

UNIT – IV

8. Explain any *two* of them with the help of a neat sketch, the principle and working of the devices : $5 \times 3 = 15$
- (i) The hydraulic ram
 - (ii) The hydraulic accumulator
 - (iii) The Hydraulic torque converter
9. What is an air vessel ? Describe the function of the air vessel for reciprocating pumps. Show from first principle that the work saved, against friction in the delivery pipe of a single acting reciprocating pump, by fitting an air vessel is 84.8%. 15

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(4)

Roll No.

3211

**B. Tech. 5th Semester (ME)
Examination – December, 2022**

FLUID MACHINES

Paper : PCC-ME-309-G

Time : Three Hours]

[Maximum Marks : 75

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt *five* questions in all, selecting *one* question from each Unit. Question No. 1 is *compulsory*. All questions carry equal marks.

- 1. (a) Explain Principle of Impulse - Momentum. 2.5
- (b) Draw the characteristic Curve of Francis turbine. 2.5
- (c) Classify Fluid Machines. 2.5
- (d) Determine force impingement on stationary inclined vertical flat plate. 2.5

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(c) Explain pressure-stroke length plot in Reciprocating pump 2.5

(d) Explain, what is Cavitation? 2.5

UNIT – I

2. Explain the term 'Governing of a turbine'. Describe with a neat sketch the working of an oil pressure governor. 15

3. A jet of water of 2.5 cm diameter, moving with a velocity of 10 m/s, strikes a hinged square plate of weight 98.1 N at the centre of the plate. The plate is of uniform thickness. Determine the angle through which the plate will swing? 15

UNIT – II

4. Explain draft tube. Why is it used in a reaction turbine? Describe with sketch *two* different types of draft tubes. Also define the efficiency of draft tube. 15

5. A propeller reaction turbine of runner diameter 4.5 m is running at 40 rpm. The guide blade angle at inlet is 1450 and runner blade angle at outlet is 250 to the direction of vanes. The axial flow area of the water through runner is 25 m². If the runner blade angle at inlet is radial determine : 15

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- (i) Hydraulic efficiency of the turbine.
(ii) Discharge through turbine.
(iii) Power developed by the runner.
(iv) Specific speed of the turbine. 15

UNIT – III

6. A Explain the following in terms of centrifugal pump : 5 × 3 = 15

- (a) Manometric Head
(b) Minimum speed for starting a CP
(c) Net positive suction head

7. A partially submerged body is towed in water. The resistance R to its motion depends on the density ρ , the viscosity μ of water, length L of the body, Velocity V of the body and the acceleration due to gravity g . Prove that the resistance to the motion can be expressed in the form : 15

$$R = \rho L^2 V^2 \phi \left[\left(\frac{\mu}{\rho V L} \right) \left(\frac{L g}{V^2} \right) \right]$$

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