Code No. : 14548 AS

VASAVI COLLEGE OF ENGINEERING *(AUTONOMOUS)*, HYDERABAD
Accredited by NAAC with A++ Grade

B.E. (Mech. Engg.) IV-Semester Advanced Supplementary Examinations, September-2022.
Mechanics of Fluids 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.	What is the difference between kinematic viscosity and dynamic viscosity? State their units of measurements.	2	1	1	1
2.	Write the relation between absolute pressure and gauge pressure.	2	1	1	1
3.	Distinguish between steady flow and unsteady flow.	2	1	2	1
4.	Define continuity equation and what is the principle behind it?	2	2	2	1
5.	State the different observations in Reynolds's experiment for various states of flow.	2	3	3	1
6.	List the types of minor losses in flow through pipes.	2	1	3	1
7.	What is a draft tube? What are its functions?	2	2	4	1
8.	Define cavitation. What are the effects of cavitation?	2	2	4	1
9.	What is priming and write its importance.	2	1	5	1
10.	Define slip and negative slip of a reciprocating pump.	2	2	5	1

Part-B (5 × 8 = 40 Marks)

		M	L	CO	PO
11. a)	Define the terms: i) Surface Tension, ii) Capillarity, iii) compressibility, and iv) specific gravity.	4	1	1	1
b)	A U-tube manometer is used to measure the pressure of oil of specific gravity 0.85 flowing in a pipe line. Its left end is connected to the pipe and the right-limb is open to the atmosphere. The centre of the pipe is 100mm below the level of mercury (specific gravity = 13.6) in the right limb. If the difference of mercury level in the two limbs is 160mm, determine the absolute pressure of the oil in the pipe.	4	4	1	2
12. a)	If stream function, $\psi = (x^3 - 3xy^2)$, indicate whether the flow is rotational or irrotational. If flow is irrotational, determine the potential function.	4	4	2	1,2
b)	Derive from basic principle the Euler's equation of motion along a stream line and deduce the equation to Bernoulli's equation for steady irrotational flow.	4	3	2	1,2

			M	L	CO	PO
13.	a)	The velocity distribution in a pipe is given by the relation: $u = 2.5\left(1 - \dfrac{r^2}{R^2}\right)$ m/s, where u is the velocity at any radius r <R, R is the radius of pipe. If diameter of pipe is 250 mm, calculate average velocity and discharge.	4	4	3	1,2
	b)	Define displacement thickness, momentum thickness and energy thickness in a boundary layer and write their expressions.	4	2	3	1,2
14.	a)	A single jet Pelton wheel runs at 300 rpm under a net head of 510 m. The jet diameter is 200 mm, its deflection inside the bucket is 165° and its relative velocity is reduced by 15% due to friction. Determine (a) Water power　(b) Resultant force on the bucket (c) hydraulic efficiency	4	4	4	1,2
	b)	Differentiate between impulse and reaction turbines.	4	2	4	1
15.	a)	Explain the following with formula i) Manometric efficiency ii) Mechanical efficiency iii) Overall efficiency of centrifugal pump.	4	1	5	1,2
	b)	A single acting reciprocating pump runs at 30 r.p.m., delivers 0.012 m³/s of water. The diameter of the piston is 25 cm and stroke length 50 cm. Determine (i) the theoretical discharge of the pump, (ii) co-efficient of discharge, and (iii) percentage slip of the pump.	4	4	5	1,2
16.	a)	State and prove the Pascal's Law and write any two applications?	4	2	1	1,2
	b)	Define path line, streak line and stream line? For what type of flow these lines are identical?	4	2	2	1
17.		Answer any *two* of the following:				
	a)	Explain boundary layer separation over a curved surface with a neat sketch.	4	3	3	1
	b)	Note on Performance characteristics of turbines.	4	2	4	1
	c)	List the main components of a Centrifugal Pump and explain the working of it with a neat sketch.	4	2	5	1

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

i)	Blooms Taxonomy Level – 1	22.5%
ii)	Blooms Taxonomy Level – 2	40%
iii)	Blooms Taxonomy Level – 3 & 4	37.5%

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