

10. The angle to an object in the horizontal plane counted from north (towards east) is called
a. Azimuth b. Zenith c. Elevation d. Nadir
11. Which force acts on opposite direction of motion of satellite that can cause perturbation?
a. Gravitational force b. Atmospheric Drag
c. Third body effect d. Solar flux
12. Which of the following is **NOT** a GPS signal?
a. Ephemeris b. Code c. Carrier d. Data signal
13. Geostationary satellites have _____
a. Same speed of revolution to that of Earth
b. Same distance from earth's center
c. Same speed of rotation to that of Earth
d. Same angle of inclination to Earth's axis of rotation
14. Which of the following is **FALSE** about ITRF?
a. Materialization of reference system
b. Actual construction that implies the choice of physical structure
c. Conceptual (theoretical) framework
d. The realization based on actual parameters
15. Full form of VLBI is _____
a. Very Long Baseline Interferometry b. Very Large Baseline Interferometry
c. Very Long Baseline Intermission d. Very Long Basement Interferometry
16. The device or surface that reflects radiation (usually light) back to its source with minimum scattering is
a. Reflector b. Transmitter c. Retroreflector d. Receiver
17. Which of the system measures the frequency shifts in radio signals, transmitted by ground beacons and received by satellites passes overhead?
a. SLR b. VLBI c. GNSS d. DORIS
18. GRACE, GOCE, CHAMP etc are the example of which missions?
a. Satellite Altimetry b. Satellite gravimetry
c. Apollo mission d. Mars Mission
19. The level 5 of GGOS are _____
a. The stable quasars b. LEO satellites
c. GNSS d. Moon and the planets
20. The controlled re-entry of a satellite to a specific location is called _____
a. De-Cay b. De-Orbit c. Deploy d. Project

KATHMANDU UNIVERSITY
End Semester Examination
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25 JUN 2023

Level : B.E.
Year : III
Time : 2 hrs. 30 mins.

Course : GEOM 315
Semester : II
F. M. : 40

SECTION "B"
[6Q × 4 = 24 marks]

Attempt *ANY SIX* questions.

1. State three laws of Kepler's law of planetary motion. Prove the first law of Kepler's law of planetary motion using Newtonian mechanics. [1.5+2.5]
2. What is reference system? What are the origin and orientation of Space fixed reference system and Earth fixed reference system according to IERS Convention. [1+3]
3. What do you understand by dynamic sea topography? How do we measure it with an altimeter? [1+3]
4. Explain briefly the working principle of VLBI with appropriate diagram.
5. What are internal and external objectives of GGOS? What are the major focus areas of GGOS? State the challenges in achieving such objectives. [1+1.5+1.5]
6. What do you mean by westward regression of ground tracks? [1]
Figure 1 is a ground track of satellite 1. Answer the following questions.

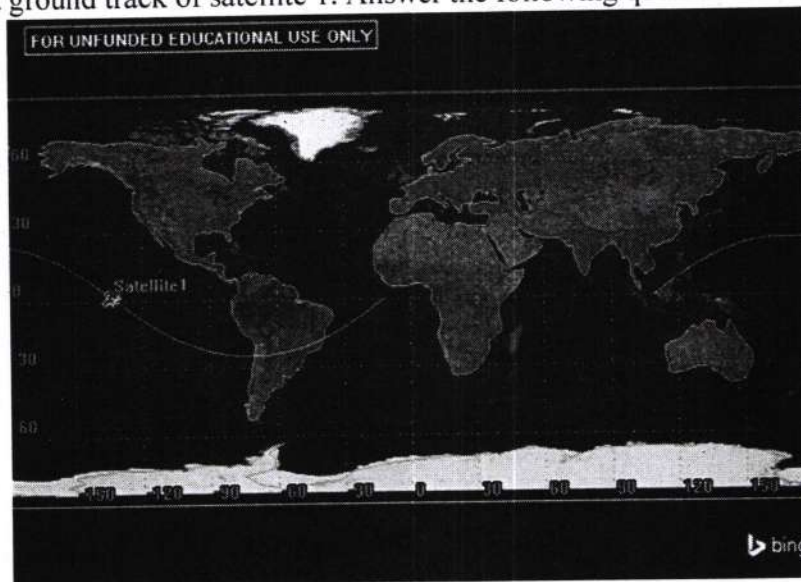


Figure 1

- a. What is the type of orbit? [1]
- b. What is its inclination? [1]
- c. What is its eccentricity? [1]

7. Write short notes on *ANY TWO*. [2 × 2 = 4]
- SLR
 - Gravity missions
 - Kalman Filter

SECTION "C"
[2Q × 8=16 marks]

Attempt *ALL* questions. Assume suitable data if necessary

Radius of Earth = 6371 km; $\mu_{earth} = GM = 398600.5$; Mass of earth = $5.9722 \times 10^{24} \text{ kg}$

8. Given below are two state vectors Answer the following questions: [8×1]

$$\vec{R} = 0\hat{i} + 0\hat{j} + 10,000\hat{k} \text{ km}$$

$$\vec{V} = 6\hat{i} + 0\hat{j} + 0\hat{k} \text{ km/s}$$

- Where is the satellite currently?
 - What is the orbit's specific angular momentum?
 - What is the orbit's semi-major axis?
 - What is the orbit's eccentricity?
 - What is its inclination, i ?
 - What is its RAAN?
 - What is its argument of perigee?
 - What is the satellite's true anomaly?
9. Explain briefly the working principle of GNSS with appropriate sketch. Discuss the factors affecting the accuracy of GNSS data and possible ways to solve them. [2+3+3]