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

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

Fourth Semester B.E. Degree Examination

Subject Title Fluid Mechanics (18MR46)

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

Note: 01. Answer any **FIVE** full questions, choosing at least **ONE** question from each **MODULE**.

		Module -1	*Bloom's Taxonomy Level	Marks
Q.01	a	Define following terms with SI units i)mass density ii) kinematic viscosity iii) capillarity iv) specific volume v) compressibility of fluids	L1	10
	b	A flat plate of surface area 1.0 m^2 and a weight of 100 N is sliding down a 60^0 inclined plane surface the flat plate slides over a 1mm layer of oil whose dynamic viscosity is 1.0 poise. Determine the steady state velocity of the plate. Find kinematic viscosity if specific gravity of oil is 0.90.	L3	10
	c			
		OR		
Q.02	a	Define (i) absolute pressure (ii) gauge pressure (iii) vaccum pressure	L1	04
	b	Derive the relation for hydrostatic force on a vertical surface completely submerged in a static liquid of specific density ρ	L2	8
	c	A U-tube Hg , manometer is used to measure pressure of oil (0.85) flowing through the pipe. Centre of pipe is 15cm below the level of Hg in right column the Hg -level difference in manometers is 25cm. Determine absolute pressure of oil flowing through pipe. Atm.pr =1bar	L3	8
		Module-2		
Q. 03	a	Derive continuity equation for three dimensional fluid flow in Cartesian co-ordinates.	L2	10
	b	A rectangular wooden block,2m long 1 m wide and 1m deep floats in water. Find the weight of the body and meta centric height ,if depth of immersion is 0.75m .specific gravity of wood= 0.6 .State the condition of equilibrium .	L4	10
		OR		
Q.04	a	Derive Bernoulli's equation for a fluid flow and state important assumptions	L2	10
	b	The water flow through on inclined pipe of 60m long having a slope of 1 in 20. The pipe tapers from 5 m diameter to 1m diameter from higher end to lower end. rate of water flow is 500 liters/sec. The pressure of water at the entry is 1.2 bar, determine the pressure of water at the exit.	L3	10
		Module-3		
Q. 05	a	Derive relation of velocity of fluid flow through circular pipe using pitot-static tube.	L2	10
	b	A venturimeter is to be fitted in a horizontal pipe of 25cm diameter which carries 7.2 M^3 of water per minute. The pressure head carrying the flow is 6 m of water. Find the minimum diameter of the throat, if there is no negative pressure at the throat, take C_d=0.98.	L3	10
		OR		
Q. 06	a	Explain model similitude and its applications.	L1, L2	10
	b	The frictional torque T on a disk of diameter, d rotating at N rpm in a fluid whose viscosity μ, density ρ in flow is $T=\rho N^2 d^5 f\left(\frac{\mu}{\rho N d^2}\right)$ use Buckingham π –theorem.	L3	10

		Module-4		
Q. 07	a	Derive Darcy equation also Chezy's equation for a fluid flow.	L2	10
	b	A smooth pipe of 40cm diameter and length 1 km, carries water at the rate of 50 Lit/sec. Determine the following (i) Head lost due to friction (ii) Reynold's number (iii) Frictional factor. (iv) Shear stress at the wall surface Assume kinematic viscosity is 0·015 stokes.	L3	10
		OR		
Q. 08	a	Derive relation for rate viscous flow through two parallel plates.	L2	10
	b	An oil of sp.gravity 0·85 and viscosity of 2·5 poise is flowing through a 30cm diameter pipe. The length of the pipe is 2.5km and head loss is 20m determine (i) Shear stress at pipe wall (ii) Shear stress at radius r=10cm (iii) Frictional factor (iv) Reynolds number.	L3	10
		Module-5		
Q. 09	a	Define displacement momentum and energy thickness.	L1	4
	b	Derive relation for displacement thickness and momentum thickness	L2	6
	c	A plate of 1m length and 0.6 m wide is held in a horizontal plane. A fluid of specific gravity 0.9 and kinematic viscosity of $1x10^{-4}$ m^2/sec is flowing over the plate with a velocity of 5m/sec parallel to 1m side of plate. Find (1) Boundary layer thickness and shear stress at the end of plate. (2) Drag force on one side of plate.	L3	10
		OR		
Q. 10	a	Explain the following terms with neat sketches, (i) Mach number (ii) Mack angle (iii) Mach cone	L2	10
	b	For adiabatic compressible fluid flow derive relation for velocity of sound wave.	L3	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.