



P.E.S. College of Engineering, Mandya - 571 401
 (An Autonomous Institution affiliated to VTU, Belagavi)
Third Semester, B.E. - Industrial and Production Engineering
Semester End Examination; March - 2021
Fluid Mechanics and Machinery

Time: 3 hrs

Max. Marks: 100

Note: I) PART - A is compulsory. Two marks for each question.

II) PART - B: Answer any **Two** sub questions (from a, b, c) for Maximum of **18 marks** from each unit.

Q. No.	Questions	Marks
I : PART - A		10
I a.	Define the following:	
	i) Specific volume ii) Specific weight	2
b.	Explain the terms 'meta-centre' and 'meta-centric height'.	2
c.	Differentiate between Rotational and Irrotational flow.	2
d.	List any four minor energy losses that occur in flow through pipe.	2
e.	Give the classification of Reciprocating pumps.	2
II : PART - B		90
UNIT - I		18
1 a.	Explain the phenomenon of capillarity. Obtain an expression for capillary rise and fall of a liquid.	9
b.	Derive an expression for vertical single column manometer.	9
c.	Find the kinematic viscosity of an oil having density 981 kg/m^3 . The shear stress at a point in oil is 0.2452 N/m^2 and velocity gradient at that point is 0.2 per second.	9
UNIT - II		18
2 a.	Obtain an expression for the total pressure and centre of pressure on vertical plane when it is submerged in the liquid.	9
b.	With neat sketches, explain the conditions of equilibrium for floating and submerged bodies	9
c.	Determine the total pressure and centre of pressure of an isosceles triangular plate of base 4m and altitude 4m when it is immersed vertically in an oil of specific gravity 0.9. The base of the plate coincides with the free surface of oil.	9
UNIT - III		18
3 a.	Briefly explain the following types of fluid flow:	
	i) Steady and unsteady flow	9
	ii) Compressible and incompressible flow	
	iii) Laminar and turbulent flow	

- b. What is venturimeter? Derive an expression for the discharge through a venturimeter 9
- c. The water is flowing through a pipe having diameter 20 cm and 10 cm at sections 1 and 2 respectively. The rate of flow through pipe is 35 litres/s. The section 1 is 6 m above datum section 2 is 4 m above datum .If the pressure at section 1 is 39.24 N/cm² , find the intensity of pressure at sec 2. 9

UNIT - IV**18**

- 4 a. How will you determine the loss of head due to friction by using?
- i) Darcy Weisbach 9
- ii) Chezy's formulae
- b. Define hydraulic turbine. Briefly explain the classification of hydraulic turbines. 9
- c. A Pelton wheel is having a mean bucket diameter of 1 m and is running at 1000 rpm. The net head on the Pelton wheel is 700 m. If the side clearance angle is 15° and discharge through nozzle is 0.1 m³/s, find;
- i) Power available at the nozzle 9
- ii) Hydraulic efficiency of the turbine

UNIT - V**18**

- 5 a. What is an air vessel? Describe the function of the air vessel for reciprocating Pumps. 9
- b. Differentiate between centrifugal pumps and reciprocating pumps. 9
- c. A centrifugal pump delivers water against a net head of 14.5 meters and a design speed of 1000 rpm .The vanes are curved back to an angle of 30° with the periphery. The impeller diameter is 300 mm and outlet width is 50 mm. Determine the discharge of the pump if monomeric efficiency is 95%. 9

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