# Large Scale Geomorphological Thematic Maps

## Questions

1. **Define large scale map.-2 Marks**
2. **Define thematic map.-2 Marks**
3. **Define geomorphological Map.-2 Marks**
4. **What are the Uses of geomorphological maps?-5 Marks**
5. **How are the surface-forms mapped in a geomorphological map?-5 Marks**
6. **How are the surface-materials mapped in a geomorphological map?-5 Marks**
7. **How are the geomorphological processes mapped in a geomorphological map?-5 Marks**
8. **Mention and define different types of geomorphological maps.-5 Marks**
9. **Mention the landform specific colour used in the geomorphological maps.-5 marks**
10. **What are the steps to be followed for the preparation of geomorphological map?-10 marks**

**Define large scale map.**

Large-scale maps show smaller areas in more detail, such as county maps or town plans might. Such maps are called large scale because the representative fraction is relatively large. For instance a town plan, which is a large-scale map, might be on a scale of 1:10,000, whereas the world map, which is a small scale map, might be on a scale of 1:100,000,000.

**Define thematic map.**

A thematic map is a map that focuses on a specific theme. It uses the base data, such as coastlines, boundaries and places, only as points of reference for the feature being mapped.

Thematic maps emphasize spatial variation of one or a small number of geographic distributions of landform, climate, population density, etc

**Define Geomorphological Map:**

The maps which are prepared for better analysis and understanding of landscape development through the study of landforms, surface and near surface deposits, geomorphic processes that act on landforms with time is known as geomorphological map. These maps are used for engineering works, planning for urban, pedological, botanical and land conservation, disaster management etc.

**What are the Uses of geomorphological maps?**

Geomorphological maps are having enormous scope of incorporating various types of physical and cultural data can be exploited in a big way as a geographic tool for planning in various development projects of human society.

Application of geomorphological mapping has a wide scope in planning and economic development. In preparing a comprehensive regional planning in the conservational practices for agriculture and forestry, in civil engineering pursuits on the surface and underground, such as construction of dams and reservoirs, roads, railways, shore protection, regulation of water level in rivers etc., in mining, mineral prospecting, various types of reclamation work etc. Geomorphological mapping can act as a useful technique and as a cartographic resource as well.

mention the different information types that are incorporated in geomorphological maps?

1. Mapping of surface form
2. Mapping of surface material
3. Mapping of processes.

**1. How are the surface-forms mapped in a geomorphological map?**

Geomorphological maps can express the form of land in greater detail than they are on contour maps.

These maps can recognize the change and break of slope showing **'V'** symbol added a packed line pointing downhill. On the basis of orientation of symbols and change of slope

- convex and
- concave slopes can be identified.

Steepness of slope is shown by an arrow lying normal to the slope and pointing downhill. It carries the angle of slope in degree.

Down slope curvature is shown-

- by placing 'X' on the arrow-stem for a convex slope and
- a vertical '-' for a concave slope.

Special symbols are used to indicate- a steep cliff, free-face of bedrock as defined by a **solid black symbol** along a line marking the crest. Short and steep slope is identified by a pecked line. Shading and contours are used to define slope classes. The I.G.U. manual identified six slope categories, such as

1. 0° -2°,
2. 2° -5°,
3. 5° -15°,
4. 15° -35°,

5. 35° -55° and
6. 55° +.

Slope steepness can be measured in-

1. degrees,
2. percentage and
3. gradient ratio.

Difference of height can be included if it is drawn on a faint contour base.

As regards the scale of the map, if the area is intensely dissected, the map scale may be of 1: 10,000, whereas if it is moderate smaller scale not less than 1:75, 000 can be used.

For variable features of similar nature variable thickness of lines may be employed. The features which are not covered by the minimum size to be shown on a particular scale, small symbols should be used for them. Different identification marks should be used for different surface forms. Thus a ridge is marked differently from that of an erosional or a solifluction lobe is different from a soil creep.

**2. How are the surface-materials mapped in a geomorphological map?**

As landforms are composed of various types of materials having distinctive characteristics in their nature and composition, it is necessary to have them mapped differently in order to distinguish the interaction of a less resistant material with geomorphic process from that of a more resistant one.

The geological materials fall into two groups:

1. Solid rocks and
2. Superficial deposits.

The superficial materials-

1. may be weathered materials in situ
2. or may be transported from elsewhere.

The distinctive characteristics of the bedrock as well as regolith can be mapped in the field in a geomorphological map. The type of bedrock should be distinguished as all of them have distinctive role in the building of country-landform. The structural characteristics of the rocks should also be marked in order to justify any specific behaviour reflected in the landform characteristics.

The superficial materials also behave differently depending on their

- compaction,

- composition,
- porosity,
- permeability,
- depth of the weathered mantle etc.

Soils also have similar behavioural features. In this regard the information about the compressive strength should also be examined and incorporated in the map. Besides, for any special purpose some other information may be needed in connection with lithology of an area or water retentivity of soils etc. For instance, a geomorphological map meant for agricultural planning should require the knowledge of

- Soil texture,
- structure,
- organic matter content,
- depth of soil etc,

However, this information may extend the process of geomorphological mapping further beyond the scope of a field technique and may be used for substantive planning for the purpose of development, that may be-

- agricultural,
- hydrological,
- soil conservation,
- landslide protection or anything else.

A comprehensive geomorphological map may be used for prediction purpose also.

**3. How are the geomorphological processes mapped in a geomorphological map?**

The ensemble of various geomorphological processes on the surface of the earth and their complicated interactions require detailed mapping. The features of coastal processes are distinctly different from that of mountain glaciers, periglacial processes have totally different set of interactions from that of fluvial processes etc. all such processes in terms of the features produced by them should comprise a major part of geomorphological information in the map.

In this regard it should be carefully maintained that an ancient landform feature largely being formed by any past geomorphological process should be marked in terms of previous process. For such features the present process should also be mentioned. For instance, a heap of glacial end-moraine, which is a legacy of the last little glacial age, may be presently modified by fluvial process.

In such cases the past process should be marked at the base faintly by any symbol, whereas, the present process will be prominently shown. An igneous intrusion after being exhumed and presently being weathered and eroded severely should also incorporate combined symbols. In the map the distinction between erosional and depositional landforms should clearly odepicted.

Anthropogenic process, like quarrying, construction of dams, roads etc. are important as well. So, these must be given due importance in the preparation of geomorphological maps.

**Mention and define different types of geomorphological maps.**

1. Morphographic maps
2. Morphogenetic maps
3. Morphometric maps
4. Morphochronologic maps

- **Morphographic maps:** This type of maps shows various landforms by their specific names.
- **Morphogenetic maps:** Such maps define the origin and development of landforms with genetic descriptions
- **Morphometric maps:** These maps show the dimensions of landforms. The morphometric information are included in such maps.
- **Morphochronologic maps**: Landforms according to their time of initiation are identified by such maps. Recent forms and those are inherited from the past processes are distinctly separated. Age is indicated by a code letter or a code number. It is omitted when age is not known.

**Mention the landform specific colour used in the geomorphological maps.**

I.T.C. has used the following colour system for the forms and other aspects of geomorphological maps:

| **Sl No** | **Forms/aspects** | **colour** |
|---|---|---|
| 01 | Forms of structural origin | Purple |
| 02 | Forms of volcanic origin | Red |
| 03 | Forms of denudational origin | Brown |
| 04 | Forms of fluvial origin | Dark blue |
| 05 | Forms of marine origin | Green |

| | | |
|---|---|---|
| 06 | Forms of glacial origin | Light blue |
| 07 | Forms of aeolian origin | Yeollow |
| 08 | Forms of solution origin | Orange |
| 09 | Morphometry | Black |
| 10 | Lithology | Black/grey |
| 11 | Chronology | Black |
| 12 | Topography | Black/grey |

**What are the steps to be followed for the preparation of geomorphological map?**

As geomorphological mapping is a comprehensive field technique of incorporating field data with the consultancy of topographic map side by side. For the preparation of geomorphological map the following steps are very useful-

**Step 1:** Comprehensive knowledge may be gathered from the available published works on the geology and geomorphology of the area.

**Step 2:** Determination of the purpose or problem for which the map would be prepared

**Step 3:** Collection of copies of topographical sheets on a scale not less than 1:50,000 for the area to be covered. On the basis of latitude and longitude given in the topographic map a base map is to be prepared.

**Step 4:**

- Through study of the topographic configuration of the area
- Identification important landform features on the base map
- Determination of the nature and geomorphic divisions of the surface and the major valley axes of the area
- Distinguishing the landform features according to process
- The landforms are to be shown on the map using separate set of symbols.

**Step 5:**

- Either preparation of slope map following Wentworth's method or determination of the gradient on map to show the general direction of slope.
- Determination of the line of changing slope and break of slope using proper symbols
- Superimposition of the above two features on the base map as a background by any subdued colour or screening.

**Step 6: techniques to be followed according to types of geomorphological maps**

**Morphometric map-** Morphometric techniques to be applied to find out the values of significance

**Morphogenetic map and Morphochronologic map-**

- Identification of the origin of landform features from the history of evolution of the area for the former period.
- Determination of age of the landforms of later period following any standard method
- Above landforms are to be compiled in the map by placing them at proper places.
- In Morphogenetic maps these features are to be named

**Step 7:**

- For the verification of ground truth field study is to be conducted
- Determination of surface geology including unconsolidated materials-
  - At the valley
  - At the ridge top
  - At mid slope and
  - At the break of slope.
- Superimposition of the map of surface geology on the main map by using proper conventional signs.

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**Step 8:**

- Identification of hydrological features in the toposheet, and placing them with the help of conventional signs.

- Information may be incorporated by figures, if available-
- Sub-surface hydrology including depth of water table at valley, ridge, plain, plateau, etc.

**Step 9:** Placing the man-made features of geomorphic significance on the map.

Step 10:

- Study of soil type under the following heads is to be required for any specific purpose , such as, area development planning-
    - Its texture,
    - Nature of drainage condition and
    - Line of water divides.
- Placing the above on the map using special symbols or alphabets.

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