Code No. : 14566 AS N/O

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS), HYDERABAD
Accredited by NAAC with A++ Grade
B.E. (Mech. Engg.) IV-Semester Advanced Suppl. Examinations, Aug./Sept-2023
Fluid Mechanics and Hydraulic Machines

Time: **3 hours**

Max. Marks: **60**

*Note: Answer all questions from **Part-A** and any **FIVE** from **Part-B***

Part-A (10× 2 = 20 Marks)

Q. No.	Stem of the question	M	L	CO	PO
1.	State Newton's Law of Viscosity.	2	1	1	1
2.	Explain the terms: Compressibility and Bulk Modulus.	2	2	1	1
3.	What do you mean by Streak line?	2	1	2	1
4.	State the momentum equation.	2	1	2	1
5.	Distinguish between Laminar and Turbulent flows.	2	1	3	1
6.	What are the Major and Minor losses in the flow through pipes?	2	2	3	1
7.	What is Impact of Jet?	2	2	4	1
8.	What are the functions of Draft Tube?	2	2	4	1
9.	What do you mean by minimum starting speed of a Centrifugal Pump?	2	2	5	1
10.	Define 'Slip' and 'Percentage Slip' of a Reciprocating Pump.	2	1	5	1

Part-B (5×8 = 40 Marks)

11. a)	Explain about Atmospheric pressure, Gauge Pressure, Vacuum Pressure and Absolute Pressure.	4	1	1	1
b)	Determine the specific gravity of a fluid having viscosity of 0.05 Poise and kinematic viscosity of 0.035 stokes.	4	3	1	2
12. a)	Briefly discuss Eulerian and Lagrangian approach for description of fluid flow.	4	2	2	1
b)	The velocity potential function for a two dimensional flow is given by x(2y+1). Find velocity at point P(4,5) and also calculate stream function at this point.	4	3	2	2
13. a)	Describe Reynold's experiment.	4	1	3	1
b)	A pipe of diameter 20 cm and length 2000 m connects two reservoirs, having difference of water levels as 20 m. Determine the discharge through the pipe. If an additional pipe of diameter 20 cm and length 1200 m is attached to the last 1200 m length of the existing pipe, find the increase in the discharge. Take f= 0.015 and neglect minor losses.	4	3	3	2

		M	L	CO	PO
14. a)	Draw the velocity diagram for the case of jet impinging on a moving curved vane and explain all the terms in it.	4	3	4	1
b)	A Pelton wheel is to be designed for the following specifications: Shaft power = 11.772 kW, Head = 380 m, Speed = 750 rpm, Overall efficiency = 86%, Jet diameter is not to exceed one-sixth of the wheel diameter. Determine: i. The wheel diameter ii. The number of jets required iii. Diameter of the jet.	4	4	4	2
15. a)	Explain the working principle of a Reciprocating Pump with a line diagram.	4	2	5	1
b)	The internal and external diameters of impeller of a centrifugal pump are 200 mm and 400 mm respectively. The pump is running at 1200 rpm. The vane angles of the impeller at inlet and outlet are 20^0 and 30^0 respectively. The water enters the impeller radially and velocity of flow is constant. Determine the work done by the impeller per unit weight of water.	4	3	5	2
16. a)	Calculate the capillary effect in millimeters in a glass tube of 4 mm diameter, when immersed in mercury at 20^0C. The surface tension of mercury at 20^0C in contact with air is 0.5610 N/m. The angle of contact for mercury is 130^0.	4	3	1	2
b)	A horizontal venturimeter with inlet diameter 200 mm and throat diameter 100 mm is employed to measure the flow of water. The reading of the differential manometer connected to the inlet is 180 mm of mercury. If the co-efficient of discharge is 0.98, determine the rate of flow.	4	3	2	2
17.	Answer any *two* of the following:				
a)	Explain about the formation of Boundary layer over a flat plate.	4	2	3	1
b)	Explain about the layout of a hydraulic power plant with a line diagram.	4	2	4	1
c)	Classify Centrifugal Pumps.	4	1	5	1

M : Marks;   L: Bloom's Taxonomy Level;   CO; Course Outcome;   PO: Programme Outcome

i)	Blooms Taxonomy Level – 1	20%
ii)	Blooms Taxonomy Level – 2	40%
iii)	Blooms Taxonomy Level – 3 & 4	40%

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