Sanjay Ghodawat University, Kolhapur

Established as State Private University under Govt. of Maharashtra. Act No XL, 2017

2018-19
EXM/P/09/01

Year and Program:2018-19 | **School of Technology** | **Department of Civil Engineering**

Course Code: CET 202 | **Course Title: Fluid Mechanics** | **Semester – I**

Day and Date: Thursday, 29/11/2018 | **End Semester Examination (ESE)** | **Time: 2.30 pm to 5.30 pm**

Max Marks: 100

Instructions: 1. All questions are compulsory.
2. Assume suitable data wherever necessary and mention it clearly.
3. Figures to the right indicate full marks.

			Marks	Bloom's Level	CO
Q.1		**Solve following questions**			
	a)	Explain different types of fluids. Give practical examples in each case.	07	L_3	CO1
		OR			
	a)	An open tank contains water upto depth of 2 m and above it an oil of specific gravity 0.9 for depth of 1 m. Find the pressure intensity at 1) at interface of both liquids 2) at bottom of tank.	07	L_3	CO1
	b)	A circular plate 3.0 m in diameter is immersed in water in such a way that its greatest and least depths below the free surface are 4m and 1.5 m respectively. Determine total pressure on one face of the plate and position of the centre of pressure.	08	L2	CO2
		OR			
	b)	A rectangular plane surface 3 m wide and 4 m deep lies in water such a way that its plane makes an angle of 30° with free water surface. Determine the total pressure and position of centre of pressure, if upper edge if 2 m below the liquid surface.	08	L_3	CO2
Q.2		**Solve following questions**			
	a)	Explain following terms in detail: 1) Stream lines 2) streak lines 3) Path lines 4) Stream tube	07	L_3	CO3
		OR			
	a)	The diameters of pipe at sections 1 and 2 are 15 cm and 20 cm respectively. Find the discharge through the pipe if velocity of water at section 1 is 4 m/s. Determine velocity at section 2	07	L_3	CO3

	b)	Derive Euler's equation of motion.	08	L_3	CO4
		OR			
	b)	An orifice meter with orifice diameter 10 cm is inserted in a pipe of 20 cm diameter. The pressure gauges fitted upstream and downstream of the orifice meter gives readings of 19.62 N/cm^2 and 9.81 N/cm^2 respectively. Co-efficient of orifice meter is given as 0.6. Find discharge through orifice meter.	08	L_3	CO4
Q.3		**Solve any Two**			
	a)	Explain following properties of fluids: 1) Surface tension 2) Capillary action 3) Unit weight	08	L_2	CO1
	b)	Explain Archimedes's Principle. Write its practical applications.	08	L_2	CO2
	c)	Write properties of flow net.	08	L_2	CO3
	d)	Explain in detail how to determine hydraulic coefficients of orifice.	08	L_2	CO4
Q.4		**Solve any Two**			
	a)	Derive Darcy-Wiesbach equation for flow through circular pipe.	09	L_3	CO5
	b)	Oil of viscosity 0.1 Pa.s and specific gravity 0.90, flows through a horizontal pipe of 25 mm diameter. If the pressure drop per meter length of the pipe is 12 kPa, Determine, a. The discharge b. The shear stress at the pipe wall c. Raynold's number of the flow d. The power required per 50 m length of pipe to maintain the flow.	09	L_3	CO5
	c)	An oil is pumped in a horizontal pipe of diameter 150 mm and pipe is 200 m long. The specific gravity of oil is 0.89 and kinematic viscosity is 1.3 stokes. The velocity of flow is 4.565 m/s. Find the capacity of the pump required to pump the oil. Assume efficiency of pump to be 65% and f = 0.012.	09	L_3	CO5
Q.5		**Solve any Two**			
	a)	A pipe 50 mm diameter is 6 m long and the velocity of flow of water in the pipe is 2.4 m/s. What loss of energy and corresponding head would be saved if central 2 m length of pipe was replaced by 75 mm diameter pipe, the	09	L_3	CO6

change of section being sudden? Take f = 0.04 for the pipes of both diameter.

b) A siphon of diameter 200 mm connects two reservoirs having a difference in elevation of 20 m. The length of siphon is 500 m and the summit is 3.0 m above the water level in upper reservoir. The length of pipe from upper reservoir to summit is 100 m. Determine the discharge through the siphon and pressure at summit. Neglect minor losses. Take friction factor = 0.02. 09 L_3 CO6

c) Using Buckingham's π theorem show that Velocity through circular orifice is given by, 09 L_3 CO6

$$v = \sqrt{2gh}\ \phi\left[\frac{D}{H}, \frac{\mu}{\rho v H}\right]$$

H – Head Causing flow, D- Diameter of an orifice, μ – Coefficient of Dynamic Viscosity, ρ – Mass density, g – Acceleration due to gravity

Q.6 **Solve any Three**

a) Write a note on Reynold's experiment and its use. 06 L_2 CO5

b) Write various forms of Hazen-Poiseuille equation. 06 L_2 CO5

c) What is meant by losses in pipes? Write formulae for all minor losses in pipes. 06 L_2 CO6

d) Write importance and use of dimensional analysis. 06 L_2 CO6

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