Total No. of Questions : 8]

SEAT No. :

P3902

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M.E. (Civil) (Water resources and Environmental Engg.)
OPEN CHANNEL HYDRAULICS
(2013 Pattern) (Semester - II) (501088)

Time :3 Hours] *[Max. Marks :50*

Instructions to the candidates:

1) ***Answer any Five questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of logarithmic tables, slide rule and electronic pocket calculator is allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) Define depth of flow, depth of flow section, Hydraulic radius, Hydraulic mean depth. **[4]**

b) A rectangular channel with bed width of 10 m, bed slope of 1 in 2500 and Manning's n = 0.002 carries a discharge of 10 m^3/s. Find the slope of water surface with respect to horizontal at the section where the depth of flow is 0.72 m. **[6]**

Q2) a) Design an economical channel with side slopes 2 H : 1 V, bed slope 1: 3600 to carry discharge of 5 m^3/s. Take Manning's n= 0.02 **[6]**

b) Draw the water surface profiles when (i) a steep slope follows a steeper slope (ii) mild slope follows a steep slope **[4]**

Q3) a) Write in detail about hydraulic jump in rectangular channel with abrupt expansion. **[5]**

b) Write in detail about V. T. Chow's method to determine length of a water surface profile crated by gradually varied flow. **[5]**

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Q4) a) How to determine energy loss in hydraulic jump graphically? **[4]**

b) A Wide rectangular channel carries a dischage of 5 $m^3/s/m$. The bed slope of the channel is 1 in 3600 and Manning's n = 0.02. If the channel ends in a drop determine how far upstream the depth of flow would be 10% of the normal depth. Use step method. Take 2 steps. **[6]**

Q5) a) Derive equation for increasing discharge of spatially varied flow **[4]**

b) Derive equation for celerity in case of a solitary wave. **[6]**

Q6) a) Derive relation for change in the area at a uniformly discharging side weir. How these weirs can be constructed? **[6]**

b) Derive continuity equation of gradually varied unsteady flow. **[4]**

Q7) a) Design a regime channel for a discharge of 50 cumecs and silt factor 1.1 using Lacy's theory. **[6]**

b) Write short note on finite difference approximation for flood routing. **[4]**

Q8) a) Define bed load, saltation load, suspended load, total load. **[4]**

b) Route the following flood through a reach of K = 22 h and x = 0.25. At t = 0 the outflow discharge is 40 m^3/s. **[6]**

Time (h)	0	12	24	36	48	60	72	84	96	108	120	132	144
Inflow m^3/s	40	65	165	250	240	205	170	130	115	85	70	60	54