(DCE 225)

B. Tech. DEGREE EXAMINATION, MAY - 2015

(Examination at the End of Second Year)

CIVIL ENGINEERING

Paper - V : Hydraulics & Hydraulic Machines

Time : 3 Hours   **Maximum Marks : 75**

**Answer question No.1 compulsory**   *(5 × 3 = 15)*

**Answer ONE question from each unit**   *(4 × 15 = 60)*

1)   a)   What is meant by hydraulically efficient?

       b)   Differentiate between pump and turbine.

       c)   Write the functions of draft tube.

       d)   Explain the concept of primning. Why is it necessary?

       e)   Mention the model laws for partially submerged objects.

UNIT - I

2)   a)   Derive the condition for most economical section of a reactangular channel of an open

            channel.

       b)   Determine the dimensions of economical section of lined trapezoidal channel to carry a

            discharge of 20 cumes at a velocity of 1.5m/s. Bed slope is 1in 3,000. Manning's n is 0.020.

OR

3)   a)   Explain chezy's and Manning formula. Derive the relation between C and n.

       b)   Explain the energy variation in a short hydraulic jump using the specific energy equation.

UNIT - II

4)   a)   Derive the dynamic equation for a gradually varied flow by stating the assumptions.

       b)   What is a surge? Distinguish between a positive surge and a negative surge.

OR

5) a) A shrice gate discharges water into a horizontal rectangular channel with a velocity of 10m/s and depth of flow of 1m. Determine the depth of flow after the hydraulic jump and consequent loss of head.

b) Briefly describe the classification of surface profiles in open channel flow.

UNIT - III

6) a) A hydraulic turbine develops 7350 kw under a head of 16 m at a speed of 90 r.p.m. gives an efficiency of 90%. Calculate the water consumption and the specific speed.

b) Derive the expression for force exerted by a jet striking a stationary curved vane.

OR

7) a) A Jet of water with a velocity 25m/s impinging normally on a flat vane moving away from it at 10 m/s. The cross-sectional area of Jet 0.02m^2. Determine the force exerted.

b) What are the characteristic curves of a hydraulic turbine? How are they useful to practical engineer?

UNIT - IV

8) a) State and explain Buckingham's Π theorem. Explain Geometric, Kinematic and dynamic similarity.

b) A centrifugal pump is to discharge 0.118 m^3/s at a speed of 1450 rpm against a head 30m. The impeller diameter is 20 cm, its width at outlet is 6 cm and the manometric efficiency is 75%. Determine the vane angle at the outer periphery of the impeller.

OR

9) a) What are the different efficiencies of a centrifugal pump?

b) A geometrically similar model of scale 1:10 is built to study wave motion on a beach. Determine the scale ratios for velocity, time, acceleration and force if mass densities in the prototype and model are 1030 kg/m^3 and 1000 kg/m^3.

❄❄❄