

**ANURAG Engineering College**

(An Autonomous Institution)

II B.Tech II Semester Regular Examinations, June/July – 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. Define steady flow.	CO1	L1	1M
2. State specific energy.	CO1	L1	1M
3. Classify channel bottom sloped.	CO2	L2	1M
4. Illustrate the equation for energy loss in a hydraulic jump.	CO2	L2	1M
5. Define dimensional homogeneity	CO3	L1	1M
6. Which principle is used to evaluate impact of jet on body?	CO3	L1	1M
7. State mechanical efficiency of the turbine	CO4	L2	1M
8. Explain cavitation phenomenon in turbine	CO4	L2	1M
9. What is priming?	CO5	L2	1M
10. List out the components of reciprocating pump.	CO5	L1	1M

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

11. A) What is most efficient channel section? Write the condition of rectangular and trapezoidal economical channel section.	CO1	L2	10M
<b>OR</b>			
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.	CO1	L3	10M
12. A) Explain the types of hydraulic jump with neat sketch	CO2	L2	10M
<b>OR</b>			
B) A rectangular flume 2 m wide carries discharge at the rate of 2 m <sup>3</sup> /s. The bed slope of the flume is 0.0004. At a certain section the depth of flume is 1 m. Calculate the distance of the section downstream where the depth of flow is 0.9 m. Solve by single step method. Assume Rugosity coefficient as 0.014. Is the slope of the channel mild or steep? How is this type of surface profile classified?	CO2	L3	10M
13. A) Explain step by step procedure of Buckingham $\pi$ method in details.	CO3	L2	10M
<b>OR</b>			
B) A jet of water having velocity of 45 m/s impinges without shock a series of vanes moving at 15 m/s, the direction of motion of the vanes being inclined at 20° to that of the jet. The relative velocity at outlet is 0.9 of that at inlet, and the absolute velocity of the water at exit is to be normal to motion of the vanes. Find: i) vane angle at entrance and exit; ii) work done on vanes per unit weight of water supplied by the jet. iii) the hydraulic efficiency.	CO3	L3	10M

14. A) Illustrate the head and efficiencies of hydraulic turbines CO4      L2      10M
- OR**
- B) A Pelton wheel has a mean bucket speed of 12 m/s and is supplied with water at a rate of 750 litres per second under a head of 35 m. If the bucket deflects the jet through an angle of  $160^\circ$ , find the power developed by the turbine and its hydraulic efficiency. Take the coefficient of velocity as 0.98. Neglect friction in the bucket. Also determine the overall efficiency of the turbine if its mechanical efficiency is 80%. CO4      L3      10M
15. A) Explain briefly components of Reciprocating pump. CO5      L2      10M
- OR**
- B) A centrifugal pump has an impeller 0.5 m outer diameter and when running at 600 r.p.m. discharges water at the rate of 8000 litres/minute against a head of 8.5 m. The water enters the impeller without whirl and shock. The inner diameter is 0.25 m and the vanes are set back at outlet at an angle of  $45^\circ$  and the area of flow which is constant from inlet to outlet of the impeller is  $0.06 \text{ m}^2$ . Determine
- i) the manometric efficiency of the pump,
  - ii) the vane angle at inlet, and
  - iii) the least speed at which the pump commences to work. CO5      L3      10M