CHAPTER 5

Geomorphic Processes

CBSE · Geography · Class 11

WHAT THIS CHAPTER DOES

Boards prep that builds confidence, not anxiety.

TODAY'S MISSION

Today's mission

WHY THIS MATTERS

The big picture — two opposing energy systems

TOPIC

Before we start — what you must already know

TOPIC

A

Part A — Endogenic processes

TOPIC

Diastrophism — the slow movements of the crust

POINT 1	POINT 2	POINT 3	POINT 4

WORKED EXAMPLE

Volcanism — magma below and lava above

1. {'step': 'INTRUSIVE forms', 'detail': 'Magma cools BELOW the surface. Forms: batholiths (massive granite domes), laccoliths (dome-shaped), sills (sheet between strata), dykes (vertical cross-cutting sheet). Revealed only after overlying rock is eroded.'}

2. {'step': 'EXTRUSIVE forms', 'detail': 'Lava + ash + gases reach the SURFACE. Forms: shield volcanoes (Mauna Loa), cinder cones, composite cones (Fujiyama), and vast lava plateaus like the Deccan Trap of India.'}

3. {'step': 'Slow vs sudden', 'detail': 'Diastrophism is mostly SLOW (millimetres to centimetres per year). Volcanism can be SUDDEN and catastrophic (Krakatoa 1883). Both build relief.'}

TRY IT · SOLVE BEFORE YOU PEEK

Quick check — endogenic so far

Work it out before you flip the answer.

SOLUTION

TOPIC

B

Part B — Exogenic processes

TOPIC

Weathering — in-situ breakdown of rock

POINT 1	POINT 2	POINT 3	POINT 4

TOPIC

Weathering type tracks climate

WORKED EXAMPLE

Mass movement — gravity does the work

1. {'step': 'Definition', 'detail': 'Downslope motion of rock and soil under GRAVITY alone, often LUBRICATED by water but needing no other transporting agent. Classified by SPEED.'}
2. {'step': 'Creep — slowest', 'detail': 'Imperceptible drift of soil and regolith. Visible only indirectly — tilted fence-posts, bent tree trunks, leaning electricity poles on a hillside.'}
3. {'step': 'Flow — water-saturated', 'detail': 'Material moves as a viscous fluid. MUDFLOW on Himalayan slopes after a cloudburst; EARTHFLOW on saturated clay; SOLIFLUCTION in cold tundra where the top layer thaws over frozen ground.'}
4. {'step': 'Slide — sudden', 'detail': 'Rock or soil block detaches along a plane of weakness. LANDSLIDE on the Kedarnath route (2013); ROCKSLIDE; SLUMP (curved failure plane). Heavy rain, earthquakes and slope-cutting for roads are the common TRIGGERS.'}

TOPIC

Erosion + deposition — agents at work

POINT 1	POINT 2	POINT 3	POINT 4

TRY IT · SOLVE BEFORE YOU PEEK

Quick check — exogenic so far

Work it out before you flip the answer.

SOLUTION

TOPIC

C

Part C — Soil formation (Pedogenesis)

TOPIC

Five factors of soil formation

POINT 1	POINT 2	POINT 3	POINT 4

WORKED EXAMPLE

Worked example — black cotton soil of the Deccan

1. {'step': 'Parent material', 'detail': "Basaltic lava of the Deccan Trap — iron- and magnesium-rich, dark in colour. Source of the soil's black colour."}
2. {'step': 'Topography', 'detail': 'Largely flat plateau surface. Water and weathered material accumulate rather than wash away. Deep profile possible.'}
3. {'step': 'Climate', 'detail': 'Semi-arid with seasonal rainfall. Alternating wetting + drying produces the famous swelling-and-cracking behaviour and concentrates clay.'}
4. {'step': 'Biological activity', 'detail': 'Long history of grass cover + earthworm activity has built up humus and stable structure.'}
5. {'step': 'Time', 'detail': "Tens of thousands of years on a stable surface. Five factors combined → one of the world's most productive cotton soils."}

PYQ PATTERNS

Top 5 PYQ patterns — Geomorphic Processes

MARKS DISTRIBUTION

Where the marks come from — sub-topic weights

TOPPER TEMPLATE · MARK-BY-MARK

Topper template — 5-mark weathering answer

TOPIC

Weathering vs erosion

TRAP → TRUTH

× **MISTAKE** Weathering and erosion are the same thing.

✓ **CORRECT** WEATHERING is the IN-SITU breakdown of rock — the rock is shattered or chemically altered WHERE IT LIES, with no transport. EROSION is the REMOVAL and transport of weathered material by an agent (river, glacier, wind, waves). Weathering prepares the material; erosion carries it away. A rock that crumbles on a hillside has weathered; the same fragments swept downhill by a river have been eroded.

TOPIC

Endogenic and exogenic energy sources

TRAP → TRUTH

× **MISTAKE** All geomorphic processes draw energy from the sun.

✓ **CORRECT** Only EXOGENIC processes (weathering, mass movement, erosion, deposition) draw energy from the SUN plus GRAVITY. ENDOGENIC processes (diastrophism, volcanism) draw energy from the EARTH'S INTERIOR — primordial heat plus heat released by radioactive decay in the mantle. The two energy systems oppose each other: endogenic builds relief up, exogenic wears it down.

TOPIC

Orogenic vs epeirogenic

TRAP → TRUTH

× **MISTAKE** Orogenic and epeirogenic movements are the same.

✓ **CORRECT** OROGENIC ('mountain-building') movements are HORIZONTAL, localised at plate margins, and produce folded and faulted mountains (Himalayas, Alps). EPEIROGENIC ('continent-warping') movements are VERTICAL, broad, and uplift or depress large parts of continents without folding (the gentle uplift of the Deccan; the post-glacial rebound of Scandinavia). Both are diastrophic but the direction and scale differ.

TOPIC

Mass movement = landslide only

TRAP → TRUTH

× **MISTAKE** Mass movement means landslide.

✓ **CORRECT** Mass movement is the umbrella; landslide is just ONE of its three families. Mass movements are classified by SPEED: (i) CREEP — imperceptibly slow soil/regolith downhill movement visible as bent fence-posts and tilted poles; (ii) FLOW — water-saturated material moving as a viscous fluid (mudflow, earthflow, solifluction); (iii) SLIDE — sudden detachment along a plane (landslide, rockslide, slump). Heavy rain, earthquakes and slope-cutting are the common triggers.

TOPIC

Chemical weathering needs the tropics

TRAP → TRUTH

× **MISTAKE** Chemical weathering only happens in hot wet places.

✓ **CORRECT** Chemical weathering is FASTEST in hot, humid climates because water and warmth speed up reactions — but it occurs EVERYWHERE there is moisture. Carbonation dissolves limestone even in cool England (Yorkshire's limestone pavements). Oxidation rusts iron-bearing rocks in dry Rajasthan. The TYPE of chemical weathering shifts with climate, but the process is not tropics-only.

TOPIC

Soil is just dirt

TRAP → TRUTH

× **MISTAKE** Soil is the same as weathered rock.

✓ **CORRECT** Soil is weathered rock PLUS organic matter (humus) PLUS air PLUS water, organised into HORIZONS (O-A-B-C) over time. The transformation from regolith (loose weathered rock) to soil is PEDOGENESIS and requires the action of microorganisms, plants, burrowing animals, and centuries of climate. Regolith without biological activity is not yet soil.

TOPIC

Volcanism is only eruption

TRAP → TRUTH

× **MISTAKE** Volcanism means a volcano erupting at the surface.

✓ **CORRECT** Volcanism includes BOTH extrusive activity (lava flows, ash, volcanic gases at the surface — producing volcanic mountains and plateaus like the Deccan Trap) AND intrusive activity (magma cooling BELOW the surface — producing batholiths, laccoliths, sills, dykes). The intrusive forms are revealed only when overlying rock is later eroded.

TOPIC

Gravity is not an agent

TRAP → TRUTH

× **MISTAKE** Mass movement has no agent — gravity is not an agent.

✓ **CORRECT** GRAVITY is the direct driver of mass movement — no other transporting agent (water, wind, ice) is required, although water often LUBRICATES the failure. That is why mass movement is treated as a distinct exogenic process, separate from erosion by running water or glaciers.

PYQ PATTERNS

Top PYQ patterns to drill

#1	Distinguish between endogenic and exogenic geomorphic processes with examples. (3-5 marks)	CBSE SQP 2020, 2022; School Annual recurrently
#2	Explain the three types of weathering with examples / Differentiate physical and chemical weathering. (5 marks)	CBSE SQP 2019, 2021, 2023; very common at school level
#3	What is mass movement? Describe its three types. (3 marks)	CBSE SQP 2022; School Annual 2021
#4	Describe the factors controlling soil formation. (5 marks)	CBSE SQP 2023; School Annual
#5	Differentiate between weathering, mass movement and erosion. (3-5 marks)	School Term papers; CBSE SQP 2020

RECAP · MEMORISE THESE

Summary — one screen

1 Geomorphic processes split into ENDOGENIC (internal energy, build relief) and EXOGENIC (sun + gravity, wear down relief).

2 Endogenic = diastrophism (orogenic + epeirogenic + faulting + folding + plate tectonics) + volcanism (intrusive + extrusive).

3 Exogenic = weathering (physical + chemical + biological) + mass movement (creep + flow + slide) + erosion (water/glacier/wind/waves) + deposition.

4 Soil formation needs FIVE factors — parent material, topography,

5 Attach an Indian example to every named process and

WHAT'S NEXT

Next class — Landforms and their evolution

→ We turn from PROCESSES to PRODUCTS — the landforms that running water, glaciers, wind, waves and groundwater produce.

→ Bring back your erosion + deposition cards from today; the next chapter is a vocabulary-rich landform tour.

→ Pre-read: NCERT Ch 6 sections on fluvial and karst landforms.

Lock it in

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