

D 30957

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**FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION
OCTOBER 2012**

**CE 09 503—OPEN CHANNEL HYDRAULICS AND HYDRAULIC MACHINERY
(2009 Scheme)**

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) Explain the concept of specific energy.
- (b) List out the types of channels used in hydraulics Engineering.
- (c) What is meant by non-uniform flow ?
- (d) Write a short note on hydraulic jump.
- (e) Explain the term slip and percentage slip with respect to pumps.

(5 × 2 = 10 marks)

Part B

2. For a triangular channel section (θ = inclination of each of the sloping sides with the vertical and y is the depth of flow) to be most economical, then prove that each of its sloping sides make an angle of 45° with the vertical.
3. Write a short note on metering flumes.
4. Derive the dynamic equation for gradually varied flow from the basic energy equation.
5. Write a short note on types of shallow water waves.
6. Explain briefly on multistage pumps.
7. Sketch and list out the components of a centrifugal pump installation.

(4 × 5 = 20 marks)

Part C

8. Write short notes on :
 - (a) Velocity distribution in open channels.
 - (b) Geometrical parameters of a channel.

Or

A flow of 110 litres/sec. flows down in a rectangular laboratory flume of width 0.60 m and having adjustable bottom slope. If the chezy's constant, C is 56, determine the bottom slope necessary for uniform flow with a depth of flow 0.30 m. Also find the conveyance and the state of flow (i.e. Tranquil or rapid).

Turn over

9. Explain the various characteristics of flow profiles in prismatic channels.

Or

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 the horizontal at this section. Assume Manning's $n = 0.02$.

10. A horizontal rectangular channel 4 m wide carries a discharge of $16 \text{ m}^3/\text{s}$. Determine whether a jump may occur at an initial depth of 0.50 m or not. If a jump occurs, determine the sequent depth corresponding to this initial depth. Also determine the energy loss in the jump.

Or

Write short notes on :

- (a) Practical applications of hydraulic jump.
 - (b) Surges in open channels.
11. Derive an expression for the force exerted by fluid jet on :
- (a) Stationary flat plate normal to jet.
 - (b) Flat plate inclined at angle (θ) to the jet.

Or

Write short notes on :

- (a) Specific speed.
- (b) Surge tanks.
- (c) NPSH.

(4 × 10 = 40 marks)