Seat No. | | | | | | |

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मजल - 065

ELECTIVE - I

Open Channel & Conduit Flow

(New) (1045)

P. Pages : 4

Time : Three Hours **Max. Marks : 100**

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Answersheet should be written with blue ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. Answer **any two** questions from each of **five** units.
5. Each question carry 10 marks.
6. It is advised to solve all parts of a question in one streter.
7. Figures to the right indicate full marks.
8. Assume suitable data if necessary.

UNIT - I

1. a) A trapezoidal channel carries a discharge of $15 m^3/s$ Bed width of the channel is 3m and bed slope is 1 in 1100 Manning's n = 0.015. Estimate the normal Vertical depth of flow using following table for trapezoidal channel. **10**

ξ_c ψ	n_0 ϕ for m = 1.5
0.56 : 0.560791	0.49 : 0.387122
0.57 : 0.578702	0.5 : 0.402073

b) A triangular channel having bed slope 1 in 2500 and Manning's n = 0.02 1 carries water at $15 m^3/s$. Estimate dimensions of most efficient triangular section. Derive the condition used. **10**

c) A rectangular channel 3m wide 1 carries a flow of $4 m^3/s$ at a depth of 1.0m A contraction of the channel is proposed at a certain section. Find the smallest allowable contracted width that will not affect the upstream flow contains. Assume that the energy loss at the transition is 10% of upstream velocity head. **10**

UNIT - II

2. a) Water flows in a triangular channel of side slope 1:1 and longitudinal slope of 0.002. Determine whether the channel is mild, steep or critical, when a discharge of $0.3 m^3/s$ flows through out ? Assume Manning's n = 0.015. For what range of depths will the flow be of type 1, 2 or 3 curve ? **10**

b) What is meant by GVF ? Describe with neat sketches, the possible GVF profiles in a mild sloped channel. Give one practical example of each type. **10**

c) Describe V.T. Chow's method of computing GVF profiles in open channel flow. State the equations to be used and explain the procedure with the help of table. **10**

UNIT - III

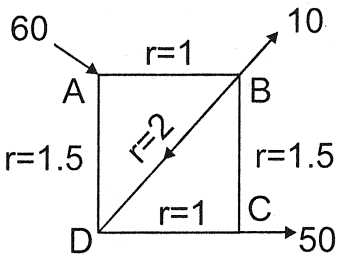
3. a) The depth of flow before and after a hydraulic jump, in a rectangular channel are 0.45 m and 3.10 m. Calculate : **10**
   i) The critical depth
   ii) The discharge intensity
   iii) The energy lost in jump
   iv) The power lost/m width
   v) Length and height of jump.

b) A rectangular channel carries water at a depth of 0.80 with velocity 1.0 m/s If a gate on down stream side is suddenly closed completely. Find the depth of flow and velocity of surge on upstream side due to the gate operation. **10**

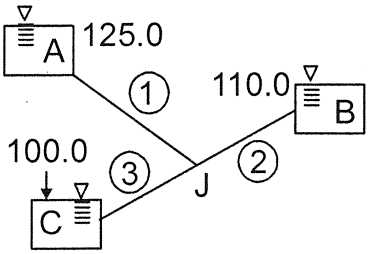
c) A standing wave flame without hump is to be used for discharge measurement in rectangular channel of bed width 2.6 m and bed slope 0.0004 having Manning's n = 0.018. A maximum discharge of $4.0 m^3/s$ is expected to be passed in this flume. Find the width of the throat requireding the modular limit of the flame is 0.75. Assume overall discharge coeff. if flame, $C_f = 1.60$. Also find the afflux due to this flame. **10**

UNIT - IV

4. a) Describe the data required and stepwise procedure for calculating economical diameter of pure water rising main of a water supply system for a town. **10**

b) 

Calculate the distribution of discharge in the pipe network as shown in fig. alone. Take two trials only the head loss h_f in each pipe is given by $h_f = r\,Q^{1.90}$. The values of r for various pipes are shown in figure alone the inflow at mole A is 60 units and cutflows at nodes B and C are 10 and 50 units. **10**

c) 

For branching system as shown in figure alone, find discharge in each pipe Neglect minor minor losses and assume that frictional loss, h_f in m of water is given as $h_f = r\,Q^{1.95}$ where Q is discharge in m^3/s. Take two trials only Use following data : **10**

Pipe	Dia (cm)	Length (m)	f
1	20	300	0.025
2	15	225	0.022
3	15	200	0.020

UNIT - V

5. a) Derive the equation for velocity of pressure wave through elastic pipes. **10**

b) The velocity of water in a 60 cm dia. cast iron pipe, having wall thickness 15 mm, is reduced from 2.5 m/s to 0.5 m/s in 1.5 second by closure of a drum stream valve. If the pipe length is 1 km, find the water hammer pressure at the valve ? What will be the corresponding pressure rise, if the valve closure take place in 2.5 seconds ? For cast iron pipe, E = 104 GPa & for water k = 2.11 GPa. **10**

c) A power plant develops 3.5 MW power under a head of 30m with an overall efficiency of 75% on the pin stock of this power plant, 3m dia, a simple cylindrical surge tank is provided at a distance of 2 km from the reservoir Find the diameter of the surge tank if the maximum up surge is to be limited to 6m above the steady state reservoir water level. Assume rapid and complete closure of the value at down stream end. Consider functions effects for the pin stock the f = 0.018. **10**

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