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|---|------------------|------------------------------|
| School: SOE                                     | Level: BE        | Invigilator's Sign: .....    |
| Program: BCE                                    | Year/Part: III/I | Superintendent's Sign: ..... |
| <b>Subject: Engineering Hydrology (EG607CE)</b> |                  | Code No. ....                |

- i. Answers should be given by filling the Multiple-Choice Questions' Answer Sheet.  
ii. The main answer sheet can be used for rough work.

Code No.

|  |                  |                         |
|--|------------------|-------------------------|
| <b>GROUP A (Multiple-Choice Questions)</b> | <b>[10x1=10]</b> | <b>Time: 20 Minutes</b> |
|--|------------------|-------------------------|

- Which factors govern the shape of hydrograph?
  - Climatic and physiographic factors
  - Climatic factors
  - River characteristics
  - Physiographic factors
- Which of the following external changes cause the rate of transpiration to decrease?
  - Increase in sunlight
  - Increase in temperature
  - Increase of carbon dioxide concentration
  - Increase of available soil water
- Which of the following factors is least significant while selecting a point for streamflow measurement?
  - Width of stream
  - Depth of stream
  - Presence of curve
  - Scouring effect on riverbank
- What does the term "runoff coefficient" represent in hydrology?
  - The fraction of rainfall that becomes direct runoff
  - The ratio of peak discharge to total rainfall
  - The speed at which water flows in a channel
  - The percentage of precipitation lost to evaporation
- Which tool is most frequently used to calculate the rate at which water evaporates in a certain area?
  - Anemometer
  - Pyrometer
  - Lysimeter
  - Evaporation pan
- Frost is formed when?
  - Dew freezes on cold surface

- Raindrops freeze upon contact with the ground
  - Warm, moist air rises rapidly
  - None of the above
- Which component of a weighing gauge rain gauge is used to measure rainfall?
    - Weighing mechanism
    - Float
    - Funnel
    - Tipping bucket
  - What is the main purpose of dead storage in a reservoir?
    - To store water for use during drought
    - To capture sediment
    - To provide recreational facilities
    - To generate hydroelectric power
  - Which type of data is most critical for performing a flood routing analysis during reservoir planning?
    - Soil composition data
    - Rainfall and runoff data
    - Evaporation rates
    - Temperature data.
  - For a given 6 hours' storm, which of the following assumptions should be necessarily true in order to plot a unit hydrograph?
    - Plane catchment area and one-way drainage only
    - Hydrograph has a base time of 6 hours
    - Uniform rainfall distribution and constant rainfall intensity for 6 hours
    - No base flow must be present in the catchment

### Multiple Choice Questions' Answer Sheet

Marks Secured: \_\_\_\_\_

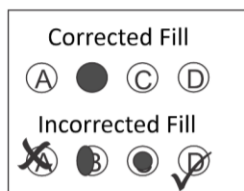
In Words: \_\_\_\_\_

Examiner's Sign: \_\_\_\_\_ Date: \_\_\_\_\_

Scrutinizer's Marks: \_\_\_\_\_

In Words: \_\_\_\_\_

Scrutinizer's Sign: \_\_\_\_\_ Date: \_\_\_\_\_



|                    |                     |
|--------------------|---------------------|
| 1. (A) (B) (C) (D) | 6. (A) (B) (C) (D)  |
| 2. (A) (B) (C) (D) | 7. (A) (B) (C) (D)  |
| 3. (A) (B) (C) (D) | 8. (A) (B) (C) (D)  |
| 4. (A) (B) (C) (D) | 9. (A) (B) (C) (D)  |
| 5. (A) (B) (C) (D) | 10. (A) (B) (C) (D) |

Manmohan Technical University  
Office of the Controller of Examinations  
**Exam Year: 2081, mangsir**

|   |                  |                |
|---|------------------|----------------|
| School: SOE                                     | Level: BE        | Time: 3 Hours  |
| Program: BCE                                    | Year/Part: III/I | Full Marks: 50 |
| Subject: <b>Engineering Hydrology (EG607CE)</b> |                  |                |

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ The figures in the margin indicate **Full Marks**.
- ✓ Assume suitable data if necessary.

**GROUP A** (Multiple-Choice Questions in separate paper)

[10×1=10]

**GROUP B** (Short Answer Questions - **Attempt Any Eight**)

[8×2=16]

1. Explain different components of hydrological cycle with diagram.
2. A river had a flood wave passing through it. At a given instant the storage of water in the reach was estimated as 15 ha.m. What would be the storage in the reach after an interval of 3 hrs if the average inflow and outflow during the time period are 14.2 m<sup>3</sup>/s and 10.6 m<sup>3</sup>/s respectively?
3. How do you obtain the average depth of rainfall over a catchment?
4. What is the use of double mass analysis? What may be the reasons for inconsistency in the recorded data?
5. Distinguish between Actual and potential evapotranspiration?
6. An infiltration capacity curve prepared for a catchment indicated an initial infiltration 2.5 cm/hr and attains a constant value of 0.5cm/hr after 10 hours. The total infiltration volume is 5.5 cm. Calculate the Horton's Constant(K).
7. Compute discharge through a river with following data:

| Distance from right bank(m) | Depth(m) | Velocity at 0.6d(m/s) |
|-----------------------------|----------|-----------------------|
| 0                           | -        | -                     |
| 2                           | 0.5      | 0.3                   |
| 4                           | 0.9      | 0.45                  |
| 6                           | 1.1      | 0.5                   |
| 8                           | 0.8      | 0.32                  |
| 10                          | 0.6      | 0.27                  |
| 12                          | -        | -                     |

8. Given the following data about a catchment of area 1000 km<sup>2</sup>, determine the peak discharge corresponding to a storm of 5cm in 1 hr.

| Time (hr)                   | 0   | 1   | 2    | 3   | 4   | 5   |
|-----------------------------|-----|-----|------|-----|-----|-----|
| Rainfall(cm)                | 0   | 2.5 | 0    | 1.5 | 0.5 | 1.5 |
| Runoff ( m <sup>3</sup> /s) | 300 | 300 | 1200 | 900 | 800 | 500 |

9. What is flood routing of a reservoir? What are its uses?

**GROUP C** (Long Answer Questions ( **Attempt any six questions**))

[6×4=24]

10. Explain different methods of determining the average rainfall over a catchment due to a storm. [4]

11. Calculate the potential evapotranspiration from an area near Dharan, Sunsari in the month of April by Penmans' formula. The following data are available.

Latitude: 26° 49'N,

Elevation (from msl): 250.00 m

Mean monthly temperate :22.5°C,

Mean relative humidity: 25%

Mean observed sunshine hour: 10 hr

Wind velocity at 2m height: 80 km/day Psychometric constant: 0.49mm of Hg per degree Celsius

Reflection coefficient:0.20

$e_w$ : 20.4 mm of Hg

A: 1.24mm per degree Celsius

$b = 0.52$ ,  $H_a = 14.9$ mm of evaporable water per day

Mean monthly value of possible sunshine hour (N): 12.7 hours

Nature of sunshine cover: closed ground green crop, where the symbols carry their usual mean

[4]

12. The ordinates of 4 hr unit hydrograph are given below:

| Time(Hrs)                         | 0 | 2 | 4  | 6  | 8  | 10 | 12 | 14 | 16 | 18 | 20 | 22 | 24 |
|-----------------------------------|---|---|----|----|----|----|----|----|----|----|----|----|----|
| 4 Hrs unit hydrograph ( $m^3/s$ ) | 0 | 9 | 12 | 28 | 40 | 52 | 49 | 36 | 29 | 20 | 13 | 10 | 0  |

The storm has successive 2 hr, 4 hr and 6 hr rainfall of 2.5, 8.0 and 9.0 cm respectively.  $\Phi$ -index is of 0.15 cm/hr and base flow of 40  $m^3/s$ . Determine the 2 hr UH and resulting flood hydrograph from above storm.

[4]

13. Annual flood peak flood of a river for 20 years yielded a mean value of 5460  $m^3/s$  and the standard deviation of 2950  $m^3/s$ , the proposed hydraulic project on this river has an expected life of 35 years and reliability of project is 87%. Using Gumbel's method predict the flood discharge for the project if the value of mean  $Y_n = 0.5402$  and  $S_n = 1.1285$ .

[4]

14. The catchment area of a reservoir is 1600 ha. A uniform precipitation of 8 mm/hr for 2 hours was observed on particular day. 55% run off reached the reservoir. A canal carrying a flow of 1  $m^3/s$  is taken from the reservoir. The rate of evaporation was 0.8 mm/h/ $m^2$ . Assuming seepage loss is 40% of evaporation loss, find the change in the reservoir level for 6 hours, if the water spread of the reservoir was 45ha.

[4]

15.Explain Double mass curve method for checking a rainfall data for consistency.

[4]

16. Describe the procedure of derivation of unit hydrograph from complex storms using appropriate expressions.

[4]

The End