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Total Number of Pages: 02

B.Tech.
PCI5J001

5th Semester Regular Examination 2017-18

Water Resources Engineering

BRANCH: CIVIL

Time: 3 Hours

Max Marks: 100

Q.CODE: B263

Answer Question No.1 and 2 which are compulsory and any four from the rest.
The figures in the right hand margin indicate marks.

- Q1** **Answer the following questions: multiple type or dash fill up type** **(2x10)**
- a) If p is the precipitation, a is the area represented by a rain gauge, and n is the number of rain gauges in a catchment area, then the weighted mean rainfall is
 - b) Mean precipitation over an area is best obtained from gauged amounts by method.
 - c) If a 4-hour unit hydrograph of a certain basin has a peak ordinate of $80 \text{ m}^3/\text{s}$, the peak ordinate of a 2-hour unit hydrograph for the same basin will be.....
 - d) The rainfall in four successive 12 hours period on a catchment are 40, 80, 90 and 30 mm. If the infiltration index ϕ for the storm is 5 mm/hour, then the total surface run off will be
 - e) If storage, inflow rate and outflow rate are denoted by S , I and Q respectively, then the value of S in Muskingham method of flood routing is
 - f) The most suitable chemical which can be applied to the water surface for reducing evaporation is.....
 - g) Hydrograph is the graphical representation of..... and
 - h) If the stage- discharge relationship for a gauging section is constant and does not change with time, the control is said to be
 - i) A rectangular channel carries a certain flow for which the alternate depths are found to be 3 m and 1 m, the critical depth for this flow is
 - j) The sequent depth ratio in a hydraulic jump formed in a horizontal rectangular channel is 16.48. The Froude number of the super-critical stream is
- Q2** **Answer the following questions: Short answer type** **(2x10)**
- a) What are the possible sources of error in the measurement of precipitation?
 - b) Define pan coefficient.
 - c) Differentiate between ϕ -index and W - index.
 - d) Differentiate between direct runoff and base flow.
 - e) What is the probability of a flood equal to or greater than 25 years flood occurring once in the next three years ?
 - f) Write two methods of deriving unit hydrograph from complex storms.
 - g) Write the differential equation of storage.
 - h) What do you mean by attenuation?
 - i) An open channel carries water with a velocity of 0.5 m/s. If the average bed shear stress is 1.0 N/m^2 , the Chezy coefficient C is.
 - j) What is conveyance of a channel?
- Q3** a) Describe the principle of working of a weighing bucket type recording rain gauge with a neat sketch. What are its advantages and disadvantages? **(10)**
- b) Define pan coefficient. Discuss the relative merits and demerits of sunken, floating and land pans. **(5)**

- Q4** a) Define catchment. Explain how the catchment boundary can be obtained from the topographic maps. **(8)**
 b) Describe the principle involved in the measurement of stream flow by dilution method. What are the requisites of a good tracer used in the dilution method ? **(7)**

- Q5** In order to compute the flood discharge in a stream by the slope area method the following data has been obtained. **(15)**

	u/s section	middle section	d/s section
Area	108.6 m ²	103.1 m ²	99.8 m ²
Wetted Perimeter	65.3 m	60.7 m	59.4 m
Gauge reading	316.8 m	-	316.55 m

Determine the flood discharge assuming Manning's $n = 0.029$ and length between u/s and d/s section as 250 m.

- Q6** The ordinate of a 4 h unit hydrograph of a basin of particular basin are given below. Determine the ordinates of the S- curve hydrograph and there from the ordinate of the 6 h unit hydrograph. **(15)**

Time (hr)	4-hr UGO (cumec)	Time (hr)	4-hr UGO (cumec)
0	0	14	70
2	25	16	30
4	100	18	20
6	160	20	6
8	190	22	1.5
10	170	24	0
12	110		

- Q7** a) The inflow hydrograph into a linear reservoir is triangular in shape with time base of 20 h and a peak flow of 240 m³/s occurring at 8 h. Assume that the storage constant of the reservoir is 2 h and the outflow from the reservoir at the time of arrival of the inflow is zero. **(10)**
 Route the inflow hydrograph with $\Delta t = 2$ h. and find the peak outflow.

- b) Define IUH. How can IUH be derived from S-Curve? **(5)**

- Q8** a) Determine the most efficient section of a trapezoidal channel with side slope 2H: 1V, carrying discharge of 11.25 m³/s with a velocity of 0.75 m/s. What should be the bed slope of the channel. Take manning's $\eta = 0.025$. **(8)**

- b) What are the assumptions for Gradually Varied Flow? Give two examples and Derive the equation for GVF. **(7)**

- Q9** Write short notes of the following :

- a) Evapo-transporation **(5)**
 b) Synthetic hydrograph **(5)**
 c) Specific energy **(5)**