Printed Page:-04

Subject Code:- AME0402

Roll. No:

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA (An Autonomous Institute Affiliated to AKTU, Lucknow)

B.Tech

SEM: IV - THEORY EXAMINATION (2024-2025) **Subject: Fluid Mechanics & Fluid Machines**

Time: 3 Hours

General Instructions:

IMP: *Verify that you have received the question paper with the correct course, code, branch etc.* 1. This Question paper comprises of three Sections -A, B, & C. It consists of Multiple Choice *Questions (MCQ's) & Subjective type questions.* 2. Maximum marks for each question are indicated on right -hand side of each question. 3. Illustrate your answers with neat sketches wherever necessary. 4. Assume suitable data if necessary. 5. Preferably, write the answers in sequential order.

6. No sheet should be left blank. Any written material after a blank sheet will not be evaluated/checked.

SECTION-A

<u>SECTIO</u>	<u>DN-A</u>
1. Attem	npt all parts:-
1-a.	The viscous force the relative motion between the adjacent layers of a fluid in
	motion. Which of the following flowing fits best in the sentence? (CO1, K1)

- never affects (a)
- may effect under certain conditions (b)
- (c) facilitates
- (d) opposes

The compressible flow is assumed to be (CO1, K1) 1-b.

- Adiabatic only (a)
- Isentropic only (b)
- Isentropic and adiabatic (c)
- Polytropic (d)

1-c. Local acceleration has constant value for a steady flow.(CO2, K1)

- (a) TRUE
- (b) False

The path taken by the smoke coming out of a chimney (in concentric circles) 1-d. 1 represents a (CO2, K1)

- (a) pathline
- streamline (b)
- streakline (c)

Max. Marks: 100

20

1

1

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	(d)	streamtube			
1-e.	What is the total loss developed in a series of pipes? (CO3, K1)		1		
	(a)	Sum of losses in each pipe only			
	(b)	Sum of local losses only			
	(c)	Sum of local losses plus the losses in each pipe			
	(d)	Zero			
1-f.	C	On which of the factors does the co-efficent of bend in a pipe depend? (CO3, K1)	1		
	(a)	angle of bend and radius of curvature of the bend			
	(b)	angle of bend and radius of the pipe			
	(c)	radius of curvature of the bend and pipe			
	(d)	radius of curvature of the bend and pipe and angle of bend			
1-g.	•	The important type of axial flow reaction turbines are (CO4, K1)	1		
	(a)	Propeller and Pelton turbines			
	(b)	Kaplan and Francis turbines			
	(c)	Propeller and Francis turbines			
	(d)	Propeller and Kaplan turbines			
1 - h.	N	Momentum is a quantity (CO4, K1)			
	(a)	Scalar			
	(b)	Vector			
	(c)	Infinite			
	(d)	Zero			
1-i.	T	he velocities of the blade angles can be found out using(CO5, K1)	1		
	(a)	Mach number			
	(b)	Froude's number			
	(c)	Velocity triangles			
	(d)	Reynolds number			
1-j.	V	When the balancing of the turbine is disturbed, we use(CO5, K1)	1		
	(a)	Throttle governing			
	(b)	Steam governing			
	(c)	Nozzle governing			
	(d)	Emergency governing			
2. Atte	empt a	all parts:-			
2.a.	D	efine specific volume. (CO1, K1)	2		
2.b.	W	That are the various minor losses? (CO2, K2)	2		
2.c.	G	ive the expression to calculate the metacentric height analytically. (CO3, K2)	2		
2.d.	W	That is breaking jet in Pelton wheel turbine? (CO4, K1)	2		
2.e.	W	Thy the foot valve is fitted with strainer? (CO5, K2)	2		

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SECTION-B

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3. Answer any five of the following:-

3-a.	The surface tension of water in contact with air at 20°C is 0.0725 N/m. The pressure inside a droplet of water is to be 0.02 N/cm greater than the outside pressure. Calculate the diameter of the droplet of water. (CO1, K3)	6
3-b.	Define the following fluid properties : Density, weight density, specific volume and specific gravity of a fluid. (CO1, K2)	6
3-с.	A pipe, through which water is flowing, is having diameters, 20 cm and 10 cm at the cross-sections 1 and 2 respectively. The velocity of water at section 1 is given 4.0 m/s. Find the velocity head at sections 1 and 2 and also rate of discharge. (CO2, K3)	
3-d.	Differentiate between a large and a small orifice. Obtain an expression for discharge through a large rectangular orifice. (CO2, K2)	6
3.e.	Briefly explain resistance to flow ? Discuss major losses and minor losses in detail. (CO3, K2)	6
3.f.	What are the methods of dimensional analysis? Describe the Rayleigh's method for dimensional analysis. (CO4, K2)	6
3.g.	What is the difference between single stage and multistage centrifugal pump? Describe multistage pump with (a) impellers in parallel (b) impellers in series (CO5 K2)	
SECT	ION-C	50
4. Ans	wer any <u>one</u> of the following:-	
4-a.	Define pressure. Obtain an expression for the pressure intensity at a point in a fluid. (CO1, K3)	10
4-b.	Define the following : (i) Steady flow, (ii) Laminar flow, and (iii) Non-uniform flow, (iv) Two-dimensional flow. (CO1, K2)	
5. Ans	wer any <u>one</u> of the following:-	
5-a.	250 litres/s of water is flowing in a pipe having a diameter of 300 mm. If the pipe is bent by 135° (that is change from initial to final direction is 135°) find the magnitude and direction of the resultant force on the bend. The pressure of water flowing is 39.24 N/cm. (CO2, K3)	10
5-b.	Explain the principle of venturimeter with a neat sketch. Derive the expression for the rate of flow of fluid through it. (CO2, K3)	10
6. Ans	wer any <u>one</u> of the following:-	
6-a.	How will you determine the loss of head due to friction in pipes by using (i) Darcy Formula and (ii) Chezy's formula? (CO3, K2)	10
6-b.	What do you mean by "equivalent pipe" and "flow through parallel pipes"? (CO3, K2)	10
7. Ans	wer any <u>one</u> of the following:-	
7-a.	What are unit quantities? Define the unit quantities for a turbine. Why are they	10

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	important? (CO4, K2)		
7-b.	Define and explain hydraulic efficiency, mechanical efficiency and overall efficiency of a turbine. (CO4, K2)	10	
8. Answer any <u>one</u> of the following:-			
8-a.	What is a reciprocating pump? Describe the principle and working of a reciprocating pump with a neat sketch. Why is a reciprocating pump not coupled directly to the motor? Discuss the reason in detail. (CO5, K2)	10	
8-b.	Find an expression for the head lost due to friction in suction and delivery pipes. (CO5, K3)	10	

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