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SEAT No. :

P4122

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[4760] - 1052

M.E. (Civil - Water Resources and Environmental Engg.)

OPEN CHANNEL HYDRAULICS

(2013 Credit Pattern) (501088) (Semester - II)

Time : 3Hours] *[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 logarithms tables, slide rule, electronics 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 0.72m. **[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 **[4]**

i) a steep slope follows a steeper slope

ii) mild slope follows a steep slope

Q3) a) Write in detail about hydraulic jump at an abrupt drop. **[5]**

b) Write a detail about standard step method to determine length of a water surface profile crated by gradually varied flow. **[5]**

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

b) A Wide rectangular channel carries a discharge 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]**

P.T.O.

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

b) A wide tidal river has a low water velocity of 1.5 m/s and depth of flow of 2.5 m/s. A tide in the sea causes a 'bore' which travels upstream. If height of bore is 0.9 m estimate speed of the bore and velocity of flow after its passage. **[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 of gradually varied unsteady flow? **[4]**

Q7) a) Define condition of incipient motion? Write in brief of Shield's analysis. **[6]**

b) Write a short note on 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