

Examination	Model Question		
	Level	BE	Full Marks
Program	BAG	Pass Marks	24
Year/Part	III/I	Time	3 hrs

Subject: - Hydrology and Agricultural Meteorology (ENAE301)

- ✓ Candidates are required to give their answer in their own words as far as practicable.
- ✓ Attempt **ALL** Questions.
- ✓ Figures in the margin indicate the **full marks**.
- ✓ Assume suitable data if necessary.

1. Define hydrology. Why hydrology is considered important in case of water resources engineering? (2+2)
2. (a) Explain the scope and application of agricultural meteorology. (4)
(b) Explain monsoon mechanism. (4)
3. (a) An isohyet drawn in the catchment of Bagmati river basin with catchment area of 442 sq. km has following data. Calculate the average rainfall for the basin. (3)

SN	Range of isohyet (cm)	Area enclosed by isohyet (Sq. km)
1	17-13	125
2	13-9	117
3	9-5	108
4	5-1	92

- (b) Explain different methods of determining the average rainfall over an area due to a storm. Discuss double mass curve. (5)
4. (a) Explain Infiltration. (2)
(b) Calculate the potential evapotranspiration for an area over Dang in the month of May by Penman's method using following data: Latitude = 26°N; Mean temperature = 10°C; Mean relative humidity = 65%; Mean monthly solar radiation at the top of atmosphere = 15.88 mm of evaporable water/day; Wind velocity at 2m height = 5 km/day; Psychrometric constant = 0.49 mm/°C; Mean sunshine hour = 10.1hr; Potential sunshine hour = 13.5hr; Reflection coefficient = 0.25; Slope of saturated vapor pressure at 10°C = 1.24 mm of Hg. (6)
5. (a) Discharge measured at Budhi Khola using current meter has following data. Calculate the total discharge of river. (4)

Distance from left bank (m)	Depth (m)	Velocity (m/s) At 0.2d	Velocity (m/s) At 0.8d
0	-	-	-
1.5	1.3	0.6	0.4
3.0	2.5	0.9	0.6
5.0	1.7	0.7	0.5
6.0	1.0	0.6	0.4

7.5	0.4	0.4	0.3
9.0	-	-	-

(b) Define flow duration and flow mass curves. (2+2)

6. Calculate the flood discharge from the outlet of the catchment if the total rainfall of 6.2cm occurred at an interval of 6 hours using following 2 UH. Assume Base Flow = 15 m³/s and infiltration index of 1.2 cm/hr. (8)

Time (hr)	0	2	4	6	8	10	12	14	16	18	20	22
2hr-UH (m ³ /s)	0	35	60	95	135	175	215	255	300	340	385	430

7. (a) What are the different methods of flood prediction for ungauged basin? (2)
 (b) Using 30 years data and Gumbel's method, the flood magnitude for return period of 100 and 50 years for a river are found to be 1200 and 1060 m³/s respectively. (6)
 (i) Determine the mean and standard deviation of the data used. Take values of reduced mean and reduced standard deviation in Gumbel's extreme value distribution for n=30 as 0.5362 and 1.1124.
 (ii) Estimate the magnitude of the flood with a return period of 500 years.
 (iii) What are the 95% confidence limits for this estimate if $f(95\%) = 1.96$?
8. (a) The storage in the reach of a stream has been studied. The values of x and k in Muskingum equation have been identified as 0.28 and 38.4 hr. If the inflow hydrograph to reach is as given below, compute the outflow hydrograph. Also find attenuation and lag of peak. Assume the outflow from the reach at t=0 is 35 m³/s. (5)

Time (hr)	0	6	12	18	24	30
Inflow (m ³ /s)	35	55	92	130	160	140

- (b) Write short note on Clark IUH and Nash Conceptual Model. (3)
