

ANURAG Engineering College

(An Autonomous Institution)

II B.Tech II Semester Supplementary Examinations, December – 2024

HYDRAULICS AND HYDRAULICS MACHINERY

(CIVIL ENGINEERING)

Time: 3 Hours

Max. Marks: 60

Section – A (Short Answer type questions)

(10 Marks)

Answer All Questions

		Course Outcome	B.T Level	Marks
1.	Explain the significance of channels of most efficient section?	CO1	L2	1M
2.	What do you mean by Equivalent roughness	CO1	L1	1M
3.	What do you mean by sequent depth?	CO2	L1	1M
4.	Explain under what conditions a hydraulic jump can occur.	CO2	L2	1M
5.	What is a dimensionally homogeneous equation?	CO3	L1	1M
6.	Define flow ratio and speed ratio?	CO3	L1	1M
7.	Explain the function of relief valve in a turbine	CO4	L2	1M
8.	Explain an axial flow turbine	CO4	L2	1M
9.	What do you mean by priming of a pump?	CO5	L1	1M
10.	Explain Unit Speed of a Centrifugal Pump.	CO5	L2	1M

Section B (Essay Questions)

Answer all questions, each question carries equal marks.

(5 X 10M = 50M)

11. A) Show that hydraulically efficient trapezoidal channel is half regular hexagon.
- OR**
- B) Determine the most efficient section of a trapezoidal channel with side slopes 1V to 2 H carrying a discharge of 11.25 m³/s with a velocity of 0.75 m/s. What should be the bed slope of the channel? Take Manning's n = 0.025.
12. A) Obtain the differential equation for water surface slope. List all the assumptions.
- OR**
- B) A rectangular channel 6 m wide discharges 1440 lit./s of water into a 6 m wide apron, with no slope, with a mean velocity of 6 m/s. Determine the height of the jump? How much energy is absorbed in the jump?
13. A) Derive an expression for the force exerted by a jet of water on a fixed vertical plate in the direction of the jet.
- OR**
- B) The drag force F_D on a sphere in laminar flow is known to depend on its diameter D , velocity of flow V , density of fluid ρ and coefficient of viscosity μ . Obtain an expression for F_D using Buckingham π method.

14. A) Discuss the turbines according to the main direction of flow of water in the runner and give an example for each. CO4 L2 10M
- OR**
- B) The internal and external diameters of an outward flow reaction turbine are 2m and 2.75m respectively. The turbine is running at 250 r.p.m. and rate of flow of water through the turbine is $5 \text{ m}^3/\text{s}$. The width of runner is constant at inlet and outlet equal to 25cm. The head at the turbine is 150 m. neglect thickness of vanes and taking discharge radial at outlet, determine vane angles and flow velocity at inlet and outlet. CO4 L3 10M
15. A) Write a note on cavitation phenomena in a pump. CO5 L3 10M
- OR**
- B) A centrifugal pump running at 1500 r.p.m. discharges 120 liters/sec. against a head of 25m. If the diameter is 250mm and its width is 50 mm, determine the vane angle at the outer periphery. The manometric efficiency of the pump is 75%. CO5 L3 10M