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06CV55

**Fifth Semester B.E. Degree Examination, June-July 2009**  
**Hydrology and Water Resources Engineering**

Time: 3 hrs.

Max. Marks:100

- Note : 1. Answer any FIVE full questions, selecting atleast TWO questions from each part.**  
**2. Assume missing data if any.**

**PART - A**

- 1 a. Define precipitation. What is cyclonic precipitation? Distinguish between cold front and warm front. (06 Marks)
- b. Differentiate between recording and non – recording type of raingauges. (04 Marks)
- c. An area is composed of a square of side 10 KM and an equilateral triangles placed on the left side. The annual precipitation recorded at four corners and the centre of the square considered clock wise from the top left corner is 460mm, 650mm, 760mm, 800mm and 700mm respectively. The apex of the triangle has recorded 600mm of annual precipitation. Find the mean precipitation over the area by Thiessen polygon method and find the percentage difference with that of the arithmetic mean method. (10 Marks)

- 2 a. Explain briefly : i) infiltration capacity ii)  $\phi$  - index iii)  $\omega$  - index. (09 Marks)
- b. An infiltration test using a ring infiltrometer with 30cm diameter yielded the following data :

Time from the start (minutes)	0	2	5	10	20	30	60	90	150	210
Cumulative volume of water added (cm <sup>3</sup> )	0	278	658	1173	1924	2500	3345	3875	4595	5315

- i) Determine the infiltration capacity rates for the time intervals in the experiment.
- ii) What is the ultimate infiltration capacity rate  $f_c$ ?
- iii) What is the average infiltration capacity for the first 10 minutes and for the first 30 minutes of the experiment? (11 Marks)
- 3 a. Define the term Runoff and list the various factors that affect the runoff of a given area. (08 Marks)
- b. Explain with a neat sketch, the method of determining infiltration. (06 Marks)
- c. A 6 hour storm produced rainfall intensities of 7, 18, 25, 12, 10 and 3mm / hr in successive one – hour intervals over a basin of 800km<sup>2</sup>. The resulting runoff is observed to be 2640 heat – mt. Determine the  $\phi$  - index of the Basin. (06 Marks)
- 4 a. What is unit hydrograph? Discuss its use and limitations. (06 Marks)
- b. Describe the ISI standard evaporation pan with a neat sketch. (06 Marks)
- c. With a neat sketch, explain the working of double ring infiltrometer. (08 Marks)

**PART - B**

- 5 a. Define the importance of stream gauging. (06 Marks)
- b. What considerations would you have while selecting the site for a stream gauge station? (06 Marks)

- c. Explain with a neat sketch the method of measuring the velocity at a point in a stream using a current meter. (08 Marks)
- 6 a. Define the terms : i) permeability ii) Transmissibility iii) Aquifer iv) Specific yield. (08 Marks)
- b. A 200mm diameter well penetrates 300mm below the static water level. After a long period of pumping at a rate of 1800 lpm, the draw downs in the observation wells at 12m and 36m from the pumped well are 1.2m and 0.5m respectively. Determine i) the transmissibility of the aquifer ii) the drawdown in the pumped well assuming the radius of influence  $r_{\infty} = 300\text{m}$  iii) the specific capacity of the well. (12 Marks)
- 7 a. What are the open wells? Explain with a sketch constant level pumping test. (08 Marks)
- b. Differentiate between confined and unconfined aquifer. (02 Marks)
- c. During a recuperation test, the water level in an open well was depressed by pumping by 2.5m and is recuperated by an amount of 1.6m in 70 minutes.
- i) Determine the yield from a well of 3mt diameter under a depression head of 3.5mt.
- ii) Also determine the diameter of the well to yield 10 lit / sec under a depression head of 2.5mt. (10 Marks)
- 8 a. Explain in brief the various methods of rain water harvesting. (12 Marks)
- b. Explain capital budgeting. (08 Marks)

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