(OLD COURSE) : **QP Code : 1950**

(3 Hours) . [Total Marks: 100]

Note:

1. Q.No. 1 is compulsory.
2. Attempt any four questions out of remaining six questions.
3. Assume any data suitably if required stating clearly

Q1. Attempt any four: -   · [5x4=20]

   (a) Explain Terminal velocity with suitable examples.

   (b) Explain boundary layer separation with neat diagram.

   (c) Classify various types of surface slopes for gradually varied flow.

   (d) What are drawbacks in Kennedy's Theory?

   (e) Explain Specific Energy Curve with neat sketch.

Q2   a) Derive the conditions for most economical of trapezoidal channel.   [10]

   b) Calculate the quantity of water that will be discharged at a uniform depth of 0.9
   m in a 1.2 m diameter pipe which is laid at a slope of 1in 1000. Assume Chezy's ·
   C=58.   [10]

Q3. a) Derive the expression for loss of energy due to Hydraulic Jump.   [10]

   b) Determine the length of back water curve caused by an afflux of 2.0 m in a
   rectangular channel of width 40 m and depth 2.5m. The slope of the bed is given ·
   as 1 in 11000take Manning's N=0.03   [10]

Q4   a) Derive the expression for Lift force acting on rotating cylinder.   [10]

   b) A man descends to the ground from an airplane with parachute having
   hemispherical shape of diameter 4m against resistance of air with uniform velocity
   of 25 m/s. Find the weight of the man if the weight of parachute is 9.81N. Take.
   C_D=0.6 and density air =1.25 kg/m^3 [10]

(P.T.O.)

Q5.   a) Compare the Kennedy's Theory and Lacey's Theory. What further works have
been carried out on Kennedy'sTheory.   [10]

b) Design an irrigation channel for the following data by Lacey Theory. Find also
longitudinal slope.   [10]
       Discharge   Q=30 Cumecs
       Silt factor   f=1.00
       Side slope   =1/2: 1

Q6   a) Derive Von-Karman Momentum Integral Equation.   [10]

b) Find the displacement thickness, momentum thickness and energy thickness for
the velocity distribution in the boundary layer given by   [10]

$u/U = 2(y/\delta) - (y/\delta)^2$ where δ is boundary layer thickness

Q7   a) Define displacement thickness, momentum thickness and energy
thickness.   [5]
   b) Differentiate between
      i) uniform and non-uniform flow
      ii) steady and un-steady flow   [5]
   c) Explain development of lift on an airfoil.   [5]
   d) What are various types of Hydraulic jump?   [5]