Mid-West University

Examinations Management Office

Semester End Examinations 2081

Bachelor level/ B.E. Civil/ 5th Semester — Full Marks: 50

Time: 3 hours — Pass Marks: 25

Subject: Engineering Hydrology (CE456/CE319)

- *Attempt all the questions*
- *Figures in the margin indicate full marks.*
- *Assume suitable values, with a stipulation, if necessary.*
- *Candidates are required to answer the questions in their own words as far as possible.*

1. a) Explain hydrological cycle. Write the importance of engineering hydrology. (4)

b) The watershed area up to dam site is 12km^2. A uniform rainfall of 0.8m/hr. for 2hr was observed on a day. 50% of the runoff reached the reservoir. A penstock carrying a flow of 1.5m3/sec is taken from the reservoir. The rate of evaporation was 0.9mm/hr./m^2. Assuming seepage loss to be 40% of evaporation loss. Find the change in reservoir level for 10 hours in the next, If the water spread of the reservoir was 0.55km^2. (3)

2. a) Write down penman equation and explain all variables involved in it. (3)

b) A basin has the area in the form of a pentagon with each side of 20km as shown in figure a. The five rain gauges located at the corners A, B, C, D and E have recorded 70,91,83,69 and 55mm of rainfall respectively. Compute mean rainfall over the basin by Thiessen Polygon method. (5)

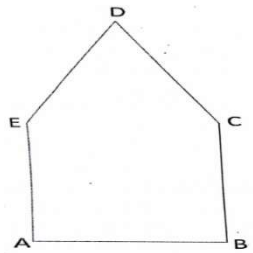

Figure : a

3. a) Derive Horton equation from following infiltration data and compute the infiltration from 1.0 to 3 hrs. (6)

Time in (hr.)	0	0.5	1.0	1.5	2	2.5	3	3.5	4
Infiltration rate (cm/hr.)	10.9	7.6	5.5	3.8	2.7	2.1	0.8	0.6	0.6

b) With the following data, compute the discharge of a Sotkhola river.

Distance from left bank(m)	Depth (m)	Revolution at 0.6d	Duration of observation (sec)
0	-	-	-
2	1.2	50	100
4	2.3	70	100
6	2.8	120	150
8	2.3	100	150
10	1.7	60	100
12	1.2	40	100
14			

Calibrated value of constant for current meter a=0.51 and b=0.03. (6)

4. a) Define floods. Write the causes of floods. Also mention the methods of mitigating floods. Explain about flood routing. (6)

b) The ordinates of a 4hour UH of a basin of area 25km2 are given below

Time (hr.)	0	4	8	12	16	20	24	28	32	36	40	44	48	52
UH (m^3/sec)	0	40	65	100	140	180	190	170	120	70	45	30	9	0

Calculate the following. (6)

i. 12 hr. UH by using the method of superposition

ii. 12 hr. UH by using the S-curve method

5. a) For a river, the estimated flood peaks for two year return periods by the use of Gumbels methods are as follows.

Return period (years)	Peak flood (m^3/sec)
100	550
50	470

What flood discharge in the river will have a return period of 500 years? (6)

b) Explain the Recharge of ground water. A 40cm diameter well penetrating an unconfined aquifer of 25m thick below water table is pumped at a uniform rate of 700litr/min, till the water level in the well becomes steady. Two observation wells drilled radially at a distance of 30 m and 90m from the center of the well, shows depression of 4.2m and 2.1 m respectively. (5)

i. Determine the permeability of the aquifer.

ii. Determine the drawdown at the main well

The End

Table 8-1 : Reduced mean $\overline{Y_n}$ in Gumbel's Extreme Value Distribution

N	0	1	2	3	4	5	6	7	8	9
10	0.4952	0.4996	0.5035	0.507	0.51	0.5128	0.5157	0.5181	0.5202	0.522
20	0.5236	0.5252	0.5268	0.5283	0.5296	0.5309	0.5320	0.5332	0.5343	0.5353
30	0.5362	0.5371	0.5380	0.5388	0.5396	0.5402	0.5410	0.5418	0.5424	0.5430
40	0.5436	0.5442	0.5448	0.5453	0.5458	0.5463	0.5468	0.5473	0.5477	0.5481
50	0.5485	0.5489	0.5493	0.5497	0.5501	0.5504	0.5508	0.5511	0.5515	0.5518
60	0.5521	0.5524	0.5527	0.5530	0.5533	0.5535	0.5538	0.5540	0.5543	0.5545
70	0.5548	0.5550	0.5552	0.5555	0.5557	0.5559	0.5561	0.5563	0.5565	0.5567
80	0.5569	0.5570	0.5572	0.5574	0.5576	0.5578	0.5580	0.5581	0.5583	0.5585
90	0.5586	0.5587	0.5589	0.5591	0.5592	0.5593	0.5590	0.5596	0.5590	0.5599
100	0.5600									

Table 8-2 : Reduced Standard Deviation S_n in Gumbel's Extreme Value Distribution

N	0	1	2	3	4	5	6	7	8	9
10	0.9496	0.9676	0.9833	0.9971	1.0095	1.0206	1.0316	1.0411	1.0493	1.0565
20	1.0628	1.0696	1.0754	1.0811	1.0864	1.0915	1.0961	1.1004	1.1047	1.1086
30	1.1124	1.1159	1.1193	1.1226	1.1255	1.1285	1.1313	1.1339	1.1363	1.1388
40	1.1413	1.1436	1.1458	1.1480	1.1499	1.1519	1.1538	1.1557	1.1574	1.1590
50	1.1607	1.1623	1.1638	1.1658	1.1667	1.1681	1.1696	1.1708	1.1721	1.1734
60	1.1747	1.1759	1.1770	1.1782	1.1793	1.1803	1.1814	1.1824	1.1834	1.1844
70	1.1854	1.1863	1.1873	1.1881	1.1890	1.1898	1.1906	1.1915	1.1923	1.1930
80	1.1938	1.1945	1.1953	1.1959	1.1967	1.1973	1.1980	1.1987	1.1994	1.2001
90	1.2007	1.2013	1.2020	1.2026	1.2032	1.2038	1.2044	1.2049	1.2055	1.2060
100	1.2065									