Model Question Paper-1 with effect from 2019-20 (CBCS Scheme)

USN | | | | | | | | | | |

Fourth Semester B.E. Degree Examination
Title-Fluid Mechanics

TIME: 03 Hours **Max. Marks: 100**

Note: Answer any **FIVE** full questions, choosing at least **ONE** question from each **MODULE**.

		Module -1	*Bloom's Taxonomy Level	CO	Marks
Q.01	a	Define Surface Tension. Derive an expression for Capillary rise and Capillary fall of water in a glass tube.	L1,L2	CO1	10
	b	A 15 cm diameter vertical cylinder rotates concentrically inside another cylinder of diameter 15.10 cm. Both cylinders are 25 cm high. The space between the cylinders is filled with a liquid whose viscosity is unknown. If a torque of 12 Nm is required to rotate the inner cylinder at 100 rpm, determine the viscosity of the fluid.	L5	CO1	10
		OR			
Q.02	a	With a neat sketch explain U-tube Differential Manometer	L1,L2	CO1	10
	b	A circular plate 3 metre diameter is submerged in water as shown in figure (a). Its greatest and least depths are below the surfaces being 2 metre and 1 metre respectively. Find: i) the total pressure on front face of the plate, and ii) the position of centre of pressure.	L5	CO1	10
		Module-2			
Q. 03	a	Explain conditions of equilibrium for a floating and submerged bodies	L2	CO2	8
	b	Derive an experimental method of determination of metacentric height of a floating body	L2	CO2	6
	c	Prove that velocity potential function satisfy the laplace equation	L5	CO2	6
		OR			
Q.04	a	Obtain an expression for continuity equation for a three-dimensional steady incompressible flow.	L2, L5	CO2	10
	b	Explain different rypes of fluid flow.	L1,L2	CO2	10
		Module-3			
Q. 05	a	State Bernoulli's theorem for steady flow of an incompressible fluid. Derive an expression for Bernoulli's equation from first principle and state the assumptions made for such a derivation.	L1, L3	CO3	10
	b	Water is flowing through a pipe having diameter 300mm and 200mm at the bottom and upper end respectivety. The intensity of pressure at the bottom end is 24.525 N/cm^2 and the pressure at upperend is 9.81 N/cm^2. Determine the difference in datum head if the rate of flow through pipe is 40 lit/second.	L5	CO3	10
		OR			
Q. 06	a	Derive an expression for theoretical Discharge through the triangular notch or weir.	L2	CO3	10
	b	A venturimeter is used for measurement of discharge of water in a horizontal pipeline. If the ratio of upstream pipe diameter to that of throat is 2:1, upstream diameter is 300 mm, the difference of pressure between the throat and upstream is equal to 3 m head of	L5	CO3	10

		water and loss of head through meter is $1/8^{th}$ of the throat velocity head, Calculate discharge in the pipe.			
		Module-4			
Q. 07	a	Using Buckingham's π-theorem, find the discharge Q consumed by an oil ring, where d is the internal diameter of the ring, N is rotational speed, ρ is density, μ is viscosity, σ is surface tension and w is the specific weight of oil.	L3	CO4	10
	b	a. Define similitude. Explain types of similarities.	L1,L2	CO4	10
		OR			
Q. 08	a	A 150 mm diameter pipe reduces in diameter abruptly to 100 mm diameter. If the pipe carries water at 30 litres per second, calculate the pressure loss across the contraction. Take the co-efficient of contraction as 0.6.	L5	CO4	10
	b	Derive an expression for the loss of head due to sudden enlargement of a pipe	L3	CO4	10
		Module-5			
Q. 09	a	Derive a Hagen-poiseuille equation for shear stress distribution and velocity distribution	L2	CO5	10
	b	Explain boundary layer concept for flow over solid body. Derive displacement thickness for flow over thin plate	L2,L4	CO5	10
		OR			
Q. 10	a	Derive an expression for lift and drag	L1,L4	CO5	10
	b	Explain propagation of pressure waves in a compressible fluid.	L2	CO5	10

*****Bloom's Taxonomy Level: Indicate as L1, L2, L3, L4, etc. It is also desirable to indicate the COs and POs to be attained by every bit of questions.