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NCE - 043

(Following Paper ID and Roll No. to be filled in your Answer Books)

Paper ID : 2289950 Roll No. | | | | | | | | | |

B.TECH.

Regular Theory Examination (Odd Sem-VII), 2016-17

OPEN CHANNEL FLOW

Time : 3 Hours *Max. Marks : 100*

Note: Attempt all Sections If require any missing data; then choose suitably.

SECTION - A

1. Attempt all questions in brief. **(10×2=20)**

a) Discuss velocity distribution for rectangular a rectangular open channel.

b) What do you mean by specific force?

c) Explain the term wetted perimeter and hydraulic mean depth.

d) Define hydraulic jump.

e) Define steaming flow, critical flow and shooting flow.

f) Classify surface profiles.

g) What are the applications of hydraulic jump?

h) Define Celerity of a wave.

i) Draw steep slope profiles.

j) Differentiate between deep and shallow water waves.

SECTION - B

2. Attempt any three of the following (3×10=30)

a) Water is flowing at a critical depth at a section in a triangular shaped channel, with side slope of 0.5H: IV with its apex pointing upwards. If the critical depth is 1.6 m and base with is 3m, estimate the discharge in the channel and the specific energy at the critical depth section.

b) A rectangular channel with a bottom width of 4 m and a bottom slope of 0.0008 has a discharge of $1.5 m^3/s$. in a gradually varied flow n this channel, the depth at a certain location is found to be 0.3m. Assuming n = 0.016, determine the type of GVF profile.

c) In a hydraulic jump taking place in a horizontal apron below an Ogee shaped weir the discharge per unit width is 0.25 $m^3/s/m$ and the energy loss is 2.75 m. Estimate the depths at the toe and heel of the jump.

d) Derive the differential equation of SVF with increasing discharge with its assumptions.

e) What do you mean by a culvert? Write down its features and explain different types of inlet and outlet controls in culverts.

SECTION - C

3. Attempt any one part of the following (1×10=10)

a) Explain specific energy curve with a neat sketch and also derive critical flow condition for constant discharge.

b) A compound channel is symmetrical in cross-section and has the following geometric properties. Main channel: trapezoidal cross-section, bottom width = 15m., side slope 1.5 H: IV, bank full depth=3m manning's coefficient = 0.03, longitudinal slope=0.0009.

Flood plains: width 75 m, side slope = 1.5 H: 1 V,manning's coefficient = 0.05, longitudinal slope = 0.0009.

Compute the uniform flow discharge for a flow with a total depth of 4.2 m by using diagonal interface method.

4. Attempt any one part of the following: (1×10=10)

a) A river 100 m wide and 3m deep has an average bed slope of 0.0005. Estimate the length of GVF profile produced by a low dam which raises the water surface just upstream of it by 1.5m. Assume n = 0.035.

b) i) What do you mean by flow profiles? Classify them with neat sketch.

ii) Derive the basic differential equation of GVF with assumptions.

5. Attempt any one part of the following: (1×10=10)

a) i) 'Hydraulic jump can be used as an energy dissipator". Discuss with neat sketch.

ii) What do you mean by surge? Discuss its types.

b) Derive the equation for motion for gradually varied unsteady flow.

6. Attempt any one part of the following: (1×10=10)

a) Explain bottom racks. Classify different types of flows over bottom racks with neat sketch.

b) What are the various methods used in profile computation of Spatially Varied flow.

7. Attempt any one part of the following: (1×10=10)

a) Explain the flow in a channel with non-linear alignment with a neat sketch.

b) What are the factors affecting culvert flow and also give in brief steps for design of culverts.