Code No: P21MET03

HALL TICKET NUMBER

PACE INSTITUTE OF TECHNOLOGY & SCIENCES::ONGOLE
(AUTONOMOUS)

II B.TECH I SEMESTER END SUPPLEMENTARY EXAMINATIONS, MARCH/APRIL - 2023

FLUID MECHANICS & HYDRAULIC MACHINES

(ME BRANCH)

Time: 3 hours Max. Marks: 70

Answer all the questions from each UNIT (5X14=70M)

Q.No.		Questions	Marks	CO	KL
		UNIT-I			
1.	a)	Differentiate between: a) Liquids and Gases b) Cohesion and Adhesion c) Real fluid and Ideal fluid d) Compressible and Incompressible fluids e) Newtonian and Non-Newtonian fluids.	[7M]	1	
	b)	Differentiate between: i) Absolute pressure and gauge pressure ii) Piezometer and simple manometer iii) U-tube differential manometer and inverted U-tube differential manometer. ?	[7M]	1	
		OR			
2.	a)	The space between two square flat parallel plates is filled with oil. Each side of the plate is 60 cm. The thickness of the oil film is 12.5 mm. The upper plate, which moves at 2.5 m/sec, requires a force of 98.1 N to maintain the speed. Determine: (i) The dynamic viscosity of the oil in poise, and (ii) The kinematic viscosity of the oil in stokes if the specific gravity of the oil is 0.95.	[7M]	1	
	b)	Define viscosity. A plate having an area of 0.7 m2 is sliding down the inclined plane at 450 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.	[7M]	1	
		UNIT-II			
3.	a)	State the momentum equation; In what way does it differ from impulse momentum equation. Mention some of its engineering applications.	[7M]	2	
	b)	Water flows through a pipe AB 1.2 m diameter at 3 m/s and then passes through a pipe BC 14.5 m diameter. At C, the pipe branches. Branch CD is 0.8 m in diameter and carries one-third of the flow in AB. The flow velocity in branch CE is 2.5 m/s. find the volume rate of flow in AB, the velocity in BC, the velocity in CD and the diameter of CE.	[7M]	2	
		OR			
4.	a)	Two reservoirs are connected by three pipes laid in parallel, their respective diameters being d, 2d, and 3d. These are all of the same length l. If f is the same for all the pipes find the discharge through the larger pipes if the discharge through the smallest is 0.05 m3 /sec	[7M]	2	
	b)	Derive Bernoulli's equation from Euler's equation.	[7M]	2	
		UNIT-III			
5.	a)	A jet of water of diameter 60 mm moving with a velocity of 25 m/s strikes a fixed plate in such a way that the angle between the jet and the plate is 55^0. Find the force exerted by the jet on the plate (i) in the direction normal to the plate, and (ii) in the direction of the jet.	[7M]	3	

	b)	A 15 cm diameter jet of water with a velocity of 15 m/s strikes a plane normally. If the plate is moving with a velocity of 6 m/s in the direction of the jet calculate the work done per second on the plate and the efficiency (η) of energy transfer.	[7M]	3	
OR					
6.	a)	Derive an expression for head loss due to friction?	[7M]	3	
	b)	Explain the Reynolds's experiment with neat sketch?	[7M]	3	
UNIT-IV					
7.	a)	Differentiate between: (i) The impulse and reaction turbines, (ii) Radial and axial flow turbines and (iii) Kaplan and propeller turbines.	[7M]	4	
	b)	Define Cavitation and derive the derivation of Thomas cavitation factor?	[7M]	4	
OR					
8.	a)	Define the term 'Governing of a turbine'. Describe with a neat sketch the working of an oil pressure governor.	[7M]	4	
	b)	Derive the derivation of specific speed of the turbine?	[7M]	4	
UNIT-V					
9.	a)	How will you determine the possibility of cavitation to occur in the installation of a pump?	[7M]	5	
	b)	Define a centrifugal pump. Explain the working of a single-stage centrifugal pump with sketches.	[7M]	5	
OR					
10.	a)	A double acting reciprocating pump of cylinder diameter 300mm and stroke of 400mm is situated at a height of 3.50 meters above the sump water level. The suction pipe is 150mm in diameter and 6 meters long. If the pump runs at 25 rpm, calculate the absolute pressure head in the cylinder on the suction side at the commencement of the stroke. Take atmospheric pressure head = 10.3 meters of water.	[7M]	5	
	b)	A centrifugal pump delivers water against a net head of 14.5m and design speed of 1000 rpm. The vanes are curved back to an angle of 300 with periphery. The impeller diameter is 300 mm and outlet width 50 mm. Determine the discharge of the pump if the manometric efficiency is 95%.	[7M]	5	

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