**DAILY ASSESSMENT FORMAT**

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| **Date:** | **02/07/2020** | **Name:** | **PRIYA P RAO** |
| **Course:** | **IIRS Outreach Program on Satellite Photyogrammetry and it’s Application** | **USN:** | **4AL18EC041** |
| **Topic:** | **Introduction to Global Positioning System** | **Semester & Section:** | **4th sem ‘A’ section.** |
| **Github Repository:** | **Priya-Rao** |  |  |

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| **FORENOON SESSION DETAILS** |
| **Image of session**  **C:\Users\Pawan\Desktop\I3.PNG**  **C:\Users\Pawan\Desktop\I23.PNG** |
| **In today’s session I have learnt about:**   * **Brief History of Navigation :** * **Landmark based navigation : Stones-Trees-Monuments** * **Celestial navigation for Latitude, poor for longitude until accurate clock invented – 1760** * **13th century : Magnetic compass** * **1907 : Gyrocompass** * **1912 : Radio direction finding** * **1930 : Radar and Inertial Nav** * **1940 – 1960 : Loran-A/B** * **1950 – 1970 : Loran-C/Chayka** * **1960 : Omega/Alpha** * **From 1960 to 2010 there were many inventions done.** * **2013 – 2016 : IRNSS** * **2019/2020 : Beidou** * **Early Space – Based Radio Navigation System :** * **Development of basic methods for satellite observations and for computations and analysis of satellite orbits provided publication of the first Earth models such as :** * **The Standard Earth Models** * **The Goddard Earth Models** * **Transit Doppler positioning helped in improving Earth geoid models.** * **Radio navigation system assisted in crustal deformation studies globally.** * **Determination of connections between the most important geodetic datums.** * **Satellite Navigation :**   **A satellite navigation system is a system that uses satellites to provide autonomous geo-spatial positioning.**  **Examples :**   * **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 space borne Global Positioning System resulting in the NAVSTARGPS.**   * **Space – Vs. Ground – based Nav. Systems :**   **High frequency radio signals, necessary for the optimal atmospheric penetration, require line-of-sight transmission paths. Ground – based systems are limited to objects above ground.**   * **GNSS :**   **It is the result of the 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.**   * **GPS Signal Structure :** * **Each GPS satellite transmits a number of signals.** * **The signal comprises two UHF carrier waves and two codes as low power radio signals as well as a satellite orbit message.** * **Bandwidth allocated for L1 – 24 MHz, L2 – 22 MHz and L5 – 28 MHz** * **Receivers :** * **Single – Frequency :** * **Baseline accuracy 1cm/5mm + 2/1ppm (ms)** * **Uses post process L1 carrier phase.** * **Used for all surveying tasks with baseline up to 15Km.** * **Network densification, detail surveys.** * **Real time.** * **Occupation time as per baseline.** * **Less expensive alternative to dual frequency.** * **Most unsophisticated receivers track only L1 and use a simplified correction model.** * **Dual and Multi Frequency :** * **The high end of the GPS market** * **Baseline accuracy ranging from 5/3/3.5mm + 1/0.4ppm (rms)** * **Used in all GPS Surveying tasks** * **Geodetic control networks, tectonic plate monitoring, photogrammetric control, network densification, detail surveys, etc.** * **Real time.** * **Smaller occupation time.** * **New applications are found on a daily basis.** * **3 – 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 base – line, where the highest possible accuracy is required.** * **This is the traditional technique for providing geodetic network and the only solution for large areas.** * **Rapid static/ Fast static :** * **For baseline 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 and ideal for open areas.** * **Kinematic :** * **Used to track the trajectory of a moving object.** * **Can be used to profile roadways, stockpiles, etc.** * **Principle of Differential – GPS/GNSS :** * **The reference station may compute the errors.** * **This can be transmitted to the user receiver in real time.** * **The user receiver computes his position using the Pseudo-ranges obtained from the same 4 GPS satellites and applies the corrections.** * **This also provides improved position estimate.** * **Precise Point Positioning :** * **It is similar to DGNSS positioning methods, however it use permanent reference stations to quantify systematic errors. It can also be in post-mission or real time mode.** * **Limitations are long observation requirements.** * **Examples :** * **RTX services by trimble.** * **Leica** * **Omnistar** * **AUSPOS** * **CSRS-PPP** * **Satellite Based Augmentation System :**   **ICAO develops the standards and procedures to support transition to the CNS/ ATM system include Global Navigation Satellite System (GNSS).**   * **GNSS Aviation Integrity :** * **Using ICAO GNSS Implementation Strategy and ICAO Standards and Recommended Practices.** * **GPS Aviation use approved for over a decade** * **Space based augmentation system since 2003** * **Development of GNSS Ground Based Augmentation System continues.** * **GNSS is cornerstone for national airspace system.** * **Satellite Navigation’s Mission SBAS/ GBAS Implementation and Performance – Based Navigation :**   **Benefits –**   * **Enhanced safety** * **Increased capacity** * **Reduced delays** * **Increased flight efficiencies** * **Increased schedule predictability** * **Environmentally beneficial procedures** * **Indian Regional Navigation Satellite System (INRSS) :** * **It is an independent regional national satellite system developed by ISRO, India.** * **Operational name : Navigation with India** * **It is designed to provide accurate real time Position, navigation and time services to users on a variety of platforms and applications.** * **It is designed to provide accurate position information service to users in India as well as the region extending up to 1500km from its boundary, which is its primary service area.** * **IRNSS is providing two types of services, namely :** * **Standard Positioning Services** * **Restricted Services** * **It is providing a position accuracy of better than 20m in the primary service area.**      * **Space Segment :**   **The space segment consists of seven satellites. Three IRNSS satellites are in geostationary orbit and four are in the inclined geosynchronous orbit.**   * **Stereovision /Stereo-plotting :**   **It is the extraction of 3D information from digital images, such as those obtained by a CCD camera by comparing information about a scene from two vantage points.** |