

## DAILY ASSESSMENT FORMAT

Date:	02 JULY 2020	Name:	PAVITHRAN S
Course:	SATELLITE PHOTOGRAMMETRY AND ITS APPLICATION	USN:	4AL17EC068
Topic:	INTRODUCTION TO GLOBAL POSITIONING SYSTEM	Semester & Section:	6 <sup>TH</sup> B
Github Repository:	Pavithran		

### FORENOON SESSION DETAILS

#### Image of session

**Early Space-Based Radio Navigation System**

- Launch of Sputnik – Tracking? -----Doppler Shift. Altitude: 985km; revolution period: 98 min
- Frank McClure, of the Applied Physics Laboratory, made a suggestion: would it be possible to invert this problem? – given rise to TRANSIT in late 1950's (US- 6 sat; Altitude: 1100km; revolution period: 108 min) / TSYKLON/Cyclone (USSR-10 sat; 6- PARUS: Military; 4- TSIKADA / Cicada[1979]-commercial /civilian; Altitude: 1000km)
- The Navy Navigational Satellite System or TRANSIT, used observed measurements in Doppler shift to calculate distance and position to satellites (till 31-12-96).
- A fix requires 40 minutes for a static user-2D.
- Development of basic methods for satellite observations (Sputnik onwards), and for the computation & analysis of satellite orbits provided publication of the first Earth models such as:
  - the **Standard Earth Models** of the Smithsonian Astrophysical Observatory (SAO SE I to SAO SE III), and
  - the **Goddard Earth Models** (GEM) of the NASA Goddard Space Flight Center.
- TRANSIT Doppler positioning helped in improving **Earth geoid models** (e.g. GEM 10, GRIM).
- Radio Navigation System** assisted in crustal deformation studies globally.
- determination of connections between the most important geodetic datums (to  $\pm 50$  m) by 1970s.
- Today's scenario: **EGM96 / EGM 2008**.

02 July 2020\_Introduction to Global Positioning System by Dr. Ashutosh Bhardwaj

3,201 watching now · Started streaming 12 minutes ago

Up next: 09 June 2020 Geology of the

**Report – Report can be typed or hand written for up to two pages.**

## Introduction to Global Positioning Systems



The Global Positioning System (GPS) is a satellite-based navigation system made up of a network of 24 satellites placed into orbit by the U.S. Department of Defense. GPS was originally intended for military applications, but in the 1980's, the government made the system available for civilian use. GPS works in any weather conditions, anywhere in the world, 24 hours a day,

365 days a year. The 24 satellites that make up the GPS space segment are orbiting the earth about 12,000 miles above us. These satellites are travelling at speeds of roughly 7,000 miles an hour. GPS satellites are powered by solar energy. They have backup batteries onboard to keep them running in the event of a solar eclipse, when there's no solar power. Small rocket boosters on each satellite keep them flying in the correct path. Each satellite weighs about 2,000 pounds and is built to last about ten years.

## How Does GPS Work?

GPS satellites circle the earth twice a day in a very precise orbit and transmit signal information to earth. GPS receivers take this information and use triangulation to calculate the user's exact location. Essentially, the GPS receiver compares the time a signal was transmitted by a satellite with the time it was received. The time difference tells the GPS receiver how far away the satellite is. Now, with distance measurements from a few more satellites, the receiver can determine the user's position and display it on the user's electronic map. A GPS receiver must be locked on to the signal of at least three satellites to calculate a 2D position (latitude and longitude) and track movement. With four more satellites in view, the receiver can determine the user's 3D position (latitude, longitude and altitude). Once the user's position has been determined, the GPS unit can calculate other information, such as speed, bearing, track, trip distance, distance to destination, sunrise and sunset time and more.

## What is WAAS?

Wide Area Augmentation System (WAAS) is a system of satellites and ground stations that provide GPS signal corrections, giving you even better position accuracy. How much better? Try an average of up to five times better. A WAAS-capable receiver can give you a position accuracy of better than three meters, 95 percent of the time. As long as your GPS system is WAAS enabled you do not need any additional equipment or pay any service fees.

### GPS Accuracy



### WAAS Satellite

