# B. TECH.
## (SEM. III) THEORY EXAMINATION 2018-19
## THERMAL & HYDRAULIC MACHINES

**Time: 3 Hours**                                                    **[Total Marks: 100]**

**Note**: Attempt all Sections. If require any missing data; then choose suitably.

## Section- A

**1**    All parts carry **equal** marks. Write answer of each part in short.         **(2 x 10 =20)**

   (a) Define quasi – static process.
   (b) Distinguish Open system & closed System.
   (c) Define 'reheat factor'.
   (d) Differentiate between closed cycle and open cycle gas turbine?
   (e) What is scavenging in 2 stroke engines?
   (f) Differentiate between Four stroke engine and two stroke engines.
   (g) Define velocity of the flow and velocity of whirl and explain their significance.
   (h) On what factors does the no. of jets depend in case of Pelton wheel?
   (i) What are the effects of Cavitation in turbine?
   (j) Give the differences between centrifugal and reciprocating pump?

## Section- B

Note: Attempt any **five** questions from this section**.**         **(10 x 5 =50)**

**2.** (i) A cyclic heat engine operates between a source temperature of $800^0$ C and a sink temperature of $30^0$ C. what is the least rate of heat rejection per kW net output of the engine?
   (ii)What are the causes of irreversibility of a process?

**3.** What is quality of steam and what are the different methods of measurement of quality?

**4.** Atmosphere air of 1 Kg at 1 bar & $45^0$C is compressed isothermally to 15 bar & then it is expanded back adiabatically without friction to its initial pressure. Determine its final temperature, net work done and the net heat transfer with its surroundings. Assume Y=1.4, R= 287 Nm/KgK & Cv = 717.5 Nm/KgK

**5.** Derive the expression for the efficiency and mean effective pressure of a Diesel cycle.

**6.** Define the following terms:
   (i)      Casing and Draft tube in reaction tube.
   (ii)       Priming and Cavitation in pump.

7. Explain the indicator diagram of a reciprocating pump. Show the effect of acceleration of piston on the indicator diagram.

8. A Pelton wheel is to be designed for the following specifications:
   Shaft power = 11,772 kW; Head = 380 m; Speed = 750 r.p.m.; Overall efficiency = 86%; Jet diameter is not to exceed one-sixth of the wheel diameter. Determine:
   (i)      Wheel diameter(ii) the number of jets required, and (iii) Diameter of the jet.
           Take $K_{v1}$ = 0.985 and $K_{u1}$ = 0.45

9. Explain the methods of steam turbine governing and control.

## Section- C

Note: Attempt any **two** questions from this section.                  **(15 x 2 =30)**

10. Describe Zeroth, $1^{st}$ & $2^{nd}$ laws of thermodynamics as well as Enthalpy & Entropy.

11. A centrifugal pump having outer diameter equal to two times the inner diameter and running at 1000 r.p.m. works against a total head of 40 m. the velocity of flow through the impeller is constant and equal to 2.5 m/s. the vanes are set at an angle of $40^0$ at outlet. If the outer diameter of the impeller is 500 mm and width at outlet is 50mm, determine:
    (i)      Vane angle at inlet
    (ii)     Work done by impeller on water per second

12. Explain air standard Otto cycle, Diesel cycle and Brayton cycle with diagram.