Hall Ticket Number:

Code No. : 15532 S O

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS), HYDERABAD
Accredited by NAAC with A++ Grade
B.E. (Mech. Engg.) V-Semester Supplementary Examinations, June-2022
Hydraulic Machinery

Time: **3 hours**   Max. Marks: **70**

*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.	Write the expression for work done when jet strikes the stationary flat plate held perpendicular to jet.	2	3	1	1
2.	Define impulse momentum principle.	2	1	1	2
3.	Define unit quantities of a turbine and why they are important?	2	1	2	3
4.	Differentiate between Impulse and Reaction turbine.	2	3	2	4
5.	What is priming? Why it is required in centrifugal pump?	2	3	3	1
6.	Define specific speed in centrifugal pumps.	2	1	3	2
7.	Draw indicator diagram considering acceleration head in reciprocating pump.	2	2	4	3
8.	List the functions of Air vessels in reciprocating pump.	2	2	4	1
9.	Differentiate between hydraulic fluid power and pneumatic fluid power.	2	4	5	1
10.	Write applications of Pascals law.	2	3	5	2

Part-B (5 × 10 = 50 Marks)

		M	L	CO	PO
11. a)	Obtain an expression for the force exerted by a jet of water on a stationary inclined flat plate in the direction of the jet with neat sketch .	5	2	1	6
b)	A jet of water 75mm in diameter issues with a velocity of 30m/s and strikes on stationary flat plate. Find the force exerted by the jet on the plate and work done.	5	4	1	1
12. a)	Explain the working principle of Pelton turbine with the help of neat sketch.	5	1	2	2
b)	Explain the following terms in hydraulic turbine (a) Water power (b) Hydraulic efficiency (b) Mechanical efficiency (d) Overall efficiency	5	2	2	3
13. a)	Explain working principle of centrifugal pump with the help of neat sketch.	5	1	3	2

			M	L	CO	PO
	b)	To predict the performance of a large centrifugal pump a scale model of one fifth size was made with the following data P = 30 kW, H = 30 m and N = 1000 r.p.m. If the prototype pump has to work against a head of 25 m. Make calculations for its working speed, the power required to drive it and the ratio of flow rates handled by the two pumps.	5	4	3	1
14.	a)	Calculate the Percentage of work saved against friction by fitting air vessel in single acting reciprocating pump.	5	2	4	3
	b)	The piston diameter and stroke length of a single acting single cylinder reciprocating pump are 150 mm and 300 mm respectively. The centre of the pump is 4.5 m above the water level in the sump and 32 m below the delivery water level. Both suction and delivery pipes have the same diameter of 75 mm. The length of suction and delivery pipes are 6 m and 36 m long respectively. If the pump is working at 30 r.p.m. Determine (a) Pressure heads on the piston at the beginning, middle and end of both suction and delivery stroke. (b) Power required to drive the pump (c) Maximum head at any instant against which the pump has to work. Take f = 0.01	5	3	4	4
15.	a)	List the various components of hydraulic circuit and explain the function of each component with a neat diagram	5	4	5	1
	b)	Explain with the help of neat sketch the working principle of gear pump.	5	2	5	2
16.	a)	A jet of velocity of 5 m/s strikes a flat plate inclined at 30° with the axis of jet. If the cross sectional area of the jet is 5 cm², find the force exerted by the jet on the plate. Also, calculate the components of the force in the direction normal to the jet. Find also the ratio in which the discharge gets divided after striking the plate.	5	4	1	3
	b)	The mean bucket speed of a Pelton turbine is 15 m/s. The rate of flow of water supplied by the jet under a head of 42 m is 1 m³/s. If the jet is deflected by the buckets at an angle of 165°, find the power and efficiency of the turbine. (Take coefficient of velocity C_v = 0.985).	5	3	2	4
17.		Answer any *two* of the following:				
	a)	Derive the expression for minimum starting speed in centrifugal pumps.	5	3	3	3
	b)	Explain working principle of reciprocating pump with the help of neat sketch.	5	2	4	2
	c)	Write a short note on different properties of hydraulic fluids	5	2	5	1

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

i)	Blooms Taxonomy Level – 1	22
ii)	Blooms Taxonomy Level – 2	30
iii)	Blooms Taxonomy Level – 3 & 4	48

*****