Code.No: 07A50103 | R07 | SET-1

III B.TECH – I SEM EXAMINATIONS, NOVEMBER – 2010
WATER RESOURCES ENGINEERING – I
(CIVIL ENGINEERING)

Time: 3hours **Max.Marks:80**

Answer any FIVE questions
All questions carry equal marks

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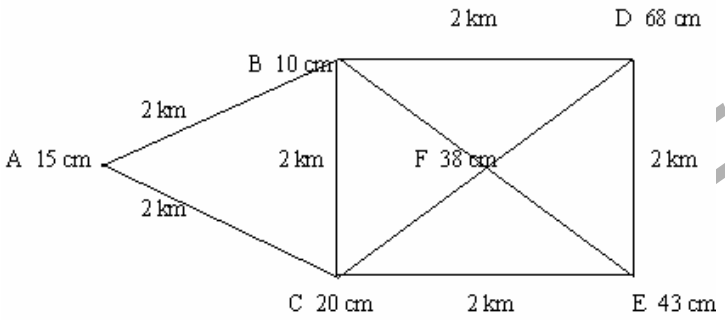
1.a) What is the system representation of a hydrologic cycle? Draw a block diagram of a global hydrologic cycle showing different parts. Also explain each part.

b) Find the mean precipitation over the basin for the figure shown below by Thiessen polygon method. The area composed of a square plus equilateral triangle plot of side 2 km. Rainfall readings are given in cm at the various stations indicated. [8+8]



2.a) A reservoir with a surface area of 450 hectares has the following average meteorological values during a week.

Water temperature	=	30^0 C
Relative Humidity	=	55%
Wind velocity at 1 m above G.L.	=	10 km/h
Mean Barometric reading	=	750 mm of Hg.

Estimate the average daily evaporation rate from reservoir and volume of water lost. Adopt Mayer's equation. Assume saturated vapour pressure at 30^0 C as 31.82 mm of Hg.

b) What is Runoff? Differentiate between runoff and base flow. Explain briefly the factors that affect runoff process. [7+9]

3.a) The design storm of a watershed has the depths of rainfall 5.6 cm and 4.6 cm for the consecutive one hour periods. The 1 hour Unit Hydrograph can be represented by a triangle of base 8 hours with a peak of 60 cumecs occurring after 3 hours from the beginning. Compute the flood hydrograph assuming an average loss rate of 6 mm per hour and a constant base flow of 12 cumecs. What is the area of watershed and coefficient of runoff?

b) What is Synthetic Unit Hydrograph? Derive Snyder's Synthetic Unit Hydrograph for a basin. [9+7]

4. The Maximum flood of a river at a site for the period of 20 years is given in table. Compute the magnitude of the flood using Gumbel's method. Assume for n = 20; $\overline{Yn}$ = 0.5236 and $\sigma n = 1.0628$

Year	1960	1961	1962	1963	1964
Flood (Lakh Cumecs)	2.00	1.20	1.90	1.75	1.60
Year	1965	1966	1967	1968	1969
Flood (Lakh Cumecs)	1.25	1.36	1.85	2.05	2.15
Year	1970	1971	1972	1973	1974
Flood (Lakh Cumecs)	1.10	1.00	0.98	1.74	1.70
Year	1975	1976	1977	1978	1979
Flood (Lakh Cumecs)	1.56	1.45	1.4	0.96	1.70

b) Explain SCS method of abstraction from a storm rainfall briefly. [10+6]

5.a) A 300 mm dia well penetrates 60 m below the static water table. After a long period of pumping at the rate of 2100 LPM, the draw downs in the wells at 20 m and 50 m from the pumped well were 2.10 m and 0.80 m respectively. Determine the transmissibility of the aquifer. What the draw down in the pumped well.

b) Differentiate between the following:
i) Specific yield and specific retention and
ii) Open well and tube well. [8+8]

6.a) Explain the advantages and ill effects of Irrigation.

b) Explain with the help of neat sketches Basin Method and Furrow methods of irrigation. [8+8]

7.a) At a certain location the soil data is as follows. Compute after how many days irrigation is required for healthy growth of crop.

i) Field Capacity of soil = 27%
ii) Permanent Wilting percentage = 12%
iii) Density of Soil = 1 200 kg/m^3
iv) Effective depth of Root Zone = 600 mm
v) Daily Consumptive use of Water for the crop = 10 mm

Note: For healthy growth moisture content must not fall below 25% of water holding capacity between the field capacity and permanent wilting point.

b) Write a detailed note on quality of water for irrigation. [8+8]

8.a) Design an alluvial channel for the following data; also compute the longitudinal slope required.

(i) Discharge = 8 cumecs
(ii) Silt factor = 0.90
(iii) Side Slope = 0.5 H : 1 V

(b) Explain different methods of lining of canals with their relative merits and demerits. [8+8]

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III B.TECH – I SEM EXAMINATIONS, NOVEMBER – 2010
WATER RESOURCES ENGINEERING – I
(CIVIL ENGINEERING)

Time: 3hours **Max.Marks:80**

Answer any FIVE questions
All questions carry equal marks

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1.a) Explain the various processes of a hydrologic cycle with a neat sketch.
b) A water shed has the following isohyetal information. Compute the average precipitation over the water shed. [8+8]

Isohyet (cm)	Area between Isohyets (Square km)	Average Precipitation (cm)
1	90	1.80
2	210	2.5
3	235	3.5
4	310	4.5
5	180	5.5
6	110	6.5
7	60	7.5
8		

2.a) The following are the monthly evaporation data (in cm) in a certain year (January to December) in the vicinity of lake. The water spread area in the lake in the January was 3.2 km^2 and in December 2.6 km^2 (Assume Linear Variation). Calculate the loss of water due to evaporation in that year. Assume pan coefficient as 0.71

Month	J	F	M	A	M	J	J	A	S	O	N	D
Evaporation (mm)	15.7	14.1	16.9	24.0	27.5	21.4	15.7	16.2	16.2	20.5	19.7	15.4

b) With the help of neat sketches explain various methods of separation of base flow from the hydrograph. [8+8]

3.a) The following are the ordinates of hydrograph of flow from a catchment area of 780 km^2 Assume a constant base flow of 40 cumecs.

Time (hrs)	0	6	12	18	24	30	36	42	48	54	60	66	72
Discharge (m^3/sec)	40	64	215	360	405	350	270	205	145	100	70	50	40

b) What do understand by S-Hydrograph? Explain how do you derive S-Hydrograph from a Hydrograph. [8+8]

4.a) The Maximum flood of a river at a site with a return period of 30 years for the data given in table. Compute the magnitude of the flood using Log Pearson type – III method. Assume k = 1.65.

Year	1960	1961	1962	1963	1964
Flood (Lakh Cumecs)	2.10	1.30	1.80	1.60	1.50
Year	1965	1966	1967	1968	1969
Flood (Lakh Cumecs)	1.05	1.36	1.65	2.15	2.25
Year	1970	1971	1972	1973	1974
Flood (Lakh Cumecs)	1.00	1.10	0.95	1.70	1.60
Year	1975	1976	1977	1978	1979
Flood (Lakh Cumecs)	1.55	1.45	1.40	0.91	1.50

(b) Write a detailed note on flood estimation by Rational formulae. [10+6]

5.a) Derive the expression for yield from a well with confined aquifer system. State all the assumptions made.

b) With the help of neat sketches explain the following.
(i) Unconfined Aquifer (ii) Specific Yield (iii) Storage coefficient. [7+9]

6.a) Explain in detail about sprinkler irrigation system and what are the conditions favorable for this Irrigation system.

b) Explain various objectives to be kept in mind for application of water for irrigation. State also the detailed procedure for preparation of land for irrigation. [8+8]

7.a) Explain various factors that will affect the duty for an irrigated area.

b) Discuss various Irrigation efficiencies. Also define the following.
i) Delta ii) Duty iii) Base Period. [8+8]

8.a) With the help of neat sketch, explain classification of alluvial canals also define what do you Understand by regime conditions of canal.

b) Design an irrigation channel by Kennedy's theory to carry a discharge of 20 cumecs. Take N = 0.0225, m = 1.0 and S = 1 in 5500. [8+8]

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III B.TECH – I SEM EXAMINATIONS, NOVEMBER – 2010
WATER RESOURCES ENGINEERING – I
(CIVIL ENGINEERING)

Time: 3hours **Max.Marks:80**

Answer any FIVE questions
All questions carry equal marks

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1.a) State the importance of Hydrology and Discuss the various processes of a hydrologic cycle with a neat sketch.

b) Find the mean precipitation over the basin for the figure shown in figure 1, by Thiessen polygon method. The area composed of a square plus equilateral triangle plot of side 3 km. Rainfall readings are given in cm at the various stations indicated. [8+8]

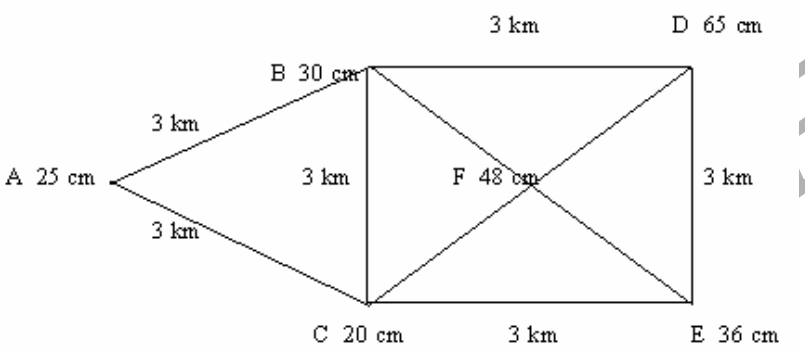

Figure - 1

2.a) Explain the process of infiltration. With the help of neat sketch, explain Horton's model of Infiltration equation.

b) Compute the Φ- index from the following data

Total Runoff = 77×10^6 m^3
Estimated Ground water Contribution = 2×10^6 m^3
Area of Basin = 250 km^2
The rainfall distribution is as follows.

Hour	0 – 2	2 – 4	4 – 6	6 – 8	8 – 10	10 – 12	12 – 14	14 – 16
Rainfall (cm/Hr)	2.50	5.00	5.00	3.50	2.00	2.00	1.50	1.50

[7+9]

3.a) The design storm of a watershed has the depths of rainfall 5.2 cm and 4.4 cm for the consecutive one hour periods. The 1 hour Unit Hydrograph can be represented by a triangle of base 6 hours with a peak of 50 cumecs occurring after 2 hours from the beginning. Compute the flood hydrograph assuming an average loss rate of 4 mm per hour and a constant base flow of 8 cumecs. What is the area of watershed and coefficient of runoff?

b) What do understand by S-Hydrograph? Explain how do you derive S-Hydrograph from a Hydrograph. [9+7]

4.a) Explain the following methods of flood frequency studies.
i) Gumbel's method ii) Log Pearson method
b) Write a detailed note on Hydrologic routing and Reservoir routing. [8+8]

5.a) A 250 mm dia well penetrates 50 m below the static water table. After a long period of pumping at the rate of 1800 LPM, the draw downs in the wells at 25 m and 40 m from the pumped well were 1.80 m and 0.70 m respectively. Determine the transmissibility of the aquifer. What the draw down in the pumped well.
b) Derive the expression for yield from a well with unconfined aquifer system. State all the assumptions made. [8+8]

6.a) Explain the necessity and importance of irrigation in India.
b) Explain with the help of neat sketches Flooding Method and Drip Irrigation methods. [8+8]

7.a) At a certain location the soil data is as follows. Compute after how many days irrigation is required for healthy growth of crop.

i) Field Capacity of soil	=	29%
ii) Permanent Wilting percentage	=	14%
iii) Density of Soil	=	1 260 kg/m^3
iv) Effective depth of Root Zone	=	610 mm
v) Daily Consumptive use of Water for the crop	=	9 mm

Note: For healthy growth moisture content must not fall below 25% of water holding capacity between the field capacity and permanent wilting point.
b) Explain various factors that will affect the duty for an irrigated area. [8+8]

8.a) Design an alluvial channel for the following data; also compute the longitudinal slope required.

i) Discharge	=	12 cumecs
ii) Silt factor	=	1.00
iii) Side Slope	=	0.5 H : 1 V

b) What are the different types of cross-sections adopted for a lined canal? Discuss the Procedure for the design of a lined canal. [8+8]

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III B.TECH – I SEM EXAMINATIONS, NOVEMBER – 2010
WATER RESOURCES ENGINEERING – I
(CIVIL ENGINEERING)

Time: 3hours **Max.Marks:80**

Answer any FIVE questions
All questions carry equal marks

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1.a) What is the system representation of a hydrologic cycle? Draw a block diagram of a global hydrologic cycle showing different parts. Also explain each part.

b) A water shed has the following isohyetal information. Compute the average precipitation over the water shed. [8+8]

Isohyet (cm)	Area between Isohyets (Square km)	Average Precipitation (cm)
1	80	1.70
2	220	2.50
3	245	3.50
4	320	4.50
5	190	5.50
6	100	6.50
7	65	7.50
8		

2.a) A reservoir with a surface area of 550 hectares has the following average meteorological values during a week.

Water temperature = 35^0 C
Relative Humidity = 50%
Wind velocity at 1 m above G.L. = 12 km/h
Mean Barometric reading = 760 mm of Hg.

Estimate the average daily evaporation rate from the lake of reservoir and volume of water lost. Adopt Mayer's equation. Assume Saturated vapour pressure at 35^0 C as 32.12 mm of Hg.

b) What is Runoff? Differentiate between runoff and base flow. Explain briefly the factors that affect runoff process. [7+9]

3.a) The following are the ordinates of hydrograph of flow from a catchment area of 860 km^2 Assume a constant base flow of 50 cumecs.

Time (hrs)	0	4	8	12	16	20	24	28	32	36	40	44	48
Discharge (m^3/sec)	50	62	185	290	345	275	190	180	125	90	80	65	50

b) Write a note on the following.
i) IUH ii) Snyder's Synthetic Unit Hydrograph. [8+8]

4.a) The Maximum flood of a river at a site for the period of 20 years is given in table. Compute the magnitude of the flood using Gumbel's method. Assume for n = 20; $\overline{Yn}$ = 0.5236 and $\sigma n = 1.0628$

Year	1960	1961	1962	1963	1964
Flood (Lakh Cumecs)	2.10	1.10	1.80	1.65	1.85
Year	1965	1966	1967	1968	1969
Flood (Lakh Cumecs)	1.35	1.39	1.95	2.25	2.05
Year	1970	1971	1972	1973	1974
Flood (Lakh Cumecs)	1.15	1.20	0.95	1.64	1.72
Year	1975	1976	1977	1978	1979
Flood (Lakh Cumecs)	1.56	1.35	1.41	0.86	1.40

b) Write a detailed note on flood estimation by Rational formulae. [8+8]

5.a) Derive the expression for yield from a well with unconfined aquifer system. State all the assumptions made.

b) With the help of neat sketches explain the following. [7+9]

i) Confined Aquifer ii) Specific Yield iii) Permeability.

6.a) Explain the advantages and ill effects of Irrigation.

b) Explain in detail about sprinkler irrigation system and what are the conditions favorable for this Irrigation system. [8+8]

7.a) Compute the consumptive use using Blaney-Criddle formula for the crop with the following data

Assume a constant crop coefficient (k) as 0.75

Month	**Nov.**	**Dec.**	**Jan.**	**Feb.**
Mean Temperature (Tm)	25^0 C	20^0 C	22^0 C	28^0 C
Percentage Monthly daylight Hours	7.10	7.25	7.50	7.20

b) Explain various factors that will affect the duty for an irrigated area. [8+8]

8.a) With the help of neat sketch, explain classification of alluvial canals also define what do you Understand by regime conditions of canal.

b) Design an irrigation channel by Kennedy's theory to carry a discharge of 22 cumecs. Take N = 0.0221, m = 0.9 and S = 1 in 5100. [8+8]

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