APPLIED THERMODYNAMICS

Time : **Three Hours** Maximum : **70** Marks

Answer ONE question from each Unit. 5x14=70 M

All Questions carry equal marks.

UNIT - I

1. A turbine takes dry steam at 20 bar and exhaust at 1.2 bar. The pressure at the release is 3bar. Find : (a) The theoretical loss of work per kg of steam due to incomplete expansion and (b) The loss in Rankine efficiency due to restricted expansion of steam. (Neglect pump work).

(OR)

2. Explain various boiler mountings and accessories.

UNIT - II

3. A convergent divergent nozzle receives steam at 7 bar and 200^{o}C and it expands isentropically into a space of 3 bar neglecting the inlet velocity calculate the exit area required for a mass flow of 0.1 Kg/sec. When the flow is in equilibrium through all and super saturated with $PV^{1.3} = C$.

(OR)

4. Classify the different steam condensers and explain surface condenser with neat sketch.

UNIT - III

5. a) Explain the working of Pelton wheel turbine with neat sketch.

   b) Compare impulse turbine with reaction turbine.

(OR)

P.T.O.

6. A Pelton wheel working under a head of 52 meters develops a shaft power of 92 kW at a speed of 250 rpm. If the overall efficiency is 82.5% and Cv = 0.98, find the jet diameter, the diameter of the bucket circle, the size of the buckets and the number of buckets required. Assume maximum efficiency condition that the peripheral velocity is 0.47 times the velocity of the jet.

UNIT - IV

7. A refrigerator working on Bell-Coleman cycle operates between pressure limits of 1.05 bar and 8.5 bar. Air is drawn from the cold chamber at 10^oC. Air coming out of compressor is cooled to 30^oC before entering the expansion cylinder. Expansion and compression follow the law $p.v.^{1.35}$ = constant. Determine C.O.P. of the system.
   Take $\gamma = 1.4$ and Cp = 1 kJ/kg-k for air.

(OR)

8. a) Explain the working of simple vapour absorption system and derive the expression for its COP.
   b) Explain the working of thermoelectric refrigeration system.

UNIT - V

9. a) Write down the applications of Psychometric process.
   b) Explain the working of winter air conditioning system.

(OR)

10. a) Explain the requirements of industrial air conditioning.
    b) 100 m^3 of air per minute at 30^oC DBT and 60% RH is cooled to 20^oC DBT by passing through a coil. Find, (i) Capacity of cooling coil in tons of refrigeration. (ii) Relative humidity of coming out air and its wet bulb temperature. Take atmospheric pressure as 1.033 bar.