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P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belagavi)

Third Semester, B.E. - Civil Engineering

Semester End Examination; Dec. - 2019

Fluid Mechanics

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 Weight density and Relative density.	2
b.	Define Pressure and Pressure head.	2
c.	Define Discharge. Express in different ways.	2
d.	What is an equivalent pipe?	2
e.	Define Venacontracta.	2
	II : PART - B	**90**
	UNIT - I	**18**
1 a.	Calculate specific weight, mass density, specific volume and specific gravity of a liquid having a volume of 4000 liters and weighing 29.43 kN. Assume missing data suitably.	9
b.	A plate having an area of 1 m^2 is dragged down an inclined plane at 45° to horizontal with a velocity of 0.5 m/s due to its own weight. There is a cushion of liquid 1 mm thick between the inclined plane and the plate. If viscosity of oil is 0.1 Pa-s, determine the weight of the plate.	9
c.	Differentiate between; i) Ideal fluid and Real fluid ii) Compressible fluid and Incompressible fluid iii) Viscosity and Kinematic viscosity Which fluids you prefer for the analysis of motion of fluids?	9
	UNIT - II	**18**
2 a.	Show that the center of pressure always lies below the centroid of a plane surface immersed vertically in fluid at rest.	9
b.	Determine the pressure difference between A and B of Fig. 2B, if d_1 = 300 mm, d_2 = 150 mm, d_3 = 460 mm, d_4 = 200 mm. The liquid used in the manometer is mercury.	9

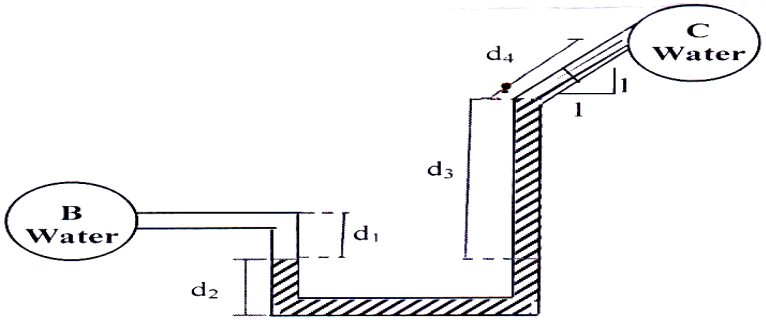

Fig. 2B

Contd…2

c. Calculate the resultant water pressure on a tainter gate of radius 8 m and width unity as shown in Fig. 2C

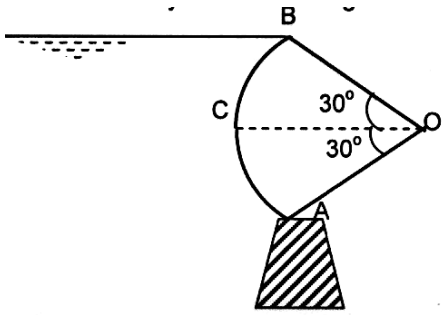

Fig. 2C 9

UNIT - III 18

3 a. Define potential function and stream function. Show that the stream lines and equipotential lines meet orthogonally. 9

b. A stream function in a two dimensional flow is $\psi = 2xy$ show that the flow is irrotational and determine the corresponding velocity potential. 9

c. A horizontal Venturimeter with inlet diameter 200 mm and throat diameter 100 mm is used to measure the flow of oil of specific gravity 0.8. The discharge of oil through venturimeter is 60 lps. Determine the reading of the oil-mercury differential manometer. Take; $c_d = 0.98$. 9

UNIT - IV 18

4 a. Explain; 9

i) Pipes in series ii) Pipes in parallel iii) Water hammer in pipes

b. The rate of flow of water through a horizontal pipe is 350 lps. The diameter of the pipe is suddenly enlarged from 200 mm to 500 mm. The pressure intensity in the smaller pipe is 0.15 N/mm^2. Determine; 9

i) Loss of head due sudden enlargement

ii) Pressure intensity in the larger pipe

iii) Power lost due to enlargement

c. Two reservoirs are connected by a 3 km long 250 mm diameter pipe. The difference in water levels of two reservoirs being 10 m. Calculate the discharge in lpm, if friction factor = 0.03. Also find the percentage increase in discharge, if a second pipe of same diameter is laid parallel to the first for the last 600 m. 9

UNIT - V 18

5 a. Define hydraulic coefficients. Give the relationship between them. 9

b. Differentiate a suppressed weir from a contracted weir. Why the ventilation of suppressed weirs is necessary? 9

c. A rectangular channel 6 m wide carries a flow of 1.5 m^3/s. A rectangular sharp crested weir is to be installed near the end of the channel to create a depth of 1m upstream of the weir. Calculate the necessary height. Assume $c_d = 0.62$ 9

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