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

Paper ID : 2289938 Roll No.

B.TECH.

Regular Theory Examination (Odd Sem-III), 2016-17

THERMAL & HYDRAULIC MACHINE

Time : 3 Hours *Max. Marks : 100*

SECTION - A

1. Attempt all questions. (10×2=20)

a) Determine the enthalpy and entropy of wet steam at 20 Bar and .9 dryness fraction?

b) Explain the reversible and irreversible processes.

c) State Zeroth law of thermodynamics.

d) What is energy equation?

e) Explain the reversible and irreversible processes.

f) What is Slip in Reciprocating pump?

g) Define Priming.

h) Write difference between impulse and reaction turbine.

i) Draw PV & TS diagram of Diesel & dual cycle.

j) Define reheat factor.

SECTION - B

2. Attempt any five questions. (5×10=50)

1. Write short notes on the following :

Thermodynamic properties, state, path, process, closed system, isolated system, open system, extensive and intensive properties.

2. State the Kelvin Planck and Clausius statements of 2nd law of thermodynamics.

3. Steam at 10bar pressure and .8 dryness fractions has been generated by boiler. Make calculation for enthalpy. Volume, entropy and internal energy.

4. A reversible heat engine deliver .6KW power and reject heat energy to reservoir at 300 K at the rate of 24 kj/min. make calculation for the engine efficiency and temp. Of the thermal reservior supplying heat to the engine.

5. Derive the expression for steady flow energy equation?

6. 5 kg of steam at "200 kPa occupies a volume of (i) 2.50m^3 and (ii) 5.00 m^3. Determine the temperature in each case and quality of steam.

7. A jet of water having a velocity of 50 m/sec impinges shock on a series of vanes moving at 15 m/s. The direction of motion of the vane is inclined at 20" to that of jet. The relative velocity at outlet is 0.9 of that at inlet. The absolute velocity of \v water at exit is to be normal to the motion of vanes. Determine : (i) Vane angles at inlet & outlet (ii) Hydraulic efficiency.

8. A single acting reciprocating pump running at 50 rpm delivers 0.00736 m^3/s of water. The diameter of the piston is 200 mm and stroke length 300 mm. If suction & delivery head are 3.5 m and 11.5 m respectively. Calculate (i) Theoretical discharge (ii) % of slip of the pump

SECTION - C

3. Attempt any **two** questions. **(2×15=30)**

1. A system containing 0.25 m^3 of air at a pressure of 4 bar and 150 $'C$ expands isentropically to a pressure of 1 bar and after this the gas is heated at constant pressure till the enthalpy increases by 60 kJ. Calculate the work done if these processes are replaced by a single reversible polytrophic process producing the same work between initial and final states, find the index of expansion. Take Cp : 1.G05 kJ/kgK of air.

2. Discuss the main components of Fancies Turbine with reference to working of Turbine.

3. A regenerative cycle with three blade heating works between 30 bar, 45^0C and 0.04 *bar*" The bleed temperature are chosen at equal temperature range. Determine the efficiency of the cycle. Neglect the pump work.