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 (2023 - 2024)
Subject: Fluid Mechanics & Fluid Machines

Time: 3 Hours **Max. Marks: 100**

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 20

1. Attempt all parts:-

1-a. Specific gravity is what kind of property? (CO1) 1

(a) Intensive
(b) Extensive
(c) None of the mentioned
(d) It depends on external conditions

1-b. The specific volume of a liquid is the reciprocal of (CO1) 1

(a) weight density
(b) mass density
(c) specific weight
(d) specific volume

1-c. The characteristic of Ideal fluid are (CO2) 1

(a) compressible
(b) viscid
(c) Inviscid, Incompressible
(d) Shear stress has a constant, non zero value

1-d. What is a special characteristic of uniform flow parallel to X axis? (CO2) 1

(a) Velocity is constant
(b) Acceleration is constant
(c) X- component of velocity is constant

(d) None of the mentioned

1-e. The total head loss for the system is equal to (CO3) 1

(a) Pipe length
(b) Pipe diameter
(c) Width of the reservoir
(d) Height difference of reservoirs

1-f. The liquid flowing through a series of pipes can take up.. (CO3) 1

(a) Pipes of different diameters
(b) Pipes of the same diameters only.
(c) Single pipe only
(d) Short pipes only

1-g. Francis and Kaplan turbines are known as (CO4) 1

(a) Impulse turbine
(b) Reaction turbine
(c) Axial flow turbine
(d) Mixed flow turbine

1-h. Pen stocks are made up of..... (CO4) 1

(a) Steel
(b) Cast iron
(c) Mild steel
(d) Wrought iron

1-i. Which among the following velocities cannot be found using the velocity triangle? (CO5) 1

(a) Tangential
(b) Whirl
(c) Relative
(d) Parabolic

1-j. Internal cavitation in pump occurs due to (CO5) 1

(a) Drag force
(b) Cyclic stress
(c) Shock waves
(d) Flow speed

2. Attempt all parts:-

2.a. State Newton’s law of viscosity. (CO1) 2

2.b. What is loss of head due to friction? (CO2) 2

2.c. What is the value for volume of water displaced? (CO3) 2

2.d. What are the classifications of turbine? (CO4) 2

2.e.	What is the need for priming in reciprocating pump? (CO5)	2

SECTION-B 30

3. Answer any five of the following:-

3-a.	Determine the viscosity of fluid having kinematic viscosity is 6 stokes and specific gravity is 0.9. (CO1)	6
3-b.	What is Surface Tension? Give the mathematical expression of surface tension for a soap bubble and water droplet? (CO1)	6
3-c.	What is velocity potential? Also derive the Laplace equation for velocity potential. (CO2)	6
3-d.	Define an orifice and a mouthpiece. What is the difference between the two? (CO2)	6
3.e.	What is turbulent flow? Write down the various types of turbulence. (CO3)	6
3.f.	Draw main characteristic curves and operating characteristic curves for hydraulic turbines. (CO4)	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)	6

SECTION-C 50

4. Answer any one of the following:-

4-a.	Explain the following : Newtonian and Non-Newtonian fluids, vapour pressure, and compressibility. (CO1)	10
4-b.	Define pressure. Obtain an expression for the pressure intensity at a point in a fluid. (CO1)	10

5. Answer any one of the following:-

5-a.	Define the term "dimensionless numbers". Discuss some important dimensionless numbers and their significance with applications. (CO2)	10
5-b.	A 30 cm x 75 cm venturimeter is inserted in a vertical pipe carrying water, flowing in the upward direction. A differential mercury manometer connected to the inlet and throat gives a reading of 20 cm. Find the discharge. Take C_d - 0.98. (CO2)	10

6. Answer any one of the following:-

6-a.	Derive the expression for head loss in pipe flow due to friction. (CO3)	10
6-b.	State Buckingham's π-theorem. The efficiency η of a fan depends on density p, dynamic viscosity p of the fluid, angular velocity coy diameter D of the rotor and the discharge Q. Express η in terms of dimensionless parameters. (CO3)	10

7. Answer any one of the following:-

7-a.	Show that in case of jet striking the series of flat plates mounted on wheel periphery, the efficiency will be maximum when tangential velocity of wheel is half of the jet. (CO4)	10
7-b.	Find the force exerted by a jet of water of diameter 100 mm on a stationary flat	10

plate, when the jet strikes the plate normally with a velocity of 30 m/s. (CO4)

8. Answer any <u>one</u> of the following:-

8-a.	What is air vessel? Also describe the function of air vessel? Explain the term negative slip as used in reciprocating pump. why and when negative slip occurs. (CO5)	10
8-b.	Find an expression for the head lost due to friction in suction and delivery pipes. (CO5)	10