Glaciers

Que.1. Describe briefly the sediment transportation of a glacier. [Marks :(3)]

(Hint: superglacial, englacial, subglacial moraines)

Ans. The general term moraine is applied for the rock material in transit and based on their location in relation to the body of the glacier, the following categories of moraines are recognized: (1) Superglacial moraine (morainic materials occurring on the surface or top of a valley glacier), (2) Englacial moraine (those occurring within a glacier) and (3) Subglacial moraine (morainic materials carried and moving along the basal portion of a glacier).

Que.2. How does glacial milk form? [Marks :(2)]

Ans. The glacial abrasion generally produces a fine clay-sized rock flour and this gives a light, cloudy appearance to the melt-water streams emerging from the terminus of a glacier and waters of such streams are described as glacial milk.

Que.3. Define the following terms: [Marks :(3)]

a] ablation b] calving c] ice bergs.

Ans. a). Ablation can be defined as the collective processes that remove snow, ice or water from a glacier or snowfield. Loss by ablation involves melting, evaporation, sublimation, calving (glacier calving or iceberg calving), or erosive removal of snow by wind (deflation).

b). Calving is the breaking off of chunks of ice at the edge of a glacier where it meets a sea or a large body of standing water. It involves a sudden release and breaking away of a mass of ice from the terminus of a glacier.

c). The floating masses of glacial ice that have broken or calved from the seaward end of either a glacier or an ice shelf are called icebergs.

Que.4. Express your ideas about the following: [Marks :(2)]

a] What is an ice age?

b] Which was the last ice age that our earth had experienced in the recent past?

Ans. a). The geological periods during which large scale glaciations have occurred are called ice ages.

b). Pliestocene glaciation

Que.5. How will you differentiate horns from aretes? [Marks :(2)]

Ans. Horns are mountain peaks or pinnacles, progressively thinned by glacial erosion from three or more glacial cirques.

An arête is a knife-edge like ridge, formed when two neighbouring cirques (corries) erode back to back and meet.

Que.6. Complete the given table on landforms formed by glacial erosion: [Marks :(3)]

LANFORMS	DESCRIPTION
Cirque	.....
.....	Tributary valleys that hang above the floor of the main valley
.....	Knife-edge like ridge of rock that seperates two cirques or valleys

Ans. LANFORMS DESCRIPTIONCirque

Semicircular or half bowl shaped depression present at the valley head in a glaciated mountain.

Hanging valleys Tributary valleys that hang above the floor of the main valley Arete Knife-edge like ridge of rock that seperates two cirques or valley

Que.7. Distinguish between the following:

a] mountain glaciers and continental glaciers

b] glacial plucking and glacial abrasion.

Ans. a). Glaciers that form in high mountains are known as mountain glaciers. Glaciers form in high latitude/in continents are continental glaciers.

b). Glacial plucking is the mechanical removal of pieces of rock, or particle detachment from bedrock surfaces that are in contact with moving glacier.

The process of mechanical scraping of a rock surface by friction between rocks and moving particles during their transport by glacier is glaial abrasion.

Que.8. List any three erosional features created by glaciers. [Marks :(4)]

Ans. Cirque, Arete, Horns, Hanging valleys,etc.

Que.9. Name the following: [Marks :(4)]

a] branch of geology that deals with the study of glaciers

b] cold regions of the earth where water exists in the form of snow and ice

c] widespread occurrence of glaciers on the earth during a particular period of time in the geological past

d] level above which snow is permanently found throughout the year.

Ans. a) Glaciology

b). Cryosphere

c). Glaciation/Ice ages

d). Snow line

Que.10. Fill in the blanks: [Marks :(2)]

a] the largest types of glaciers found on the earth are .....

b] mountain peaks that project out prominently above the general surface of a continental glacier are called .....

Ans. a). continental glaciers

b). nunataks

Que.11. How does a rochee moutonnee differ from a drumlin? [Marks :(2)]

Ans. A roche moutonné is a symmetric erosional form produced by passage of a glacier as a result of abrasion on the 'stoss' (direction in which ice advances) side of the rock (which will be a smooth surface) and plucking on the 'lee' (down-ice) side (resulting in a steep and jagged face).

A drumlin is a streamlined oval and asymmetric hill (resembling an inverted spoon) formed during the advancement of thick glaciers (ice sheets), by reworking of older glacial sediments (poorly sorted till) located below

Que.12. a). When and where are medial moraines formed? [Marks :(4)]

b). Name the various landforms produced by glacial deposition.

Ans. a). Medial moraines are formed where two mountain glaciers converge or when two tributary glaciers merge their lateral moraines unite to form a dark band of rock fragments traceable along the medial portion of the resulting glacier.

b). Morainic landforms, drumlins, Esker, Kame, Erratics, Outwash plain

Que.13. What is a glacier? Discuss the various stages involved in the formation of glacial ice. [Marks :(3)]

Ans. A glacier is a large, long-lasting mass of ice, formed on land by the compaction and recrystallization of snow, and showing evidence of present or past motion.

The glaciers form from snow. Snow is precipitation made up of ice crystals. Snow crystals form in nature when cold temperatures and high humidity levels combine in the atmosphere.The snow falling in glaciated regions, gradually thickens and after considerable time the individual snow crystals undergo partial melting and get transformed into granular grains. Ice at the pointed ends of the delicate hexagonal snow crystals, melts and migrates towards the centre forming a granule of recrystallized ice. Thus, the snow layer originally composed of delicate hexagonal snow crystals, gradually changes to an aggregate of spherical grains. This process also leads to a reduction in porosity. This intermediate stage in the transformation of snow to glacial ice is known as 'firn' or 'névé'. Firn looks like wet sugar, but has a hardness that makes it extremely resistant to shoveling. Further compaction as a result of melting of individual grains and accompanying recrystallization transforms névé or firn to glacial ice.

Que.14. In what way cols are useful in a glaciated terrain? [Marks :(1)]

Ans. Cols, like gaps, offer convenient and short communication routes or passage ways permitting movement of men and animals across mountain chains.

Que.15. Mention any four landforms that are formed by glacial erosion. [Marks :(2)]

Ans. Cirque, Arete, Horns, Col, Glacial valley, Hanging valley, Fjords.

Que.16. Write any four important characteristics of a cirque. [Marks :(4)]

Ans. Cirques are often the starting point of a mountain glacier or Alpine glacier.

These are semicircular or half bowl shaped depression present at the valley head.

They are arm-chair like depressions.

Cirques are invariably bounded on three sides by steep walls.

Generally, they range in diameter from a few meters to a few kilometers.

Que.17. Prepare a detailed note on glacial troughs and hanging valleys. [Marks :(4)]

Ans. Glacial Valley (Glacial trough): A mountain valley reshaped or modified by glacial action into a valley with a flat floor and steep sides. Glaciers (valley glaciers) that occupy valleys of mountainous regions modify these, in due course of time, into valleys with a U-shaped transverse section (cross section). Such glacial valleys or glacial troughs have broad bottoms and steeper sides, in contrast to the ordinary stream valleys of the region.

Hanging valley:- Where a glacier occupying a small tributary valley meets the larger valley, the tributary valley usually does not have the ability to erode the valley floor to the level of the floor of the main valley. This is because the intensity of glacial action in tributary valleys will be relatively lesser than that in the main valley. It is largely because of the lesser thickness of the tributary glacier in comparison with that of the trunk glacier. When the glacial ice melts or retreats, the floor of the tributary valleys hang above the floor of the main valley (or stand at a higher elevation than that of the main valley) and form hanging valleys.

Que.18. a). Which of the following is true about ice caps? [Marks :(4)]

i) They are the smallest type of glacier.

ii) They flow in all directions.

iii) They usually flow down valleys.

iv) They are found only in high mountain areas.

b) distinguish amomng ice sheets, ice shelves and ice cap.

Ans. a):- iv) They are found only in high mountain areas.

b). Ice sheets are the largest types of glaciers found on earth. In areal extent some of these attain continental dimensions.

Ice shelfs are extensive sheets of glacial ice found floating on water forming a seaward continuation of a land glacier.

Ice caps are formed in mountain zones when all the valley glaciers that occupy neighbouring valleys grow in size

Que.19. a). Distinguish between ground moraine and terminal moraine. [Marks :(4)]

b). How do you distinguish an esker from erratics?

Ans. a). A gently rolling ground surface underlain by till deposited beneath a glacier and usually bordered by terminal moraines (described below) is called ground moraine. Terminal Moraine or End Moraine are ridges formed by the accumulation of glacial deposits at the point marking the furthest advance of an ablating glacier.

b). An esker is a sinuously curving, narrow ridge of stratified glacial sediments deposited by melt-water streams formed in water filled tunnels beneath, above and within the ice.

Huge rock boulders carried and transported within a glacier and deposited several kilometers away from their source as the glacier melts are called erratics.