(OLD COURSE)   **QP Code : 4227**

(3hours)   [Total Marks-100]

NB. : (1) Question **No. 1** is compulsory

(2) Attempt any **four** questions out of remaining six questions.

(3) Assume suitable data where required and clearly state the same.

Q1   Solve any four of the following   20

(a) Boundary layer separation
(b)What do you understand by steady and unsteady flow in the case of channels?
(c)Write short note on Aero foils
(d) Define the term drag and lift
(e) Explain M1, M2 and M3 Profiles

Q2   a) Derive the dynamic equation for gradually varied flow   10

b) Calculate the critical depth corresponding to a discharge of 6.0 m³/s in   10
(i) Rectangular channel of width 3m.
(ii) Triangular channel of side slope 1.5 horizontal: 1 vertical
(iii) Trapezoidal channel of bottom width 2.0m and side slope 1Horizontal to 1.0 vertical.

Q3   a) Derive an expression for the lift produced on a rotating cylinder placed in a uniform flow field such that the axis of the cylinder is perpendicular to the direction.   10

b)The discharge of water through a rectangular channel of width 8m is 15 m³/s when depth of flow of water is 1.4 m. Determine   10
i) Specific energy of flowing water
ii) Critical depth and critical velocity
iii) Value of minimum specific energy

Q4   a) Obtain Von Karman momentum integral equation.   10

b)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 m³/s. Find width at the base and length of flow for most economical cross section.
Take the value of Chezy's C= 66.   10

(P.T.O.)

RJ-Con. : 10191-15.

Q5   a) Show that the head loss in hydraulic jump formed in a rectangular channel may be expressed as   10

$$\Delta E = (v1 - v2)^3 / 2g \, (v1 + v2)$$

b) Derive the conditions for circular section to be most economical   10

Q6   a) Design an irrigation channel in alluvial soil according to Lacey's silt theory with the following data.   10
      Full supply discharge = 10 Cumecs
      Lacey's silt factor = 0.9
      Channel side slope = ½ (H): 1 (V)

b) Compare Kennedy's theory and Lacey's theory   10

Q7   a) Derive silt supporting capacity of channel according to Kennedys theory.   10

b)Distinguish between deformation drag, surface drag and form drag. In the case of spherediscuss their relative importance at various increasing values of Reynolds number.   10