II B. Tech I Semester Supplementary Examinations, July - 2022
FLUID MECHANICS & HYDRAULIC MACHINES
(Com to ME, AME)
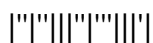
Time: 3 hours   Max. Marks: 70

Answer any **FIVE** Questions each Question from each unit
All Questions carry **Equal** Marks
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1		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.	[14M]

Or

2	a)	Enunciate Newton's law of viscosity. Explain the importance of viscosity in fluid motion. What is the effect of temperature on viscosity of water and that of air?	[7M]
	b)	An oil of viscosity 5 poise is used for lubrication between a shaft and sleeve. The diameter of shaft is 0.5 m and it rotates at 200 rpm. Calculate the power lost in the oil for a sleeve length of 100 mm. The thickness of the oil film is 1.0 mm.	[7M]

3	a)	Explain the terms: (i) Path line (ii) Streak line (iii) Stream line and (iv) Stream tube.	[7M]
	b)	A 40 cm diameter pipe, conveying water, branches into two pipes of diameter 30 cm and 20 cm respectively. If the average velocity in the 40 cm diameter pipe is 3 m/s. Find the discharge in this pipe. Also, determine the velocity in 20 cm pipe if the average velocity in 30 cm diameter pipe is 2m/sec.	[7M]

Or

4	a)	Derive Bernoulli's equation from Euler's equation.	[7M]
	b)	A 420 reducing bend is connected in a pipe line, the diameters at the inlet and outlet of the bend being 40 cm and 20 cm respectively. Find the force exerted by water on the bend if the intensity of pressure at inlet of bend is 20.00 N/cm^2. The rate of flow of water is 550 litres/s.	[7M]

5	a)	Show that the loss of head due to sudden expansion in pipe line is a function of velocity head.	[7M]
	b)	Describe the characteristics of laminar and turbulent boundary layers.	[7M]

Or

6	a)	Explain about Bluff body and its application.	[7M]
	b)	Explain about momentum and energy thickness in boundary layer.	[7M]

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7 a) What is specific speed? State its significance in the study of hydraulic machines. [7M]

   b) By means of a neat sketch, explain the governing mechanism of Francis Turbine. [7M]

Or

8 a) What do you mean by gross head, net head and efficiency of turbine? Explain the different types of efficiencies of a turbine. [7M]

   b) A Pelton wheel has a mean bucket speed of 30 m/s with a jet of water flowing at the rate of 0.8 m^3/s under a head of 250 m. The buckets deflect the jet through an angle of 1600 . Calculate the power delivered to the runner and the hydraulic efficiency of the turbine. Assume co-efficient of velocity as 0.85. [7M]

9 a) How will you determine the possibility of cavitation to occur in the installation of a pump? [7M]

   b) What are pump troubles and remedies? Explain. [7M]

Or

10 a) Explain the principle and working of a Centrifugal pump with a neat sketch. [7M]

   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]

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