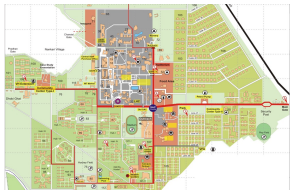
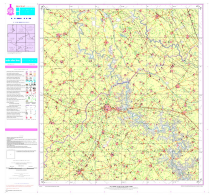


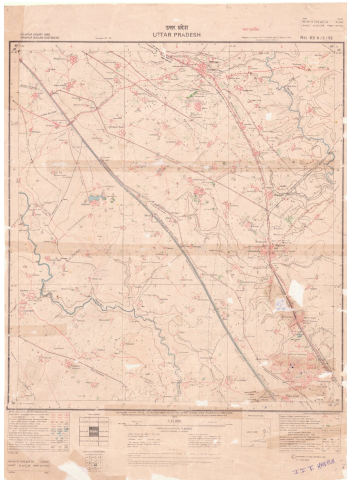
CE331 Lab 1 : Map Reading

Aman Kumar Singh
Teaching Assistant
Department of Civil Engineering
Indian Institute of Technology Kanpur

Objective

Lab Exercise 1 : Map Reading

- Understand map numbering system
- Study various details on a topographic map

Survey of India

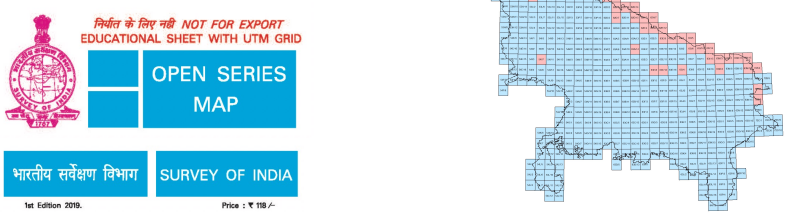
- National Survey and Mapping Organization of the country under the Department of Science & Technology
- In charge of mapping and surveying
- Set up in 1767
- https://www.surveyofindia.gov.in
- Main Roles:
  - Conducting all survey control (horizontal and vertical) and geophysical surveys.
  - Managing all mapping activities, including creating topographic maps.
  - Demarcating the external boundaries of India.
  - Providing training and conducting research and development in digital mapping.
  - Creating a digital topographical database at scales of 1:250,000, 1:50,000, and 1:25,000.
  - Predicting tides and publishing tide tables to support navigational activities.

भारतीय सर्वेक्षण विभाग
Survey of India
विज्ञान और प्रौद्योगिकी विभाग
Department of Science & Technology

Obtaining Maps from SOI

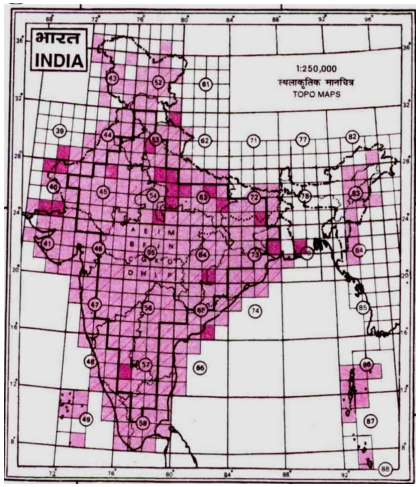
- Maps available at 1:250k, 1:50k, 1:25k scales.
- How to order the map of your area of interest?
- Maps can be purchased from SOI offices or obtained by post.
- SOI document

Map Numbering System !!!



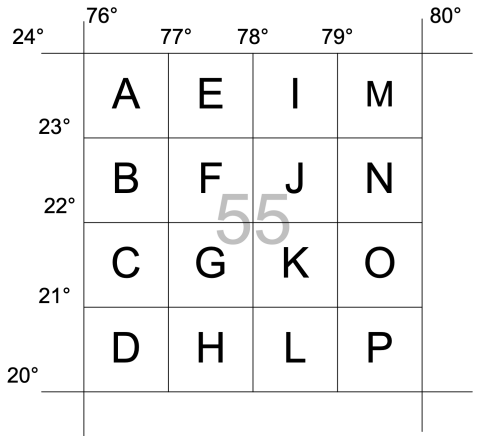
Map Numbering of SOI

- Each 4° by 4° area is given a unique number
- Map number for Lucknow, Kanpur and Delhi?
- Example number 55



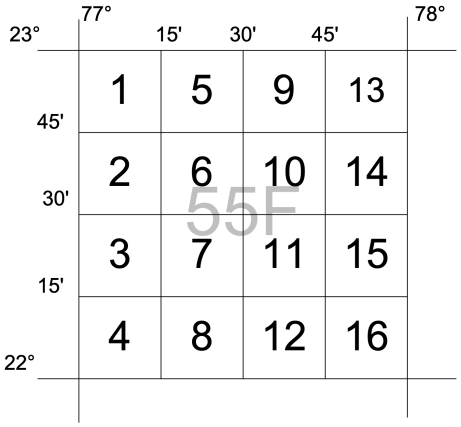
Map Numbering 1:250k sheet

- Each 4° by 4° area divided in 16 parts named A to P
- Coverage of each sheet is 1° by 1°
- The scale of a topo sheet is 1:250k
- Example number 55F



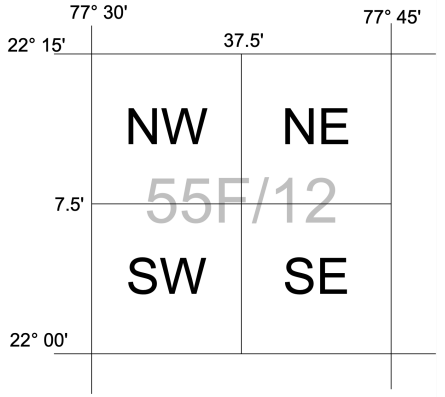
Map Numbering 1:50k sheet

- Each 1° by 1° area divided in 16 parts named 1 to 16
- Coverage of each sheet is 15' by 15'
- The scale of a topo sheet is 1:50k
- Example number 55F/12



Map Numbering 1:25k sheet

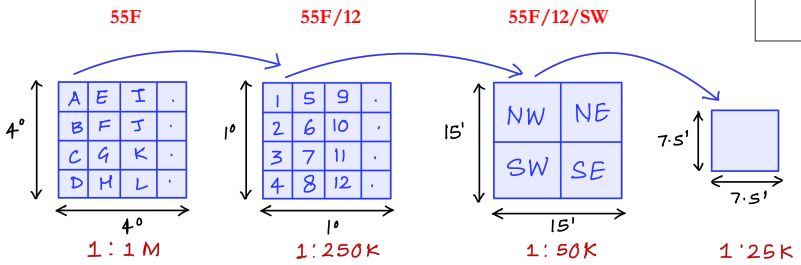
- Each 15' by 15 ' area divided in 4 parts named NW, NE, SW, SE
- Coverage of each sheet is 7.5' by 7.5 '
- The scale of a topo sheet is 1:25k
- Example number 55F/12/SW



Sheet Index

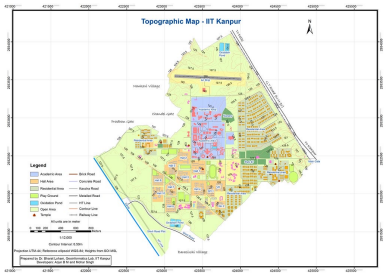
- Map numbering is done to organize and identify maps.
- What are the sheets which surround our area of interest?
- Sheet index can be written at each stage.

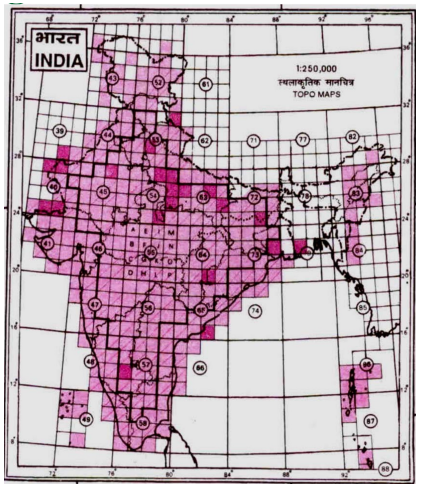
?		
?	63B/2/SE	



Sheet number for IIT Kanpur

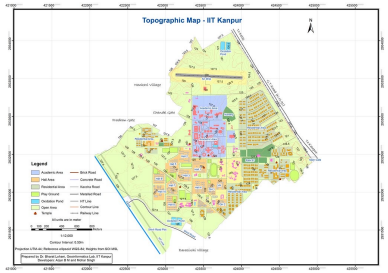
- IT Kanpur
  - Longitude: 80° 14.5′ E
  - Latitude: 26° 30.5′ N
- At 4° by 4° level, it should be in area 63

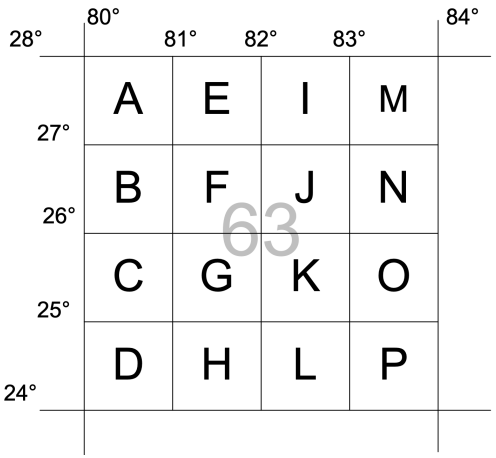




Sheet number for IIT Kanpur

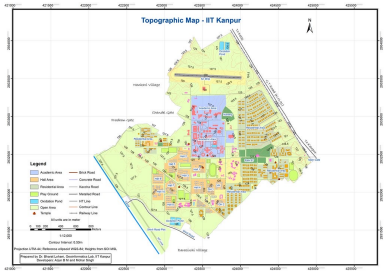
- IT Kanpur
  - Longitude: 80° 14.5′ E
  - Latitude: 26° 30.5′ N
- At 1:250k (i.e. 1° by 1°) it should be in sheet 63B

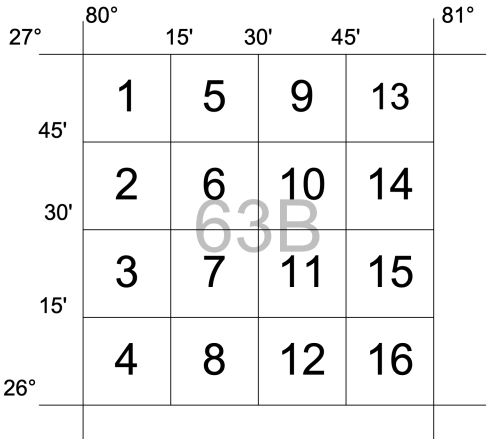




Sheet number for IIT Kanpur

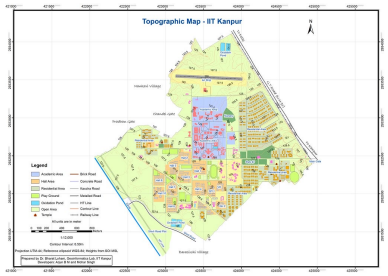
- IT Kanpur
  - Longitude: 80° 14.5′ E
  - Latitude: 26° 30.5′ N
- At 1:50k (i.e. 15’ by 15’) it should be in sheet 63B/2

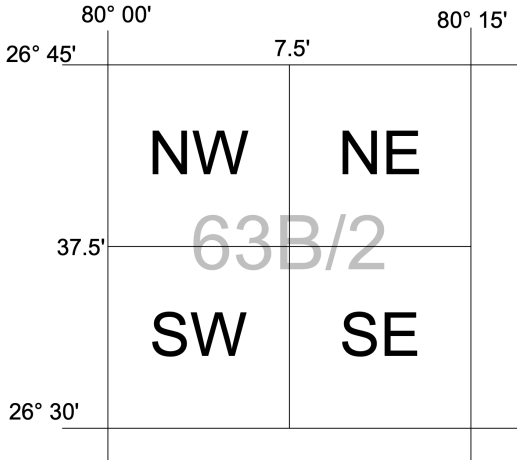




Sheet number for IIT Kanpur

- IT Kanpur
  - Longitude: 80° 14.5′ E
  - Latitude: 26° 30.5′ N
- At 1:25k (i.e. 7.5' by 7.5') it should be in sheet 63B/2/SE





Topographic Map

Topo Map

- Representation of natural and artificial features of an area
- Use of contour lines to show elevation
- Standardized symbols and colors for different features on map legend
- Topographic maps usually show a geographic graticule (latitude & longitude) and a coordinate grid, so you can determine relative and absolute positions of mapped features
- Scales: 1:1,000,000 (1:1M), 1:250,000 (1:250K), 1:50,000 (1:50K)

Note: Surveyed trees are marked in black, and unsurveyed trees are marked in green on the map.

Topographic Map

Map Scale

- A Scale is the ratio of the distance between any two points on a map to the actual distance between the corresponding points on the ground
- Scale is also referred to as Representative Fraction (RF)

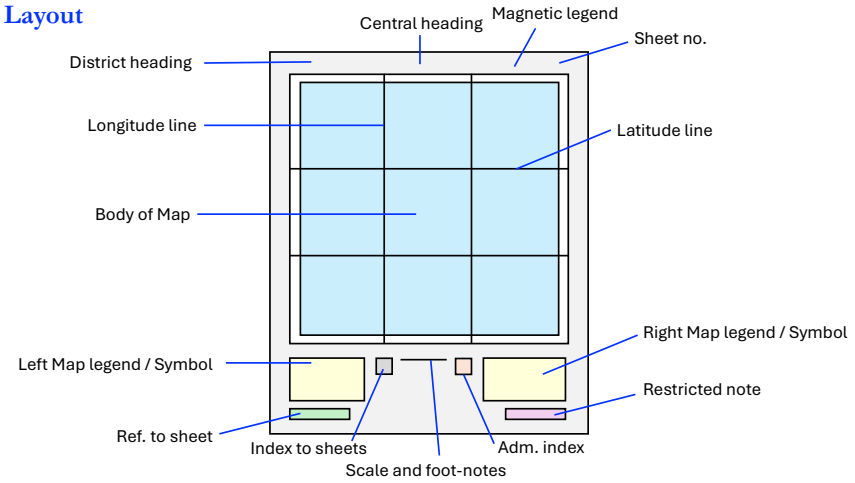
$$Scale = \frac{Map\ Distance}{Ground\ Distance}$$

Classification of Maps

- Based on scale
  - Large scale maps: larger than 1:25k
  - Medium scale: 1:25k,1:50k, 1:250k
  - Small scale: smaller than 1:250k
  - Very small scale: smaller than 1:1M
- Based on contents and purpose
  - Physical maps: Relief, Climatic, Weather, Bathymetrical, Vegetation, Geological and Soil maps
  - Cultural maps: Population, Linguistic and Economic and Commercial maps

Topographic Map

Map Layout



Plottable Accuracy / Error

- The smallest dimension of a feature that can be represented on a map
- A pencil dot on the map approximately equal to 0.25 mm
- Plottable error determines the scale of the map.
- Examples:

1:10000 Scale

1 mm = 10000 mm

- Plottable error 0.25 mm = 2.5 meters.
- Topographical features smaller than 2.5 m in dimension cannot be shown on this scale of map

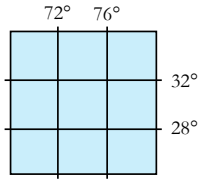
1:250000 Scale

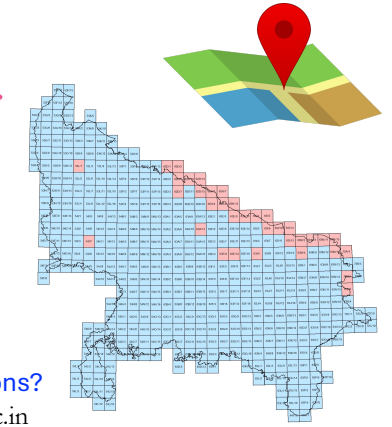
1 mm = 250000 mm

- Plottable error 0.25 mm = 62.5 meters
- Topographical features smaller than 62.5 m in dimension cannot be shown on this scale of map

Conversion of Degrees to Arc Length in Maps

- 1° = 100 km of Arc Length
- 1' = 1.6 km of Arc Length





Comments and Questions?

Email: amanks20@iitk.ac.in

Courtesy: Maj. Gen. (Dr.) B. Nagarajan, Dr. Bharat Lohani, Dr. Salil Goel, Geoinformatics Lab, IIT Kanpur