

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

3211-2000-(P-4)/(Q-9)(22)

(4)

Roll No.

3211

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

FLUID MACHINES

Paper : PCC-ME-309C

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

3211-2000-(P-4)/(Q-9)(22)

P. T. O.

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

3211-2000-(P-4)/(Q-9)(22) (2)

UNIT - III

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

- (a) Different types of efficiencies
- (b) Multistaging of CP
- (c) 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

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

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

- (1) The Hydraulic press
- (2) The Hydraulic intensifier
- (3) The hydraulic coupling.

3211-2000-(P-4)/(Q-9)(22) (3)

P. T. O.