

**5TH SEM. /DIP.IN MECH./ MECH(MAINT.) /MECH(PROD.) /MECH(SAND.) /
MECHANICAL / MECH(IND.INT.)/ 2023(W) NEW**

Th-3 Hydraulic Machine & Industrial Fluid Power

Full Marks: 80

Time- 3 Hrs

**Answer any five Questions including Q No.1& 2
Figures in the right-hand margin indicates marks**

1. Answer **All** questions 2 x 10
 - a. Define Pump.
 - b. What is the difference between axial flow and radial flow turbine?
 - c. Write down the formula for speed ratio of Kaplan Turbine.
 - d. What is directional control valve?
 - e. Define Slip and Percentage Slip.
 - f. Why air is preferred as the working medium in pneumatic pump?
 - g. Define Manometric efficiency.
 - h. What is an actuator?
 - i. Draw the symbol for (i) Pressure relief valve (ii) Double acting cylinder
 - j. Classify turbine in terms of head of water available.
2. Answer **Any Six** Questions 6 x 5
 - a. Explain the working of external gear pump.
 - b. What is centrifugal pump? Explain main parts of centrifugal pump with neat sketch.
 - c. What are the advantages & disadvantages of Francis turbine over a Pelton turbine?
 - d. Compare Centrifugal pump with Reciprocating pump.
 - e. Derive the expression for discharge through a double acting reciprocating pump.
 - f. Write down the merits and demerits of pneumatic system.
 - g. Describe the working Pelton Turbine.
3. Explain the working of direct control of single acting cylinder pneumatic circuit with neat sketch. 10
4. Discuss about 5/2 directional control valve used in pneumatic circuit. 10
5. A single-acting reciprocating pump, running at 50r.p.m. delivers $0.01\text{m}^3/\text{s}$ of water. The diameter of the piston is 200mm & stroke length 400mm. Determine (i) the theoretical discharge of the pump (ii) Co-efficient of discharge (iii) Slip & % slip of the pump. 10
6. The internal and external diameters of the impeller of a centrifugal pump are 200mm & 400mm respectively. The pump is running at 1200 r.p.m. The vane angle of the impeller at inlet and outlet are 20° and 30° respectively. The water enters the impeller radially and velocity of flow is constant. Determine work done by the impeller per unit weight of water. 10
7. A Pelton turbine is having a mean bucket diameter of 1m & running at 1000 r.p.m. The net head on the Pelton turbine is 700m. If the side clearance angle is 15° & discharge through the nozzle is $0.1\text{m}^3/\text{s}$. Find the power available at the nozzle & hydraulic efficiency of turbine. 10