KATHMANDU UNIVERSITY
End Semester Examination
February, 2025

Marks Scored:

Level : B.Sc./B.Tech.
Year : III

Course : ESEE 307
Semester : II

Exam Roll No. :

Time: 30 mins.

F. M. : 20

Registration No.:

Date 10 FEB 2025

SECTION "A"

[20 Q. × 1 = 20 marks]

Choose and mark [X] the most appropriate option from each set of choices

1. A Moderate rain intensity is
   [ ] <2.5 mm/hr [ ] 2.5 mm/hr to 4.5 mm/hr
   [ ] 2.5 mm/hr to 7.5 mm/hr [ ] > 7.5 mm/hr

2. Non-recording rain gauge (Symon's rain gauge) has cylindrical vessel with internal diameter of
   [ ] 12. 7 cm [ ] 12.7 mm [ ] 11.7 cm [ ] 11.7 mm

3. Which method is suitable for measuring discharge in mountain stream
   [ ] Dilution method [ ] area-velocity method
   [ ] Ultrasonic methods [ ] slope-area method

4. A line joining equal rainfall is called
   [ ] isotherm [ ] isohyet [ ] isobar [ ] isoline

5. A Depth-Area-Duration (DAD) curve is a plot of
   [ ] rainfall depth vs time [ ] discharge vs time
   [ ] rainfall depth vs duration [ ] rainfall depth vs area

6. The intermediate stage between snow and ice is called
   [ ] depth hoar [ ] firn [ ] snow crystal [ ] dense snow

7. A hydrograph is a plot of
   [ ] rainfall intensity against time [ ] stream discharge against time
   [ ] cumulative rainfall against time [ ] cumulative rainfall against time

8. Sectional staff gauge measures the
   [ ] velocity of the flow [ ] height of water in the channel
   [ ] discharge of the river [ ] sediment load in the river

9. Rational method for flood analysis is
   [ ] Estimating flood frequency for large river basins
   [ ] Calculating the peak discharge for small catchments up to 50 sq. km
   [ ] Analyzing the effects of human activities on floodplain development
   [ ] Determining the probability of dam failures

10. Snow tube is used to measure
    [ ] depth and water equivalent [ ] snow density
    [ ] water equivalent [ ] weight

11. Density of fresh snow ranges from
[ ] 100 – 200 kg/m^3 [ ] 100 – 300 kg/m^3 [ ] 200 – 300 kg/m^3 [ ] 50 – 70 kg/m^3

12. Equilibrium Line altitude of glacier means
[ ] The boundary that separates accumulation and ablation zone
[ ] The point of maximum glacier thickness
[ ] The area where ice velocity is the highest
[ ] The location of maximum melt during summer equivalent

13. Infiltrometer is used to measure
[ ] infiltration [ ] snow density [ ] rainfall [ ] mass balance

14. Current meter measures the
[ ] velocity of the flow [ ] height of water in the channel
[ ] discharge of the river [ ] sediment load in the river

15. Universal soil loss equation is
[ ] RKLCP [ ] RKLSCP [ ] RKLEP [ ] RKLSCEP

16. Volume of water that cannot be extracted by the force of gravity from a unit volume of aquifer is called
[ ] Permeability [ ] Specific yield [ ] Specific retention [ ] Storage coefficient

17. The return period of a flood is defined as:
[ ] The number of floods that occur in one year
[ ] The average time interval between floods of a given magnitude
[ ] The total rainfall during a specific event
[ ] The time taken for water to infiltrate the soil

18. What is the primary goal of flood routing?
[ ] To measure water velocity in a river
[ ] To calculate the total sediment in a floodplain
[ ] To predict the timing and magnitude of a flood wave downstream
[ ] To control the peak discharge of a river during floods

19. The zone below the water table, where all pores are filled with water, is called
[ ] vadose zone [ ] capillary fringe [ ] saturated zone [ ] unsaturated zone

20. What is the primary source of river discharge in Nepal during the monsoon season?
[ ] Groundwater [ ] glacial melt [ ] snowmelt [ ] rainfall

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SECTION "B"

Attempt ALL questions.

1. Define evaporation and evapotranspiration and describe factor affecting evaporation. Explain the Penman's equation for estimating evapotranspiration. [1+2+4]

OR

Describe different types of floods and flood control measures in detail with illustrations

2. What is current meter? Explain the Area-Velocity method of discharge measurement including the criteria for site selection for measurement. [1+4+2]

3. Describe the three methods of determining the average depth of rainfall over an area. Provide figures to support your answers wherever required. Mention merits and demerits of each method. [2+2+2]

4. What is mass balance of glacier? Describe glaciological and remote sensing methods of estimating mass balance. [1+4]

5. Describe the perennial, intermittent and ephemeral streams with illustration. [6]

6. Discuss the factors influencing runoff in a river basin. What are the main components of a hydrograph? Illustrate your explanation with a diagram. [3+3]

SECTION "C"

7. Differentiate between ***ANY THREE*** of the following: [3×2=6]
   a. Confined and unconfined aquifer
   b. Actual evapotranspiration and potential evapotranspiration
   c. Ice shelf and Ice sheet
   d. Vertical axis and horizontal axis current meters

8. Write short notes of ***ANY THREE*** of the following [3×2=6]
   a. GLOF mitigation effort in Nepal
   b. Lysimeter
   c. Reservoir sediment trap efficiency
   d. Darcy's Law

9. **Define following in no more than one sentence.** [6×1=6]
   a. Snow pillow
   b. Evaporimeter
   c. Consumptive use
   d. Double mass curve
   e. Convective precipitation
   f. Tipping bucket rain gauge