University of Mumbai

Examination summer 2022

Program: Mechanical Curriculum Scheme: REV- 2019 'C' Scheme

Examination: SE Semester: IV

Course Code: 402 and Course Name: Fluid Mechanics

Time: 3 hour DATE: 20/5/2022 QP CODE: 93293 Max. Marks: 80

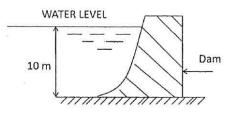
Choose the correct option for following questions. All the Questions are
compulsory and carry equal marks
The viscosity of liquids With increase in temperature.
decreases
increases
first decreases and then increases
first increases and then decreases
Find Reynolds number if velocity of fluid is 2 m/s and density of fluid 800 kg/m ³ and Viscosity 0.2 N.s/m ² is flowing through 0.25 m diameter pipe.
2000
200
is the square root of the ratio of the inertia force to the pressure force.
Reynolds number
Mach's number
Euler's number
Froude's number
C 4 # 6 6 6 6 7 7 7 7 6 6 6 7 8 7 8 8 8 8 8 8
The term $V^2/2g$ is known as
Potential energy
pressure energy
kinetic energy per unit weight
kinetic energy
Which property of the fluid accounts for the major losses in pipes?
Density
Specific gravity
Viscosity
Compressibility
880 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
If liquid has specific gravity 0.2, then what is weight density of the liquid?
200 N/m ³
2000 N/m ³
1962 N/m ³
1.962 N/m ³
The Reynolds transport theorem establishes a relationship between and
Control mass system, Control volume system
A 2 / 18 / 12 / 12 / 12 / 12 / 12 / 12 /
Differential equation, Integral equation

Substantial derivative, Local derivative		
The state of the s		
The coefficient of discharge of Venturimeter lies within the limits:		
0.95 to 0.99		
0.8 to 0.85		
0.7 to 0.8		
0.6 to 0.7		
The maximum velocity in a circular pipe when flow is laminar occurs at		
the top of the pipe		
the bottom of the pipe		
the centre of the pipe		
on D: not necessarily at the centre		
\$ 600 K L & & & & & & & & & & & & & & & & & &		
What is the graph that is represented in the airfoil section?		
Lift-moment ratio		
Coefficient of lift-coefficient of drag ratio		
Angle of attack-drag ratio		
Lift–angle of attack ratio		

Q2.			
A	Solve any Two 5 marks each		
i.	What is Pascal law and Archimedes Principle?.		
ii.	How do you determination of head loss in pipes due to friction		
iii.	Write short notes on types of fluids.		
В	Solve any One 10 marks each		
i.	A 1 m wide and 1.5 m deep rectangular plane surface lies in water in such a way that its plane makes an angle of 30° with the free water surface. Determine the total pressure and position of centre of pressure when the upper edge is 0.75 m below the free water surface.		
ii.	In a two-dimensional incompressible flow, the fluid velocity components are given by $u = x - 4y$ and $v = -y - 4x$. Show that velocity potential exists and determine its form as well as stream function.		

Q3.				
A	Solve any Two	5 marks each		
io	What are the properties of Newtonian and non-Newtonian fluids?			
ii	With neat sketch explain working and construction of venturimeter			
iii.	Write a short note on Buckingham's π theorem.			
B	Solve any One	10 marks each		
200	Determine the flow rate through the Venturimeter shown in figure (γ = ρ g)			
1000 A 400 A	$p_1 = 735 \text{ kPa}$	$p_2 = 550 \text{ kPa}$		
300	0, V. K.	$\gamma = 9.1 \text{ kN/m}^3$		
500	8 8 9 7 8 7 7 7 8 8 8 8 8 8 8 8 8 8 8 8			

ii. Find the magnitude and direction of the resultant water pressure acting on a curved face of a dam which is shaped according to the relation $y = (x^2/8)$ as shown in fig. The height of the water retained by the dam is 10 m. Consider the width of the dam as unity.



Q4.	\$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$		
A	Solve any Two 5 marks each		
i.	What is Reynolds transport theorem? What purpose does it serve?		
ii.	Define stream function and velocity potential function.		
iii.	Write short note on boundary layer separation and methods to control it		
В	Solve any One 10 marks each		
i.	An oil of viscosity 9 poise and specific gravity 0.9 is flowing through a horizontal pipe of 60 mm diameter. If the pressure drop in 100 m length of the pipe is 1800 kN/m ² determine the rate of flow of oil.		
ii.	Water (ρ = 999.7 kg/m3 and μ =1.307 x10-3 kg/m.s) is flowing in a 0.20-cm-diameter 15-m-long pipe steadily at an average velocity of 1.2 m/s. Determine (a) the pressure drop and (b) The pumping power requirement to overcome this pressure drop Water 1.2 m/s $L = 15 \text{ m}$		