KATHMANDU UNIVERSITY
End Semester Examination
January/February 2025

Marks Scored:

Level : B.Sc.
Year : IV

Course : ENVS 423
Semester : I

Exam Roll No. :

Time: 30 mins.

F. M. : 20

Registration No.:

Date : 09 FEB 2025

SECTION "A"
[20Q. × 0.5 = 10 marks]

Choose the most appropriate answer from the given alternatives and ***encircle****.*

1. The upper most part of the accumulation area is called
   [ ] wet snow zone [ ] ablation zone [ ] dry snow zone [ ] percolation zone

2. Density of ice ranges from
   [ ] 100-300 kg m^{-3} [ ] 830-917 kg m^{-3} [ ] 700-800 kg m^{-3} [ ] 400 - 830 kg m^{-3}

3. Tidewater glaciers flow
   [ ] into the sea [ ] on the landmass [ ] into a lake [ ] into a mountain valley

4. Which oxygen isotope is much abundance in nature?
   [ ] ^{16}O [ ] ^{17}O [ ] ^{18}O [ ] ^{15}O

5. Thin ice layers may present at
   [ ] wet snow zone [ ] ablation area [ ] inside the glacier [ ] equilibrium line

6. In general, glacier mass balance will be negative in
   [ ] ablation area [ ] wet snow zone [ ] dry snow zone [ ] accumulation area

7. Total number of glacial lakes in Nepal is
   [ ] 3808 [ ] 1460 [ ] 1466 [ ] 2070

8. The Little Ice Age period was before about
   [ ] 4.5 years [ ] 45 years [ ] 450 years [ ] 4500 years

9. En-glacial channels are found
   [ ] at the bottom of a glacier [ ] on the surface of a glacier
   [ ] at the end of a glacier [ ] inside the glacier ice

10. Air bubbles found in glacier ice might change to
    [ ] water vapor [ ] oxygen isotope [ ] hydrogen isotope [ ] clathrate hydrate

11. Deformation that results from movement within or between individual ice crystals is called
    [ ] stress [ ] strain [ ] creep [ ] dislocation

12. Any part of a glacier which has ceased to flow and usually covered with debris is called
[ ] active ice [ ] dead ice [ ] blue ice [ ] dirty ice

13. Under the present condition, land ice has δ (per mil) values around
[ ] -30 [ ] -40 [ ] -50 [ ] -60

14. Oxygen isotope ratio is used to know past
[ ] air temperature [ ] humidity [ ] rainfall [ ] snowfall

15. Ice coring in the Himalayas is not suitable because of
[ ] sub-surface melting [ ] surface and basal melting
[ ] warm place [ ] cold place

16. Which of the following heat budget component links the sublimation process?
[ ] Radiation [ ] Sensible [ ] Latent [ ] Conduction

17. Which of the following glacier type is not found in Nepal?
[ ] Surging glacier [ ] Rock glacier
[ ] Debris-covered glacier [ ] Valley glacier

18. A glacier whose mass balance remains zero for many years is called
[ ] stationary state [ ] advancing state [ ] retreating state [ ] in steady state

19. Surface melt water may reach to the sub-glacial drainage system through
[ ] sub-glacial channel [ ] supra-glacial lakes
[ ] seepage [ ] moulin

20. During past glacial period, sea level lowered by around
[ ] 100-140 m [ ] 10-14 m [ ] 1000-1400 m [ ] 1-4 m

SECTION "B"

[10Q. × 1 = 10 marks]

Define in one sentence.

21. Rock Glacier

22. Ice water equivalent (w.e.)

23. Ice sheet

24. Ablation

25. Equilibrium Line

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26. Abrasion

27. Glacial Striation

28. Valley Glacier

29. Moraine

30. Kame

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SECTION "C"
[3Q. × 7 = 21 marks]

Attempt *ANY THREE* questions.

1. Describe in detail about the past glacial periods and its effects on the earth.

2. Describe a method of measuring accumulation and ablation of a glacier in the field.

3. What does study in the ice core of a glacier? Why is it important in glaciology?

4. How do glaciological studies help to explain the climate change?

SECTION "D"
[34 marks]

5. Differentiate between ***ANY FOUR*** [4Q. × 4 =16]
   a. Glacier and glacial lake
   b. Ice cap and ice sheet
   c. Heat budget and statistical methods for estimating glacier ablation
   d. Supra-glacier and En-glacial hydraulic systems
   e. Polar glacier and sub-polar glacier

6. Write short notes on ***ANY THREE*** [3Q. × 4 =12]
   a. Permafrost
   b. Snow, firn, and ice
   c. Glacier surge
   d. Glacial erosion

7. Give reasons why [2Q. × 3 =6]
   a. Energy balance method is used for glacier mass balance estimation instead of conventional glaciological method.
   b. Surging glaciers are not present in the Himalayan region.