Course Code: 2040116 Roll No: MLRS-R20

MARRI LAXMAN REDDY
INSTITUTE OF TECHNOLOGY AND MANAGEMENT
(AN AUTONOMOUS INSTITUTION)
(Approved by AICTE, New Delhi & Affiliated to JNTUH, Hyderabad)
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II B.Tech II Sem Regular End Examination, July 2022

Fluid Mechanics

(Civil Engineering)

Time: 3 Hours. **Max. Marks: 70**

Note: 1. Question paper consists: Part-A and Part-B.
2. In Part – A, answer all questions which carries 20 marks.
3. In Part – B, answer any one question from each unit.
Each question carries 10 marks and may have a, b as sub questions.

PART- A

(10*2 Marks = 20 Marks)

1.	a)	Name the phenomenon of capillarity. ?	2M	CO1	BL1
	b)	Explain the difference between simple and differential manometer	2M	CO1	BL4
	c)	Explain rotational and irrotational flows?	2M	CO2	BL4
	d)	What are the practical applications of Bernoulli's equation?	2M	CO2	BL1
	e)	Define the following coefficients : (i) Coefficient of velocity, (ii) Co-efficient of discharge	2M	CO3	BL1
	f)	Define the terms : notch, weir, nappe and crest	2M	CO3	BL1
	g)	What is meant by pipes in series and pipes in parallel?	2M	CO4	BL1
	h)	Define Hydraulic gradient line and Total energy line.	2M	CO4	BL1
	i)	Explain how laminar and turbulent boundary layers are formed.	2M	CO5	BL4
	j)	What do you understand by total drag on a body, resultant force on a body?	2M	CO5	BL1

PART- B

(10*5 Marks = 50 Marks)

2	a)	Differentiate between: (i) Liquids and gases, (ii) Real fluids and ideal fluids, (iii) Specific weight and specific volume of a fluid.	5M	CO1	BL2
	b)	Find the pressure inside a water droplet of dia 0.03mm, if the surface tension of water is 0.075N/m, atmospheric pressure=$10.32x10^4 N/m^2$.	5M	CO1	BL3
		OR			
3		Define viscosity. A plate having an area of 0.7 m2 is sliding down the inclined plane at 45^0 to the horizontal with a velocity of 0.45 m/s. there is a cushion of fluid 2 mm thick between the plane and the plate. Find the viscosity of the fluid if the weight of the plate is 300N.	10M	CO1	BL3

4	a)	Define and distinguish between: a) (i) uniform flow and non- uniform flow (ii) laminar and turbulent flow b) stream lines, path lines, streak lines and stream tube	5M	CO2	BL2
	b)	In a steady flow, two points A and B are 0.5 m apart on a straight stream line. If the velocity of flow varies linearly between A and B, What is the acceleration at each point, if the velocity at 'A' is 3 m/sec and velocity at 'B' is 8 m/sec.	5M	CO2	BL3
		OR			
5		Derive Bernoulli's equation for the flow of an incompressible frictionless fluid from consideration of momentum.	10M	CO2	BL6
6	a)	The head of water over the centre of an orifice of diameter 30 mm is 1.5 m. The inlet pipe dia is 60mm. The actual discharge through the orifice is 2.35 litres/sec. Find the co-efficient of discharge.	5M	CO3	BL3
	b)	Explain the principle and working of venturi meter with a neat sketch	5M	CO3	BL4
		OR			
7		Derive the equation for actual discharge for trapezoidal notch.	10M	CO3	BL6
8	a)	At a sudden enlargement of a water main from 240 mm to 480 mm diameter, the hydraulic gradient rises by 10 mm. Estimate the rate of flow.	5M	CO4	BL3
	b)	If co-efficient of friction for these pipes is same, then derive the formula for the total head loss, neglecting first the minor losses and then including them.	5M	CO4	BL6
		OR			
9		Obtain expression for head loss due to friction in the pipe. List all the assumptions made in the derivation	10M	CO4	BL3
10	a)	Obtain an expression for the boundary layer in flat plate in terms of momentum thickness.	5M	CO5	BL3
	b)	Define the terms: boundary layer, boundary layer thickness, drag, lift and momentum thickness.	5M	CO5	BL1
		OR			
11		A thin plate is moving in still atmospheric air at a velocity of 5 m/s. The length of the plate is 0.6 m and width 0.5 m. Calculate (i) the thickness of the boundary layer at the end of the plate, and (ii) drag force on one side of the plate. Take density of air as 1.24 kg/m and kinematic viscosity 0.15 stokes.	10M	CO5	BL3

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