Question Paper Code: R18A22ME04

R18

ANURAG Engineering College

(An Autonomous Institution)

II B.Tech II Semester Supplementary Examinations, Jan/Feb-2024

MECHANICS OF FLUIDS AND HYDRAULIC MACHINES

(MECHANICAL ENGINEERING)

Time: 3 Hours **Max. Marks: 75**

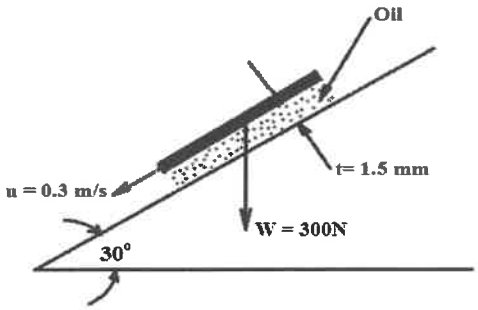
Section – A (Short Answer type questions) (25 Marks)

Answer All Questions	Course Outcome	B.T Level	Marks
1. Explain surface tension and capillary effect.	CO1	L2	2M
2. What is the principle of manometer and write the various types of manometers?	CO1	L1	3M
3. Define streamlines, stream tube, path lines and streak lines.	CO2	L1	2M
4. Write the differences between laminar and turbulent flows.	CO2	L1	3M
5. Write the expression for Reynolds number and explain the factors affecting the Reynolds number.	CO3	L2	2M
6. Explain boundary layer separation?	CO3	L2	3M
7. Draw and explain the inlet and outlet velocity triangles for an Impulse turbine.	CO4	L2	2M
8. Explain Draft tube theory.	CO4	L2	3M
9. Explain water hammer effect.	CO5	L2	2M
10. Explain the functions of air vessels in a reciprocating pump.	CO5	L2	3M

Section B (Essay Questions)

Answer all questions, each question carries equal marks. **(5 X 10M = 50M)**

11. A)	Calculate the dynamic viscosity of an oil, which is used for lubrication between a square plate of size 0.8 m *0.8 m and an inclined plane with angle of inclination 30° as shown in the figure. The weight of the square plate is 300 N and it slides down the inclined plane with a uniform velocity of 0.3 m/s. The thickness of oil film is 1.5 mm.	CO1	L3	10M



OR

B)	Explain differential U tube and inverted U tube differential manometer with neat sketches.	CO1	L3	10M
12. A)	A horizontal pipe has diameters 200 mm and 100 mm at sections 1-1 and 2-2 which are 12 m apart, the flow of water being from section 1-1 to 2-2. The pressure intensity at section 1-1 is 400 kPa and the velocity at this section is 4.75 m/s. find the pressure head at section 2-2.	CO2	L3	10M

OR

B)	Derive Bernoulli's equation from Euler's equation and write the assumptions.	CO2	L3	10M

13. A)	A horizontal venturi meter with inlet and throat diameters 30 cm and 15 cm respectively is used to measure the flow of water. The reading of differential manometer connected to the inlet and the throat is 20 cm of mercury. Determine the rate of flow. Take C_d = 0.98.	CO3		10M
	OR			
B)	Define drag force and lift force of an object immersed in a fluid. Also, distinguish between the friction drag and the pressure drag with the aid of neat sketches.	CO3	L2	10M
14. A)	A jet of water of diameter 75 mm moving with a velocity of 25 m/s strikes a fixed plate in such a way that the angle between the jet and plate is 60°. Find the force exerted by the jet on the plate i) In the direction normal to the plate and ii) In the direction of the jet.	CO4	L3	10M
	OR			
B)	Explain working of Pelton wheel turbine and compare Impulse and Reaction turbines.	CO4	L2	10M
15. A)	With a neat diagram, explain the working of a Centrifugal pump and define suction head, delivery head and manometric head.	CO5	L2	10M
	OR			
B)	A single acting reciprocating pump running at 50 r.p.m., delivers 0.00736 m^3/s of water. The diameter of the piston is 200 mm and stroke length is 300 mm. The suction and delivery heads are 3.5 m and 11.5 m respectively. Determine: i) The theoretical discharge of the pump, ii) Co-efficient of discharge and iii) Slip and percentage slip of the pump.	CO5	L3	10M