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Name .....

Reg. No. .....

FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION
OCTOBER 2011

CE/PTCE 09 503 : OPEN CHANNEL HYDRAULICS AND HYDRAULIC MACHINERY

(2009 Admissions)

Time : Three Hours Maximum : 70 Marks

"Assume any data suitably".

Answer **all** *questions from Part A and any* **four** *questions from Part B and all questions from Part C.*

Part A

1. (a) Differentiate between open channel flow and pipe flow.
   (b) List out the various geometrical properties of a channel.
   (c) List down the basic assumptions in deriving the dynamic equation for gradually varied flow.
   (d) Differentiate between initial and sequent depths.
   (e) List out the pumps classification.

(5 × 2 = 10 marks)

Part B

2. For a trapezoidal channel section of bottom width (B), depth of flow (y) and side slope (z horizontal to 1 vertical) to be most economical, then prove that it s hydraulic radius is equal to half the depth of flow.
3. Sketch and explain the typical pattern of velocity distribution in a channel.
4. A rectangular channel 7.5 m wide has a uniform depth of flow of 2.0 m and has a bed slope of 1 in 3000. If due to weir constructed at the downstream end of the channel, water surface at a section is raised by 0.75 m. Determine the water surface slope with respect to horizontal at this section. (Assume Manning's n = 0.02).
5. A trapezoidal channel having bottom width 8 m and side slope 1 : 1, carries a discharge of 80 m^3/sec. Find the depth conjugate to initial depth of 0.75 m before the jump.
6. Write a short note on surge tanks.
7. Sketch and explain the working of a typical Centrifugal Pump installation.

(4 × 5 = 20 marks)

Part C

8. Write short notes on :
   (a) Application of specific energy principle.
   (b) Transitions in rectangular channel.

Or

A rectangular channel which is laid on a bottom slope of 0.0064 is to carry 20 m^3/sec. of water. Determine the width of the channel when the flow is in critical condition. (Take Manning's $n = 0.015$).

Or

9. Write a short note on characteristics of flow profiles in prismatic channels.

Or

Derive an expression for the dynamic equation for the gradually varied flow [Assumptions Not required].

10. In a rectangular channel there occurs a jump corresponding to Froude Number = 2.5. Determine the critical depth and head loss in terms of the initial depth (y_1).

Or

Define the term hydraulic jump and list out and explain the various types.

11. Derive an expression for the force exerted by fluid jet on :

    (a) Moving flat plate normal to jet.

    (b) Moving flat plate inclined at an angle θ to the jet.

Or

Write short notes on :

(a) NPSH.

(b) Slip.

(c) Coefficient of discharge.

(d) Specific speed of pumps.

(4 × 10 = 40 marks)