(Following Paper ID and Roll No. to be filled in your Answer Book)

Paper ID : 140324   Roll No.⬚⬚⬚⬚⬚⬚⬚⬚⬚⬚

B.Tech.

(SEM. III) THEORY EXAMINATION 2015-16

THERMAL & HYDRAULIC MACHINES

[Time:3 hours]   [Total Marks:100]

Section-A

Note: Attempt **all** parts. All parts carry equal marks. Write answer of each part in short.   (10x2=20)

1.   (a)   What is Thermodynamic equilibrium?

       (b)   State with reasoning whether following system is closed, open or isolated? (i) IC Engine (ii) Refrigerator (iii) Pressure cooker

       (c)   What is reheat factor in steam turbine?

       (d)   What is Inter-cooling in gas turbine?

       (e)   Define scavenging in 2 stroke engine.

(f) Why a reciprocating pump is called a positive displacement pump?

(g) Define velocity of the flow and velocity of whirl with their significance.

(h) What factors does the no. of jets depend in case of Pelton wheel?

(i) Explain the principle of spiral casing for a centrifugal pump?

(j) Write the applications of 2 stroke SI & IC engines.

Section-B

Note: Attempt **any five** questions from this section.

(5x10=50)

2. Explain the method of steam turbine governing and control.

3. Describe Zero'th, Ist & 2nd laws of thermodynamics.

4. With the help of graphical representation explain stages in generation of steam.

5. A pelton wheel is to be designed for the following specifications:

Shaft power=11,772kW; Head =380m; Speed=750 r.p.m.; Overall efficiency=86%; Jet diameter is not exceed one-sixth of the wheel diameter. Determine:
(i) Wheel diameter (ii) the number of jets required, and (iii) Diameter of the jet.

Take Kv_1=0.985 and Ku_1=0.45

6. Explain the working of 4 stroke SI engine.

7. Explain the terms Priming and Cavitation in pump.

8. Differentiate between centrifugal and reciprocating pump.

9. Define the indicator diagram of a reciprocating pump. Show the effect of acceleration of piston on the indicator diagram.

Section-C

Note: Attempt any two questions from this section.

(2x15=30)

10. Explain air standard Otto, Diesel, Brayton cycles by drawing diagrams.

11. Explain how to improve Rankine cycle efficiency by

    (a)   Super heating of steam, increase steam, pressure inlet to turbine and

    (b)   Reheat & regenerative cycles.

12. In an air standard regenerative gas turbine cycle the pressure ratio is 5. Air enters the compressor at 1 bar, 300 K and leaves at 490 K. The maximum temperature in the cycle is 1000 K. Calculate the cycle efficiency, given that the efficiency of the regenerator and the adiabatic efficiency of the turbine are each 80%. Assume for air, the ratio of specific heat is 1.4.also, show the cycle on a T-s diagram.

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