Code No: RT32014   **R13**   SET - 1

III B. Tech II Semester Regular/Supplementary Examinations, April - 2018
WATER RESOURCES ENGINEERING–I
(Civil Engineering)

Time: 3 hours   Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answering the question in **Part-A** is compulsory
3. Answer any **THREE** Questions from **Part-B**
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PART –A

1	a)	Explain as to how weather affects precipitation.	[3M]
	b)	Mention the factors responsible for reducing the evaporation process.	[4M]
	c)	Differentiate between total runoff and surface runoff.	[4M]
	d)	List out the objectives of flood mitigation methods.	[4M]
	e)	Enumerate the factors affecting the safe yield and specific yield.	[3M]
	f)	Enlist the advantages and disadvantages of Hydrological numerical models.	[4M]

PART –B

2 a) Discuss briefly the three important methods, which are used for determining the mean rainfall over a drainage basin. [8M]

   b) Define the terms: Design storm, applications of Engineering Hydrology, frequency of rainfall. [8M]

3 a) Explain in detail the factors affecting the infiltration capacity. [8M]

   b) How do you control the evapotranspiration? Explain in detail along with the significance of the term Interception. [8M]

4 a) Explain the use of unit hydrograph in the construction of flood hydrograph resulting from two or more periods of rainfall. [8M]

   b) During a storm event an average depth of 10cm of rain fell over a watershed with a land use of pasture in good condition and soils from hydrologic soil group C. Estimate the direct runoff. [8M]

5 a) For a date of maximum recorded flood of a river, the mean and standard deviation are $4500m^3/s$ and $1700m^3/s$, respectively. Using Gumbel's extreme value distribution, estimate the return period of a design flood of $9500m^3/s$. Assume an infinite sample size. [8M]

   b) Derive Muskingum equation and incidentally determine the coefficients there in. What is the sum of the coefficients? [8M]

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6 a) A 30 cm well completely penetrates an unconfined aquifer of depth 40 m. After a   [8M]
       long period of pumping at a steady state of 1580 lpm, the drawdown in two
       observation wells 25 m and 75 m from the pumping well were found to be 3.5 m and
       2.0 m respectively. Determine the transmissibility of the aquifer. What is the
       drawdown at the pumping well?

   b) Write a short note on the following: [8M]
       (i) storage coefficient and (ii) yield of a open well-recuperation

7 a) Explain various Hydrologic models along with their area of application.   [8M]

   b) How is the application of Kulandaiswamy model different when compared to   [8M]
       any conceptual model? Explain in detail.

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Code No: RT32014   **R13**   SET - 2

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Time: 3 hours   Max. Marks: 70

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2. Answering the question in **Part-A** is compulsory
3. Answer any **THREE** Questions from **Part-B**
*****

PART –A

1	a)	State the importance of hydrologic cycle, with a neat sketch	[3M]
	b)	Define the term: Infiltration capacity and infiltration rate.	[4M]
	c)	Enlist the assumptions made in the analysis of unit Hydrograph.	[4M]
	d)	Discuss the concept of Flood control methods.	[3M]
	e)	Detail the Darcy's law along with the assumptions.	[4M]
	f)	Enumerate the basic elements adopted in hydrologic simulation models	[4M]

PART –B

2	a)	By means of neat sketch, explain in detail about Float and Tipping type automatic rain gauge.	[8M]
	b)	Discuss three important ways in which clouds are formed indicating the type of precipitation caused by each of them.	[8M]
3	a)	What do you understand by water budget determination of reservoir evaporation? Explain in brief.	[6M]
	b)	Explain in detail the process involved in the measurement of infiltration by single ring infiltrometer and rainfall simulators	[10M]
4	a)	A watershed of 630 acres has 400 acres in row crop, contoured, good rotation and 230 acres in rotation meadow, contoured, good rotation. All soils are in the Hydrologic Soil Group B. Find the direct runoff for a rain of 5.1 cm, where the watershed is in AMC-II condition.	[8M]
	b)	The six-hour unit hydrograph of a watershed having a drainage area equal to 490 km^2 is as follows. For a storm over the watershed having excess rainfall of 10 cm for the first six hours and 20 cm for the second six hours, compute the stream flow hydrograph, assuming a constant base flow of 95 m^3/s.	[8M]

Time (hr)	0	6	12	18	24	30	36	42	48
Unit Hydrograph (m^3/sec)	0	2.8	45.9	105.6	51.8	35.8	24.6	10.5	1.9

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5 a) Explain flood routing through reservoirs. Describe the stepwise procedure adopted for flood routing computations by trial and error method. [8M]

   b) In a frequency analysis of rainfall based on the years of data 10 minutes storm, the following values were obtained: Arithmetic mean of the data = 1.85 cm, standard deviation = 0.55 cm. Find using Gumbel's extreme value distribution the recurrence interval of a storm of ten minutes and depth equal to 3 cm. [8M]

6 a) Two identical tube wells fully penetrating a 12 m thick aquifer are located at 170 m apart. The tube wells have diameter of 30 cm, radius of influence of 300 m and the coefficient of permeability of aquifer is 10^{-3} m/sec. Compute discharge of tube well when only one is working with a drawdown of 5 m and percentage decrease in discharge of the well, if both are working with a drawdown of 5 m. [8M]

   b) Give detailed classification of types of wells and explain them in detail. [8M]

7 a) Discuss the importance and applications of rainfall – runoff modeling techniques. [8M]

   b) Explain in detail the procedure involved in adopting Chow hydrological model. [8M]

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Code No: RT32014   **R13**   SET - 3

III B. Tech II Semester Regular/Supplementary Examinations, April - 2018
WATER RESOURCES ENGINEERING–I
(Civil Engineering)

Time: 3 hours   Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answering the question in **Part-A** is compulsory
3. Answer any **THREE** Questions from **Part-B**
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PART –A

1 a)	Define the term cyclonic precipitation.	[3M]
b)	Enumerate measures adopted to control evaporation	[4M]
c)	State and explain rational method used for computing peak runoff.	[4M]
d)	Enlist the effects of floods.	[4M]
e)	What is the importance of permeability and porosity in groundwater analysis?	[4M]
f)	Give the detailed classification of Hydrologic models.	[3M]

PART –B

2 a)	Discuss in detail the procedure for estimate the average rainfall using Thiessen Polygon method.	[8M]
b)	Explain in brief the significance of Depth-Area-Duration (DAD) curves and also Probable Maximum Precipitation.	[8M]
3 a)	What are various abstractions adopted for estimation of precipitation? Explain.	[3M]
b)	Explain in detail various methods adopted for estimation of Evapotranspiration.	[8M]
c)	State the factors affecting Infiltration.	[5M]
4 a)	State the rules to be observed in developing Unit hydrograph from gaged watersheds	[6M]
b)	A watershed has 35 acres in woods in good condition on A-soil and 250 acres of orchards and 400 acres of contoured row crops, both in good condition and on B-soils. An additional 36 acres is bare on B-soil. Estimate the weighted CN and the weighted discharge for storm rainfalls of 2, 4, 6, 8, and 10 cm.	[10M]
5 a)	Differentiate between hydrologic routing and hydraulic method of flood routing.	[8M]
b)	Explain the procedure involved in flood analysis by using Log Pearson type-III distribution method.	[8M]
6 a)	Write a short note on Recuperation test and aquifer parameters.	[8M]
b)	A well penetrate into an unconfined aquifer having a saturated depth of 100 m. The discharge is 250 lpm at 12 m drawdown. Assuming equilibrium flow conditions and a homogeneous aquifer, estimate the discharge at 18 m drawdown. The radius of influence may be taken as equal in both the cases. Derive the formula used.	[8M]
7 a)	What are various conceptual hydrologic models? Explain any one with detail procedure.	[8M]
b)	Derive the equation to draw the instantaneous unit hydrograph using Nash model.	[8M]

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Code No: RT32014   **R13**   SET - 4

III B. Tech II Semester Regular/Supplementary Examinations, April - 2018
WATER RESOURCES ENGINEERING–I
(Civil Engineering)

Time: 3 hours   Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answering the question in **Part-A** is compulsory
3. Answer any **THREE** Questions from **Part-B**
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PART –A

1	a)	Define the terms: Convective precipitation and Orographic Precipitation.	[4M]
	b)	State the difference between Evaporation, Interception and Transpiration.	[4M]
	c)	Explain how unit hydrograph is used to estimate the flood hydrograph of a storm.	[4M]
	d)	What is the use of Attenuation and Time Lag parameters in Flood analysis?	[4M]
	e)	Discuss the occurrence of groundwater and its utilization.	[3M]
	f)	Enumerate the assumptions made in the analysis of hydrological models	[4M]

PART –B

2	a)	What is intensity – duration curve, and how will you derive a curve for a given frequency at a rain gauge station from the available data.	[8M]
	b)	Explain how you can supplement precipitation records if they are missing for a particular year.	[8M]
3	a)	Explain clearly the terms: Infiltration capacity curve and Factors affecting infiltration.	[8M]
	b)	Discuss in detail any one method for the measurement of Evapotranspiration.	[8M]
4	a)	Calculate peak discharges using Rational method and the "Runoff Curve Numbers for Urban Areas." For 10 year, $C_f = 1.0$ and for 100 year, $C_f = 1.25$.	[3M]
	b)	Obtain a Unit Hydrograph for a basin of 282.6 km^2 of area using the rainfall and stream flow data tabulated below.	[13M]

Time (hr)	0	1	2	3	4	5	6	7	8	9	10
Observed Hydrograph (m^3/s)	0	170	160	360	850	900	700	650	500	300	150

Time (h)	0-1	1-2	2-3	3-4	4-5
Gross Precipitation (GRH) (cm/h)	0.35	1.75	3.75	3.75	0.25

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5 a) Write a short note on the following: [6M]
       (i) Standard Project Flood   (ii) Flood control management
   b) Route the following flood through a river reach for which the Muskingum   [10M]
       coefficients K and X are 22h and 0.25 respectively. At time t=0, the outflow
       discharge is 45cumec.

Time (hr)	0	12	24	36	48	60	72	84
Inflow (m^3/s)	35	90	160	360	300	200	195	75

6 a) A well penetrates into an unconfined aquifer having a saturated depth of 15 m. The   [8M]
       discharge is 8000 l/hour at 6m drawdown. Assuming equilibrium flow conditions
       and a homogenous aquifer, compute the discharge at 9 m drawdown. The radius of
       influence may be taken as equal in both the cases. Deduce the formula that can be
       used and calculate the discharge.
   b) Explain in detail various types of aquifers.   [8M]

7 a) What are various Deterministic models? Explain each of them in detail.   [8M]
   b) A watershed of 950-acre drainage area has the following 15-minute time-area   [8M]
       curve. The storage coefficient *k* of the watershed is 35 minutes. Determine the 10-
       minute unit hydrograph UH(10,t).

Time of Isochrones (minutes)	Area between isochrones (acres)
0	0
10	100
35	400
45	550
60	100

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