

**ANURAG Engineering College**

(An Autonomous Institution)

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

**HYDRAULICS AND HYDRAULIC MACHINES****(CIVIL 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. What is dimensional homogeneity?	CO1	L1	2M
2. What are the limitations of Reyleigh's method of dimensional analysis?	CO1	L1	3M
3. Write two important functions of draft tube	CO2	L2	2M
4. On what factors does the number of jets depend in the case of Pelton wheel	CO2	L1	3M
5. What is priming in case of centrifugal pump?	CO3	L1	2M
6. Distinguish between suction head and delivery head	CO3	L2	3M
7. What is critical flow in open channel?	CO4	L1	2M
8. State the geometric properties of channel	CO4	L1	3M
9. Write any two applications of hydraulic jump	CO5	L2	2M
10. Differentiate positive charge and negative charge	CO5	L2	3M

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

11. A) Describe Buckingham's $\pi$ – theorem method of dimensional analysis	CO1	L3	10M
<b>OR</b>			
B) Define and derive different dimensionless numbers involved in Fluid mechanics	CO1	L3	10M
12. A) A jet of water of diameter 5 cm strikes a curved plate horizontally at one of its end with a velocity of 20 m/s. The curved plate is moving with a velocity of 8 m/s in the direction of the jet. The jet is deflected to an angle of $150^\circ$ . Assuming the plate is smooth, find the force exerted on the plate in the direction of the jet and also efficiency of the jet	CO2	L3	10M
<b>OR</b>			
B) A Kaplan turbine produces 60,000 kW under a net head of 25m with an overall efficiency of 90%. Taking the value of speed ratio as 1.6 and flow ration as 0.5 and hub diameter equal to 0.35 times the outer diameter, determine the diameter and speed of the turbine.	CO2	L3	10M
13. A) Explain with sketch the working of single stage centrifugal pump	CO3	L3	10M
<b>OR</b>			
B) A centrifugal pump delivers water against a net head of 14.5 metres and a design speed of 1000 r.p.m. The vanes are curved back up to an angle of $30^\circ$ with periphery. The impeller diameter is 300 mm and outlet width is 50mm. Determine the discharge of the pump if manometric efficiency is 95%.	CO3	L3	10M

14. A) Derive an expression for the discharge through open channel by Chezy's formula. CO4 L3 10M
- OR**
- B) A rectangular channel which is laid on a bottom slope of 0.0064 is to carry 20 m<sup>3</sup>/s of water. Determine the width of the channel when the flow is in critical condition. Take Manning's  $n = 0.015$  CO4 L3 10M
15. A) Derive the expression for head loss due to hydraulic jump in a rectangular channel of horizontal slope CO5 L3 10M
- OR**
- B) A sluice gate discharges water into a horizontal rectangular channel with velocity of and depth of flow 1m/s and depth of flow of 1m. Determine the depth of flow after the jump and consequent loss in total head CO5 L3 10M