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06CV55

Fifth Semester B.E. Degree Examination, Dec 08 / Jan 09
Hydrology and Water Resources Engineering

Time: 3 hrs.

Max. Marks:100

Note : Answer any FIVE full questions, selecting at least TWO from each part.

PART – A

- 1
 - a. Explain with neat sketch, Horton's Engineering representation of 'Hydrologic cycle'. (08 Marks)
 - b. Briefly explain optimum number of rain gauge stations in a catchment. (06 Marks)
 - c. The normal annual precipitation of five rain gauge stations P, Q, R, S and T are 1200, 1020, 780, 1135 and 1350mm respectively. During a particular storm the precipitation recorded by stations P, Q, R and S are 135, 95, 70 and 100mm respectively. The instrument at 'T' is inoperative during that storm. Estimate the missing precipitation at station T. (06 Marks)

- 2
 - a. Briefly explain "Evaporation Process". (06 Marks)
 - b. Explain factors affecting Infiltration capacity. (08 Marks)
 - c. A 6h storm producing rainfall intensities of 7, 18, 25, 12, 10 and 3mm/h in successive one hour interval over a basin of 800 sq.km. The resulting runoff is observed to be 2640 ha – m. Determine the ϕ - index for the basin. (06 Marks)

- 3
 - a. Briefly explain 'schematic representation of runoff components'. (06 Marks)
 - b. Explain 'Unit hydrograph theory'. Derive the unit hydrograph from an isolated storm. (06 Marks)
 - c. The ordinates of a 4h unit hydrograph of a basin area 630 Km² measured at 2 hour interval are given below. Obtain the ordinates of 6h unit hydrograph for the basin using S – curve technique. (08 Marks)

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

- 4
 - a. Briefly explain Porosity ; Specific yield ; Specific retention ; Storage co-efficient ; Co-efficient of Permeability ; Transmissibility. (06 Marks)
 - b. Derive the expression for discharge for steady radial flow to well in a unconfined aquifer in terms of radius of influence. (08 Marks)
 - c. A well of diameter 30cm fully penetrates a confined aquifer of thickness 15m. When pumped at a steady rate of 30 lps, the drawdown observed in wells at radial distances of 10m and 40m are 1.5m and 1.0m respectively. Compute the Permeability, Transmissibility and drawdown at the well. (06 Marks)

PART – B

- 5
 - a. What is stream gauging? Briefly explain 'rating curve'. (04 Marks)
 - b. Explain with a neat sketch, area – velocity method of discharge measurement. (06 Marks)

- c. In order to compute the flood discharge in a stream by the slope – area method the following data has been obtained.

	U/s section	Middle section	D/s section
Area	108.6m ²	103.1m ²	99.8m ²
Wetted Perimeter	65.3m	60.7m	59.4m
Gauge reading	+ 316.8m	-	+ 316.55m

Determine the flood discharge assuming Manning's $\eta = 0.029$ and length between U/s and d/s section as 250m. (10 Marks)

- 6 a. Explain different types of Erosion. (06 Marks)
 b. Explain various measures adopted for reservoir sedimentation control. (08 Marks)
 c. Explain with neat sketch, a typical 'Sediment Sampler' (Punjab bottle sampler). (06 Marks)
- 7 a. Explain any five river basins of India and their water potential. (10 Marks)
 b. Briefly explain 'Importance of water Resources Projects' in India. (05 Marks)
 c. Briefly explain 'Water Resources development' in Karnataka. (05 Marks)
- 8 a. What is rainwater harvesting? Why it is necessary? (04 Marks)
 b. Explain any two methods of rainwater harvesting in urban areas. (08 Marks)
 c. Explain any two methods of 'artificial recharge' of ground water. (08 Marks)
