

Roll No.

3211

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

FLUID MACHINES

Paper : PCC-ME-309G

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 any 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) Differentiate Turbine & Pump. 2.5
- (c) Draw the characteristic curve of Impulse turbine. 2.5
- (d) Determine force impingement on stationary vertical flat plate. 2.5
- (e) Explain indicator diagram. 2.5
- (f) Explain, what is priming? 2.5
- (g) Explain the significance of Reynold's number. 2.5

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UNIT - I

2. Discuss cavitation. How can it be avoided in reaction turbine? 15
3. A jet of water of diameter 75 mm moving with a velocity of 25 m/s strikes a fixed plate in such a way that the angle between the jet and plate is 60° . Determine the force exerted by the jet on the plate (i) in the direction normal to the plate and (ii) in the direction of the jet. 15

UNIT - II

4. Prove that the hydraulic efficiency for a Francis turbine having velocity of the flow through runner as constant, is given by the relation. Where α = guide blade angle and θ = runner vane angle at outlet. And if vanes are radial at inlet, then show $\eta = \frac{2}{2 + (\tan \alpha)^2}$ 15
5. A Kaplan turbine develops 24647.6 kW power at an average head of 39 meters. Assuming a speed ratio of 2, flow ratio of 0.6, diameter of the boss equal to 0.35 times the diameter of the runner and an overall efficiency of 90%, Determine the diameter, speed and specific speed of the turbine. 15

UNIT – III

6. Explain the following in terms of centrifugal pump.

5 × 3 = 15

- Different types of efficiencies
 - Multistaging of CP
 - Specific Speed
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

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

UNIT – IV

8. Explain any two of them with the help of a neat sketch, the principle and working of the devices: 5 × 3 = 15

- The Hydraulic press
- The Hydraulic intensifier
- The hydraulic coupling.

9. Explain indicator diagram. How will you prove that area of indicator diagram is proportional to the work done by the Double acting reciprocating pump in these factors ? (a) Effect of acceleration of piston (b) Effect of friction in pipes (c) Combined effect of acceleration and friction.

15

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