Total No. of Questions : 5] *[Total No. of Printed Pages : 3*

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CE-503

B.E. V Semester

Examination, June 2016

Fluid Mechanics - II

Time : Three Hours

Maximum Marks : 70

Note: i) Answer five questions. In each question part A, B, C is compulsory and D part has internal choice.

ii) All parts of each question are to be attempted at one place.

iii) All questions carry equal marks, out of which part A and B (Max. 50 words) carry 2 marks, part C (Max. 100 words) carry 3 marks, part D (Max. 400 words) carry 7 marks.

iv) Except numericals, Derivation, Design and Drawing etc.

1. a) Define physically and mathematically the concept of momentum and energy thickness of a boundary layer.

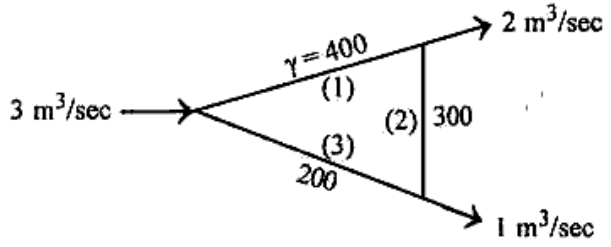
   b) Define hydrodynamically smooth and rough surfaces.

   c) What is Prandtl mixing length theory? Explain clearly.

   d) Derive an expression for loss due to sudden enlargement of a pipe flow.

   OR

   For a network shown in figure, determine the discharge distribution in three pipes, if n = 2.0



2. a) Define open channel flow.

   b) Define most economical sections and find the condition for rectangular section.

   c) What is critical flow? Show that critical flow occurs in an open channel when the depth of flow is 2/3rd of the specific energy.

   d) Determine the dimensions of the most economical trapezoidal earth lined channel n = 0.020, to carry 14 m^3/s at a slope of 4 in 10,000.

   OR

   What is a specific energy curve? What do you understand by critical depth of an open channel when the flow in it is not uniform? Discuss the different components of specific energy curve.

3. a) State the assumptions made in gradually varied flow.

   b) Explain surges in open channel.

   c) Discuss different flow profiles.

   d) Derive the dynamic equation of gradually varied flow.

   OR

   Explain the salient difference between venturi flumes and standing wave flumes.

4. a) Explain the various types of drag forces.

   b) What is an aerofoil? Draw the pressure distribution.

   c) What is the expressions for the drag on a sphere?

   d) With the help of a neat sketch explain the circulation theory of lift and derive the expression for magnus force.

   OR

   A kite 0.8 m × 0.8 m weighing 4 N assumes an angle of 12° to horizontal. The string attached to the kite makes an angle of 45° to the horizontal. The pull on the string is 25 N when the wind is blowing at a speed of 40 kmph. Find the coefficient of lift and drag. Take $P_a = 1.2\ kg/m^3$.

5. a) Define turbine and pump.

   b) Discuss cavitation phenomenon in turbine.

   c) Draw a velocity triangle of a centrifugal pump. Also explain priming of a C.P.

   d) A pelton wheel, 2.45m in diameter operates under the following conditions : Net head = 380 m; coefficient of velocity = 0.98, speed ratio = 0.47, Angle of deflection = 160°. Diameter of jet = 18 cm

   Determine

   i) The input power to the shaft

   ii) The r.p.m. of the wheel.

   OR

   A centrifugal pump having an overall efficiency of 75% delivers 0.04 m^3/sec. of water to height of 20 m, through a 10 cm dia. pipe 70 m long. Taking friction coefficient = 0.01. Calculate the power required to run the pump.

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