(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 2688 Roll No. | | | | | | | | | | |

B. Tech.

(SEM. VII) ODD SEMESTER THEORY EXAMINATION 2012-13

ENGINEERING HYDROLOGY

Time : 3 Hours *Total Marks : 100*

Note :–Attempt **all** the questions. All questions carry equal marks.

1. Attempt any **four** parts : **(5×4=20)**

(a) Define the Hydrology and discuss critically the statement "Knowledge of Hydrology is a must for any water resource planning".

(b) Explain briefly the types of rain gauges.

(c) What is hydrological cycle and what is its importance ?

(d) Discuss the different forms of precipitation.

(e) The isohyets for annual rainfall over a catchment basin were drawn. The areas of strips between isohyets are indicated below. Find the average depth of annual precipitation over the basin.

Isohyets (cm)	Areas (sq. km)	Isohyets (cm)	Areas (sq. km)
75-85	580	105-115	1000
85-95	2960	115-135	610
95-105	2850	135-155	160

(f) Write the short notes on any **two** of the following :

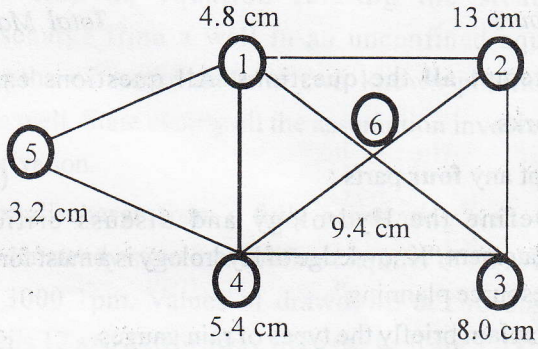
(i) Water budget equation

(ii) Mass curve of rainfall

(iii) Depth Area duration curves.

2. Attempt any **two** parts : **(10×2=20)**

(a) Find the mean precipitation for the area sketched below by Thissens's method. The area composed of a square and an equilateral triangle each side of 4 km. Rainfall readings at the various stations are given in fig :



(b) The following are the rates of rainfall for successive 20 minutes period of a 140 minutes storm : 2.5, 2.5, 10.0, 7.5, 1.25, 1.25, 5.0 cm/hr. Taking the value of φ_{index} as 3.2 cm/hr, find out the net runoff in cm, the total rainfall and value of W_{index}.

(c) Distinguish between :

(i) Infiltration capacity and Infiltration rate

(ii) Actual and Potential evapotranspiration

(iii) Field Capacity and permanent wilting point

(iv) Depression storage and interception.

3. Attempt any **two** parts : **(10×2=20)**

(a) Sketch a typical flow mass curve and explain how it could be used for the determination of :

(i) The minimum storage needed to meet a constant demand

(ii) The safe yield from a given storage.

(b) The ordinates of a 2-h unit hydrograph are given. Determine the ordinates of an S-curve hydrograph and using this determine the ordinates of 4-h unit hydrograph.

Time (h)	0	2	4	6	8	10	12	14	16	18	20	22
2-h UH Ordinate (m^3/s)	0	25	100	160	190	170	110	70	30	20	6	0

(c) (i) Describe the analysis of the recession limb of a flood hydrograph.

(ii) Write the short notes on :

(i) Direct hydrograph

(ii) Unit hydrograph

(iii) Instantaneous unit hydrograph.

4. Attempt any **two** parts : **(10×2=20)**

(a) Explain the rational method of computing the peak discharge of a small catchment. Where is it commonly used and what are its merits and demerits ? Also discuss the runoff coefficient C of the rational formula.

(b) Following observations were recorded for Flood frequency computations of the river Chambal at Gandhisagar dam :

Return Period T(years)	Peak Flood m^3/s
50	40,809
100	46,300

Estimate the flood magnitude using Gumbel's method in this river with a return period of 500 years.

(c) Explain the terms risk, reliability and safety factor. A factory is proposed to be located on the edge of the 50 year flood plain of a river. If design life of factory is 25 years, what is the reliability that it will not be flooded during its design life ?

5. Attempt any **two** parts : **(10×2=20)**

(a) Develop an equation relating the steady state discharge from a well in an unconfined aquifer and depths of water table at two known positions from the well. State clearly all the assumption involved in your derivation.

(b) The discharge from a fully penetrating well operating under steady state in a confined aquifer of 35 m thickness is 3000 1pm. Values of drawdown at two observation wells 12 and 120 m away from the well are 3.0 and 0.30 m respectively. Determine the permeability of the aquifer.

(c) Distinguish between :

(i) Aquifer and aquitard

(ii) Specific capacity of a well and specific yield of an aquifer

(iii) Aquiclude and aquifuge

(iv) Unconfined aquifer and leaky aquifer.