Seat No.	

Total No. of Pages : 4

S.E. (Civil) (Part - II) (Semester - IV) Examination, December - 2015

FLUID MECHANICS - II (Revised)

Sub. Code : 43590

Day and Date : Friday, 04 - 12 - 2015 **Total Marks : 100**

Time : 10.00 a.m. to 01.00 p.m.

Instructions :
1) **Question Nos. 1 & 5 are compulsory.**
2) **Attempt any other two questions from each section.**
3) **Assume any other data, if necessary.**
4) **Figures to the right indicate full marks.**

SECTION - I

Q1) Attempt any Four of the following:

a) Define the following types of flows through open channel with practical examples.

Steady GVF, Steady RVF, Steady UF, Unsteady RVF, Unsteady SVF **[5]**

b) A trapezoidal channel has a side slope of 3 Hori. to 4 Vert. & bed slope of 1 in 2000. Determine the dimensions of best section, if it is to carry water at 0.5 m^3/s. Take C = 80. **[5]**

c) Draw sketches of following GVF profiles & their practical examples. **[5]**

i) M1 ii) M2 iii) S3

iv) C1 v) A3

d) In a horizontal rectangular channel, 5m wide the initial and sequent depths due to hydraulic jump are 0.8m & 3.0m respectively. Determine the rate of flow and power lost. **[5]**

e) Derive expression for discharge over broad crested weir. **[5]**

P.T.O.

Q2) a) A triangular channel has one side vertical and other has slope 1:1. Calculate the discharge through this channel for a depth of flow 1m. Channel has longitudinal slope 1 in 3600. Take n = 0.02 **[5]**

b) A wide rectangular channel carries discharge of 1.2 $m^3/s/m$, laid on bed slope of 1 in 3600. Determine the slope of water surface at depth of 1m & mention the type of profile. Take C = 60 **[5]**

c) Enumerate the uses of hydraulic jump. Draw a neat sketch of Hydraulic jump type Energy Dissipater. **[5]**

Q3) a) Determine the length of backwater curve caused by a construction of weir in a wide rectangular river. **[5]**

Data :

i) Discharge per m width = $2m^3/s/m$,

ii) n = 0.03,

iii) Depth immediately upstream of weir = 3.5m,

iv) Bed slope = 1 in 6400

GVF computations should be taken upto 1% more than normal depth. Take single step.

b) In a hydraulic jump type energy dissipater, it is desired to have energy loss of 5m, when the initial Froude No. is 8.5. Determine the sequent depths. **[5]**

c) Derive an expression for discharge over contracted rectangualr notch. Consider velocity of approach. Sketch the nappe profile. **[5]**

Q4) a) How to calibrate a triangular notch in laboratory? What are the advantages of Triangular notch over rectangular notch. **[5]**

b) A right angled V notch is inserted in the side of a tank of length 4m and width 2.5m. Initial height of water above the apex of the notch is 30cm. Find the height of water above the apex if the time required to lower the head in tank is 3 minutes. Derive the required equation. Take $C_d = 0.6$ **[5]**

c) Write a note on effect on discharge over a notch due to error in the measurement of head. Explain with derivation for triangular & rectangular notch. [5]

SECTION - II

Q5) Attempt any four: [4 x 5 = 20]

a) What are the causes of separation of boundary layer and how can separation be controlled?

b) A 30 mm water jet with a velocity of 20 m/s strikes a symmetrical vane at centre and gets deflected by 150°. Compute the thrust on the vane. Also determine the efficiency.

c) What is priming of a pump? Why it is necessary?

d) Write short note on : Classification of turbines.

e) Write a short note on : Governing of Pelton wheel.

Q6) a) With neat sketch explain the development of a boundary layer along a thin flat smooth plate held parallel to a uniform flow and explain its salient features. [9]

b) The laminar boundary layer profile in case is approximated by a cubic parabola. Find the displacement thickness and momentum thickness in terms of δ

$$\frac{u}{v}=2\left(\frac{y}{\delta}\right)-\left(\frac{y}{\delta}\right)^2$$

where , u = velocity at a distance y from the surface and $y \to \delta, u \to v$. [6]

Q7) a) Show that the maximum efficiency possible is only 50% in case of jet striking normally a series of flat plates mounted on the periphery of a wheel. **[9]**

b) Define the terms (w.r.t. centrifugal pump): **[6]**

i) Theoretical head imparted by the impeller.

ii) Total manometric head.

iii) Hydraulic efficiency.

iv) Overall efficiency.

Q8) a) Write a short note on: Drag and Lift forces on a object totally immersed in a fluid. **[6]**

b) A centrifugal pump running at 1450 rpm delivers 118 lps against a head of 25 m. The impeller diameter and width at exit are 25 cm and 5 cm respectively. The entry of water in the impeller is radial. Draw inlet and outlet velocity triangles and Determine the vane angle at the outer periphery, if manometric efficiency is 75%. **[9]**