



MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT

(AN AUTONOMOUS INSTITUTION)

(Approved by AICTE, New Delhi & Affiliated to JNTUH, Hyderabad)

Accredited by NBA and NAAC with 'A' Grade & Recognized Under Section 2(f) & 12(B) of the UGC act, 1956

II B.Tech II Sem Supply End Examination, July 2022

Hydraulics and Hydraulic Machinery

(CIVIL)

Time: 3 Hours.

Max. Marks: 70

Note: 1. Question paper consists: Part-A and Part-B.

2. In Part - A, answer all questions which carries 20 marks.

3. In Part - B, answer any one question from each unit.

Each question carries 10 marks and may have a, b as sub questions.

PART- A

(10*2 Marks = 20 Marks)

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|-------|---|----|-----|-----|
| 1. a) | Define steady and unsteady flow. | 2M | CO1 | BL1 |
| b) | Define critical flow. | 2M | CO1 | BL2 |
| c) | Define the sequent depth. | 2M | CO2 | BL1 |
| d) | List out the different types of water surface profiles. | 2M | CO2 | BL3 |
| e) | Define Reynolds number and Froude's number. | 2M | CO3 | BL2 |
| f) | Define fundamental quantity and derived quantity. | 2M | CO3 | BL1 |
| g) | Classify different types of turbines. | 2M | CO4 | BL3 |
| h) | Define hydraulic efficiency of a turbine. | 2M | CO4 | BL1 |
| i) | Differentiate between turbine and pump. | 2M | CO5 | BL3 |
| j) | Explain priming of a pump. | 2M | CO5 | BL3 |

PART- B

(10*5 Marks = 50 Marks)

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|---|--|-----|-----|-----|
| 2 | A trapezoidal channel having the side slope equal to 60° with the horizontal and laid on a slope of 1 in 750; carries a discharge of $10\text{m}^3/\text{sec}$. Find the width at the base and depth of flow for most economical section. Take the value of Chezy's resistance co-efficient $C=55$. | 10M | CO1 | BL5 |
|---|--|-----|-----|-----|

OR

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|---|---|-----|-----|-----|
| 3 | Derive and formulate the most economical condition for rectangular section. | 10M | CO1 | BL4 |
| 4 | A 8 m wide rectangular channel conveys $15\text{m}^3/\text{s}$ of water at a depth of 1.2 m. Calculate: (i) Specific energy of the flowing water; (ii) Critical depth, critical velocity and minimum specific energy; (iii) Froude number and state whether flow is subcritical or supercritical. | 10M | CO2 | BL5 |

OR

- 5 Explain the types, applications and location of hydraulic jump with suitable diagram. 10M C02 BL4
- 6 Define distorted models. State the merits and demerits of distorted models. What are the reasons of constructing such models for rivers? 10M C03 BL4
- OR**
- 7 An oil of specific gravity 0.92 & Viscosity 0.03 poise is to be transported at the rate of 2500 liters/ seconds through a 1.2 meters diameter pipe. Tests were conducted on a 12cm diameter pipe using water at 20°C is 0.01 poise, Find
(i) Velocity of flow in the model. (ii) Rate of flow in the model. 10M C03 BL5
- 8 Explain the different heads and efficiencies of Francis turbine. 10M C04 BL4
- OR**
- 9 A Pelton wheel is receiving water from a penstock with a gross head of 480 meters. One third of the gross head is in friction in the penstock. The rate of flow through the nozzle fitted at the end of the penstock is 2.5 m³ / sec. The Angle of deflection of the jet is 160°. Determine (i) The power given by the water to the runner. (ii) Hydraulic Efficiency of the Pelton wheel; take Cv = 0.98 & Speed Ratio = 0.46. 10M C04 BL5
- 10 Explain the construction and working of a centrifugal pump with the help of neat schematic diagram. 10M C05 BL4
- OR**
- 11 The impeller of a centrifugal pump has an external diameter of 500 mm and internal diameter of 250 mm and it runs at 1500 r.p.m. Assuming a constant radial flow through the impeller at 2.8 m/s and that the vanes at exit are set back at an angle 30°, determine: (i) Inlet vane angle, (ii) The angle, absolute velocity of water at exit makes with the tangent, and (iii) The work done per N of water. 10M C05 BL5

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