Total No. of Questions – [3]

Total No. of Printed Pages: [2]

G.R. No.	

PAPER CODE	V223-263 (BOB)

May 2023 (ENDSEM) EXAM

S.Y. (Mechanical) (AY 2022-23 SEMESTER - II)

COURSE NAME: FLUID MECHANICS AND MACHINES

COURSE CODE: MEUA22203

(PATTERN 2020)

Time: [1Hr]

[Max. Marks: 30]

(*) Instructions to candidates:

1) **Use of scientific calculator is allowed**
2) **Use suitable data where ever required**
3) **All questions are compulsory**

Question No.	Question Description	Max. Marks	CO mapped	BT Level
Q.1	a) Sketch Velocity and shear stress distribution for laminar flow through pipe. Also write mathematical equation for them.	[4]	[4]	[3]
	b) A plate of length 0.5 m and width 0.25 m is placed longitudinally in a fluid of specific gravity 0.9 and of kinematic viscosity one stoke. If the fluid is moving with a velocity of 5 m/s, then determine (i) friction drag on the plate, (ii) thickness of boundary layer and (iii) shear stress at the trailing edge of the plate. Use Blasius solution	[6]	[4]	[3]
	OR			
	c) Two parallel plates are 5 mm apart and a steady laminar flow of oil is occurring between them. If the pressure drop is 10 kPa per meter length of the plates and viscosity of oil is 0 06 Ns/m^2 , then calculate (i) the discharge per meter width, (ii) maximum shear stress and (iii) maximum velocity of flow	[6]	[4]	[3]
Q.2	a) Compare Francis and Kaplan turbine based on 1) Head 2) Type of flow, 3) Specific speed 4) Discharge	[4]	[5]	[2]

	b) A Pelton wheel working under a head of 70 m. It develops 100 kW shaft power when it runs at 220 rpm. Assume the speed ratio as 0.45, coefficient of velocity as 0.98 and overall efficiency as 85%. Determine i) Wheel diameter ii) Jet diameter iii) Jet ratio.	[6]	[5]	[4]
	OR			
	c) The hub diameter of a Kaplan turbine working under a head of 15 m is 0.3 times the diameter of the runner. The turbine is running at 90 rpm and the velocity of whirl at outlet is zero. If the vane angle of the extreme edge of the runner at outlet is 15° and the flow ratio is 0.6, then determine (i) the diameter of runner, (ii) the diameter of boss and (iii) discharge through the runner.	[6]	[5]	[4]
Q.3	a) Discuss the cavitation phenomenon and effects of cavitation on the performance of pumps.	[4]	[6]	[2]
	b) The external and internal diameters of the impeller of a centrifugal pump are 0.4 m and 0.2 m, respectively. The centrifugal pump runs at 1200 rpm and its vanes at the exit are set back at an angle of 25°. If a constant radial flow through the impeller is maintained at 2.5 m/s, then determine (i) the inlet vane angle, (ii) angle made by absolute velocity at the outlet and (iii) work done by the impeller per unit weight of water.	[6]	[6]	[4]
	OR			
	c) A three stage centrifugal pump delivers water at the rate of 0.06 m^3/s. Each impeller is 0.42 m in diameter and 0.024 m wide at the outlet. The speed of the impellers is 950 rpm. The vanes are curved back at the outlet at an angle of 45° and reduce the circumferential area by 10%. The overall efficiency is 78% and the manometric efficiency is 88%. Determine the head generated and the power consumed	[6]	[6]	[4]

Note: [BT level – 1: Remember 2: Understand 3: Apply 4: Analyze 5: Evaluate 6: Create]