# DAILY ASSESSMENT FORMAT

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| **Course:** | **IIRS** | **USN:** | **4al15ec036** |
| **Topic:** | **Introduction to Global Positioning** | **Semester & Section:** | **8th A** |
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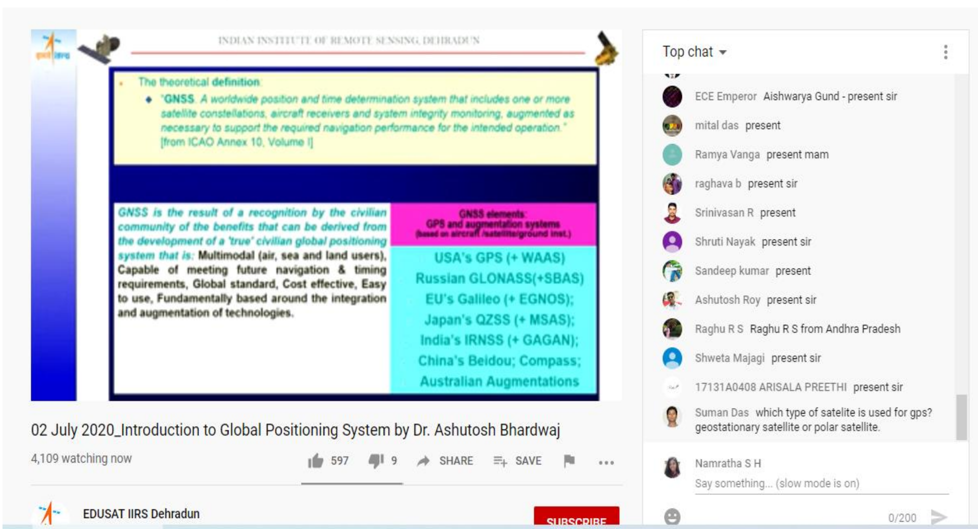
| FORENOON SESSION DETAILS |
|---|
| **Image of session** |




# Introduction to Global Positioning

## MAPPING AND SURVEYING

Planimetric maps – Planimetric maps are maps that represents only the horizontal features of the mapped area. Planimetric maps display features such as roads, sidewalks, buildings, river banks, shore lines, manholes, trees etc. No elevation information appears on planimetric maps.

Topographic maps – Topographic maps are maps on which both horizontal and vertical features of the mapped are represented. In addition to the above mentioned planimetric features, a topographic map depicts elevation information as contours and/or as spot elevations.

DEM's – Digital Elevation Model (DEM) or Digital Terrain Model (DTM) are dense networks of spot elevations represented by X,Y,Z coordinates. The DEM points are collected in a regular grid with break points which depict the characteristics of the topography. DEM's are used to draw contours and are an essential ingredient for the production of orthophotos.

In highway applications, DEMS can be used for producing cross sections, road profiles, and earth work computations. The advantage of using DEM's for volume computations is that the computation and the generation of the associated plots are almost automatic if the design was made under the same coordinate system. This is another good reason to use state plane coordinates and a unique elevation datum in all NJDOT work. One should be aware that an appropriate photo scale must be used to obtain centimeter level elevations.

Special purpose maps – Special purpose maps are maps that are designed to meet special needs or depict a special theme. The rule is that if you can see it on the aerial photograph, you can map it with photogrammetry. For example, a right-of-way map can be produced if all property corners are either targeted or can be identified on the photographs. Another example is a wetland map showing the delineation of wetland areas.

**HISTORY OF NAVIGATION**

- Landmark based navigation: Stones-Trees-Monuments (local use)
- Celestial Navigation Ok for latitude, poor for longitude until accurate clock invented in1760
- 13th Century: Magnetic Compass
- 1907: Gyrocompass
- 1912: Radio Direction Finding
- 1930's: Radar and Inertial Nav

- 1940-60's: "Loran-NB (Very Low frequency Radio-based)
- 1950-70's: Loran-C/Chayka (High frequency Radio-based)
- 1960's: Omega/Alpha*(Radio-based) &Transit
- 1980's: Development of GPS
- 1993/95: GPS - IOC/FOC
- 1993/95: GLONASS-IOC/FOC
- 1994: International GPS Service IGS begins (now GNSS)
- 2006:GNSS conceptualization
- 2000's: eLoran (Enhanced Loran-20m)/eChayka
- 2010: GLONASS resumes
- 2010's: conceptualization of integrated receivers with GNSS
- 2013-16: IRNSS
- 2019/20: Beidou

**SATELLITE NAVIGATION**

A satellite navigation system is a system that uses satellites to provide autonomous geo-spatial positioning. Example:

**GLOBAL**

- NAVSTAR GPS
- GLONASS
- BEIDOU
- GALILEO

**REGIONAL**

- IRNSS
- QZSS

## NAVSTAR GLOBAL POSITIONING SYSTEM

In 1973 the U.S. DOD decided to establish, develop, test, acquire, and deploy a spaceborne Global Positioning System (GPS), resulting in the NAVSTARGPS Wooden (1985) defined: "It is an all-weather, space based navigation system development by the U.S. DOD to satisfy the requirements for the military forces to accurately determine their position, velocity, and time in a common reference system, anywhere on or near the Earth on a continuous basis".

## GNSS

**The theoretical definition:**

- "GNSS, A worldwide position and time determination system that includes one or more satellite constellations. aircraft receivers and system integrity monitoring. augmented as necessary to support the required navigation performance for the intended operation."
- GNSS is the result of a recognition by the civilian community of the benefits that can be derived from the development of a 'true' civilian global positioning system that is:
- Multimodal (air, sea and land users), Capable of meeting future navigation & timing requirements, Global standard, cost effective, Easy to use, fundamentally based around the integration and augmentation of technologies

## CLASSES OF GPS RECEIVERS

- Geodetic class: capable of sub-centimeter accuracy, high-precision mapping
- Mapping grade: capable of <3 meters accuracy, portable, less expensive
- Navigation: capable of 10 meters accuracy, light weight, cheap

## GPS SURVEYING TECHNIQUES

Static

For long baselines (>20Km), where the highest possible accuracy is required

This is the traditional technique for providing Geodetic Networks and the only solution for large areas

**Rapid Static / Fast Static**

- For baselines up to 20Km
- Short Occupation times/high production

**Stop and Go**

- Detail Surveys. Any application where many points close together have to be surveyed
- Fast, economical & Ideal for open areas

**Kinematic**

- Used to track the trajectory of a moving object
- Can be used to profile roadways, stockpiles, etc.