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**SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR**  
(AUTONOMOUS)

**B.Tech III Year I Semester Regular Examinations December-2021**

**HYDRAULIC ENGINEERING**

(Civil Engineering)

Time: 3 hours

Max. Marks: 60

(Answer all Five Units 5 x 12 = 60 Marks)

**UNIT-I**

- 1 Derive the condition for a trapezoidal channel to be most economical. L1 12M

**OR**

- 2 a Derive the condition for a trapezoidal channel to be most economical. L1 6M  
 b The discharge of water through a rectangular channel of width 6.5m is  $20\text{m}^3/\text{sec}$ . L3 6M  
 When the depth of flow of water is 1.8m. Calculate: (i) specific energy of the flowing water (ii) critical depth and critical velocity.

**UNIT-II**

- 3 What are assumptions of gradually varied flow? Derive the Dynamic equation of gradually varied flow. L1 12M

**OR**

- 4 a A hydraulic jump forms at the downstream end of spillway carrying  $17.93\text{ m}^3/\text{s}$  discharge. If depth before jump is 0.80 m, determine the depth after the jump and energy loss. L3 6M  
 b Write about the classification of bottom channel slope. L1 6M

**UNIT-III**

- 5 a Derive the equation for force exerted by a jet on stationary inclined flat plate. L3 6M  
 b Find the force exerted by a jet of water of diameter 90mm on a stationary flat plate, when the jet strikes the plate normally with velocity of 25m/s. L3 6M

**OR**

- 6 A jet of water of diameter 7.5 cm strikes a curved plate at its centre with a velocity of 20m/sec. the curved plate is moving with a velocity of 8 m/sec in the direction of jet. The jet is deflected through an angle of  $165^\circ$ . Assuming the plate smooth. Find  
 i) Force exerted on the plate in the direction of jet  
 ii) Power of jet  
 iii) Efficiency of jet L3 12M

**UNIT-IV**

- 7 A centrifugal pump discharges  $0.15\text{ m}^3/\text{sec}$  of water against a head of 12.5 m, the speed of impeller being 650 r.p.m. The outer and inner diameter of impeller are 500 mm and 200 mm respectively and the vanes are bent back at  $35^\circ$  to the tangent at exist. If the area of flow remains  $0.07\text{ m}^2$  from inlet to outlet, calculate  
 (i) Manometric efficiency of pump (ii) Vane angle at inlet (iii) Loss of head at inlet to impeller when the discharge is reduced by 35% without changing the speed. L3 12M

**OR**

- 8 a What are different types of dimensionless numbers? Explain them. L1 6M  
 b Define the terms: model, prototype, hydraulic similitude. L1 6M

## UNIT-V

- 9 a What is a turbine and give the classification in detail. L1 6M  
b A Pelton wheel is to be designed for a head of 60m when running at 200r.p.m. The pelton wheel develops 95.6475kW shaft power. The velocity of the buckets =0.45times the velocity of the jet, overall efficiency=0.85and co-efficient of the velocity=0.98. L3 6M

OR

- 10 a What are the uses of draft tube? Describe with neat sketches different types of draft tube. L2 6M  
b What is specific speed, derive the equation for specific speed. L2 6M

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