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Total Number of Pages: 02

B.Tech.  
PCI5J001

5<sup>th</sup> 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)

- 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 .....
- Mean precipitation over an area is best obtained from gauged amounts by .... method.
- 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.....
- The rainfall in four successive 12 hours period on a catchment are 40, 80, 90 and 30 mm. If the infiltration index  $\phi$  for the storm is 5 mm/hour, then the total surface run off will be .....
- 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 .....
- The most suitable chemical which can be applied to the water surface for reducing evaporation is.....
- Hydrograph is the graphical representation of..... and .....
- If the stage- discharge relationship for a gauging section is constant and does not change with time, the control is said to be .....
- 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 .....
- 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)

- What are the possible sources of error in the measurement of precipitation?
- Define pan coefficient.
- Differentiate between  $\phi$ -index and  $W$ - index.
- Differentiate between direct runoff and base flow.
- What is the probability of a flood equal to or greater than 25 years flood occurring once in the next three years ?
- Write two methods of deriving unit hydrograph from complex storms.
- Write the differential equation of storage.
- What do you mean by attenuation?
- An open channel carries water with a velocity of 0.5 m/s. If the average bed shear stress is  $1.0 \text{ N/m}^2$ , the Chezy coefficient  $C$  is.
- What is conveyance of a channel?

**Q3** a) Describe the principle of working of a weighing bucket type recording (10)

- Define pan coefficient. Discuss the relative merits and demerits of sunken, floating and land pans. (5)

- 210 210 210 210 210 210 210
- 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)**

- 210 210
- 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 <sup>2</sup>	103.1 m <sup>2</sup>	99.8 m <sup>2</sup>
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.

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- 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		

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- 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 m<sup>3</sup>/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)**

- 210 210 210 210 210
- Q8 a)** Determine the most efficient section of a trapezoidal channel with side slope 2H: 1V, carrying discharge of 11.25 m<sup>3</sup>/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)**