P P SAVANI UNIVERSITY

Fifth Semester of B. Tech. Examination
December 2022
SEME3021 Fluid Machines

25.11.2022, Friday

Time: 10:00 a.m. To 12:30 p.m.

Maximum Marks: 60

Instructions:
1. The question paper comprises of two sections.
2. Section I and II must be attempted in separate answer sheets.
3. Make suitable assumptions and draw neat figures wherever required.
4. Use of scientific calculator is allowed.

SECTION – I

			CO	BTL
Q - 1	MCQ/Short Question/Fill in the Blanks (Any Five)	[05]		
(i)	Write any two differences between impulse and reaction turbine.		1	2
(ii)	Define mechanical efficiency of hydraulic turbine.		1	2
(iii)	Define volumetric efficiency of turbine.		1	2
(iv)	Define speed ratio.		1	2
(v)	Define flow ratio.		1	2
(vi)	Write any two uses of draft tube.		1	2
(vii)	What is specific speed?		1	2
			1	2
Q - 2 (a)	Derive the equation for force exerted by a jet on stationary inclined flat plate.	[05]	2	2
Q - 2 (b)	Find the force exerted by a jet of water of diameter 75 mm on a stationary flat plate, when the jet strikes the plate normally with velocity 20 m/s.	[05]	2	2

OR

Q - 2 (a)	The internal and external diameters of an inward flow reaction turbine are 2 m and 2.75 m respectively. The turbine is running at 250 r.p.m. and rate of flow of water through the turbine is 5 m³/ s. The width of the runner is constant at inlet and outlet and is equal to 250 mm. The head on the turbine is 150 m. Neglecting thickness of the vanes and taking radial at outlet determine: i. vane angles at inlet and outlet ii. velocity of flow at inlet and outlet	[08]	2	2
Q - 2 (b)	Define Francis turbine. Write down the components of Francis turbine.	[02]	1	2
Q - 3 (a)	Derive the expression for drag and lift.	[05]		
Q - 3 (b)	A flat plate 1.5 m x 1.5 m moves 50 km/ hour in stationary air of density 1.15 kg/m³. If the co-efficient of drag and lift are 0.15 and 0.75 respectively, determine: i. the lift force ii. the drag force iii. the resultant force iv. the power required to keep the plate in motion.	[05]		

OR

Q - 3 (a)	Define and explain stream-line body and bluff body.	[05]
Q - 3 (b)	Explain the terms: i. friction drag ii. pressure drag	[05]
Q - 4	Attempt any one.	[05]

(i)	Differentiate between fan and blowers.		3	2
(ii)	Name and explain various types of fan and blowers.		3	2

SECTION – II

Q - 1	MCQ/Short Question/Fill in the Blanks (Any Five)	[05]		
(i)	What is priming?		4	6
(ii)	Draw velocity diagram of centrifugal pump.		4	6
(iii)	Define pump.		4	6
(iv)	Express the equation for jet striking a vertical fixed blade.		5	2
(v)	What is hydraulic intensifier?		6	2
(vi)	What is hydraulic accumulator?		6	2
(vii)	State two disadvantages of single acting reciprocating pump.		4	6
Q - 2 (a)	Derive the expression for the jet of water striking tangentially on a non-symmetrical curved vane moving with velocity u.	[05]	5	2
Q - 2 (b)	Derive the expression for the jet of water striking on inclined fixed blade.	[05]	5	2
	OR			
Q - 2 (a)	Write down the operation of double acting reciprocating pump.	[05]	4	2
Q - 2 (b)	What are the effects of air vessel? Explain working principle of air vessel with neat diagram.	[05]	4	2
Q - 3 (a)	Name and explain various pump losses.	[05]	4	2
Q - 3 (b)	Draw characteristic curve of centrifugal pump.	[05]	4	2
	OR			
Q - 3 (a)	What are the differences between hydraulic turbine and pump?	[05]	3	2
Q - 3 (b)	How hydraulic intensifier works?	[05]	6	2
Q - 4	Attempt any one.	[05]		
(i)	Why priming is needed?.		4	6
(ii)	Explain in brief about cavitation.		4	6

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CO   : Course Outcome Number   BTL   : Blooms Taxonomy Level

Level of Bloom's Revised Taxonomy in Assessment

1: Remember	2: Understand	3: Apply
4: Analyze	5: Evaluate	6: Create