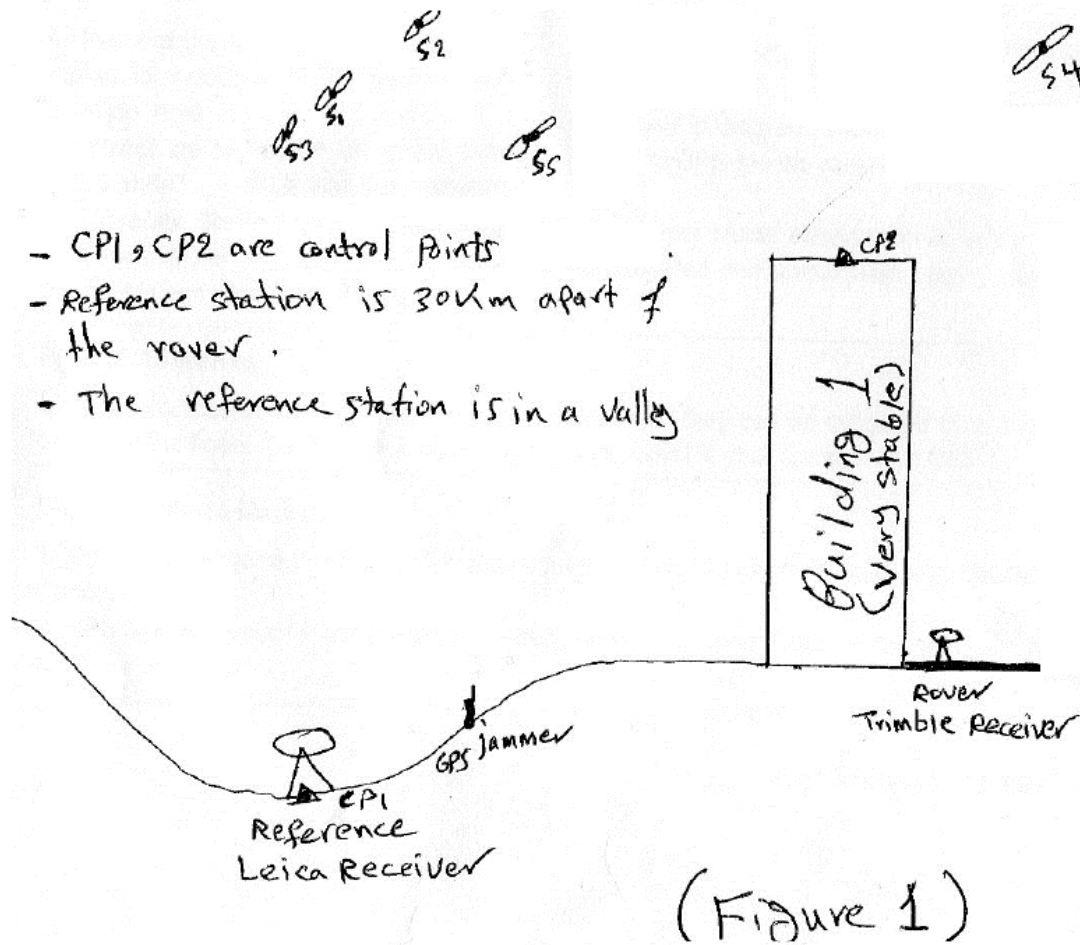


Question bank GNSS

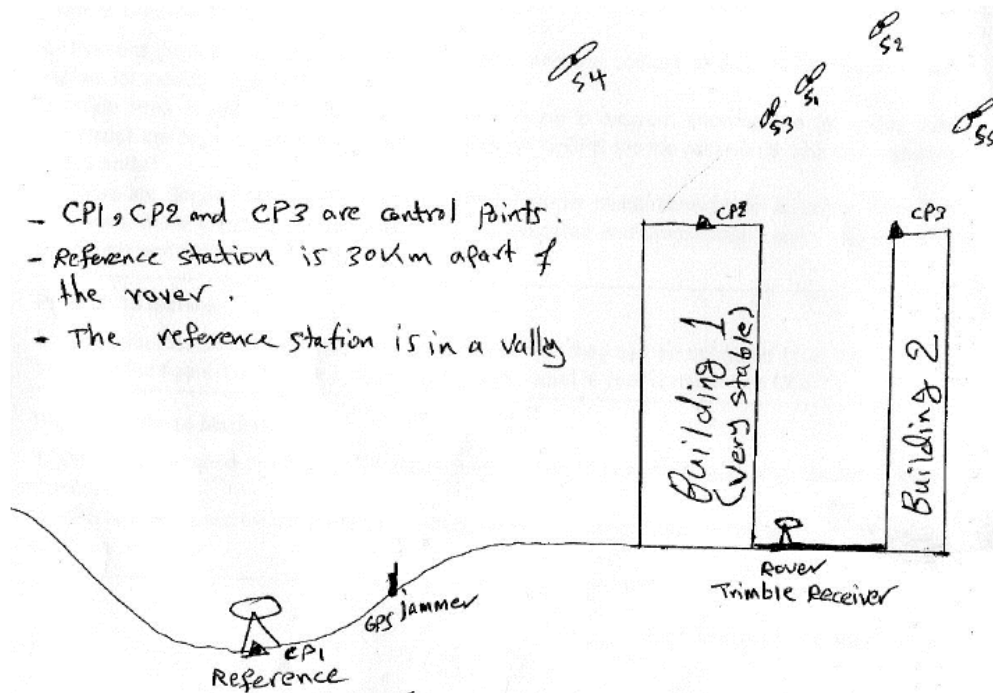
1- List the sources of error in Figure 1 then explain how they can be mitigated (give the solutions based on the figure if applicable). In the same figure, what is your comment on DOP



2- A topographic survey for a land is to be performed using GNSS. You are required to perform the survey. Discuss all the stages and details required to perform the survey, considering the instrument, cost, time, software, output and the criteria.

3- A site plan for a university is to be established using GNSS. You are required to perform the survey. Discuss all the stages and details required to produce the site plan considering the instrument, cost, time, software, output and the criteria.

4- List the sources of error in Figure 1 then explain how they can be mitigated (give the solutions based on the figure if applicable). In the same figure, what is your comment on DOP



5- Fill the blanks with appropriate phrases (blanks carry equal marks):

- 1- ---- and ---- are biases while ---- and ---- are errors.
- 2- In ---- technique, the error in satellite coordinate is not cancelled away.
- 3- The accuracy of satellite clocks has been improved over time by using more precise ----.
- 4- The ionosphere layer has ---- density and its thickness is about ----.
- 5- The receiver antenna phase center variation is because ---- center is not equal to ---- center.
- 6- GPS spoofing is the act of broadcasting ---- GPS signal to fool the devices and can be mitigated by using ---- receivers.
- 7- ---- is a term used to describe the effect of satellite geometry on the user position accuracy.
- 8- Absolute tropospheric bias include ---- error while relative tropospheric bias include ---- error.
- 9- Direct plus reflected signal from the satellite and the surroundings to the antenna cause ----.

6- Choose the correct answer(s) for the following (there maybe more than one correct answer for each of them, points carry equal marks despite the number of correct answers selected)

- 1- As part of RTK technique, the reference sends what kind of raw data to the rover?
a- reference station coordinates b- precise ephemeris c- antenna types. d- all of them
- 2- The goal of NRTK is:
a- improve the rover performance b- model the errors c- both of them d- neither of them.
- 3- The condition of NRTK is that both reference station and rover contain:
a- The same error b- no error c- relative error d- error models
- 4- Virtual reference station technique require:
a- one-way communication b- two way communication c- uni-communication
- 5- PPP is:
a- a relative positioning technique b- absolute positioning technique c- neither of them.
- 6- in both ZD and DD the ionospheric effect is:
a- fully mitigated b- partially mitigated c- not mitigated c- remained
- 7- In both ZD and DD the final accuracy is within:
a- meters b- decimeters c- kilometers d- millimeters

7- A site plan for a university is to be established using GNSS. You are required to perform the survey. Discuss in points: all the stages and details required to produce the site plan considering: the instrument, cost, time, software, output and the criteria.

8- **State** whether the following statements are TRUE or FALSE and **state** the reason why they are true or false:

1- GPS segments are two: space segment and user segment.

2- GPS receiver needs to be connected to at least 4 satellites to get the position accurately.

3- Satellites are receiving the signal from the user which is a one-way communication.

4-The intersection of the signal from three satellites will assign the user position within a circle.

5- Each satellite has a unique code which is recognized by the receiver.

6- Kepler's third law is: "The cube of the ratio of the two semi-minor axis of the orbital ellipses of any two satellites is equal to the square of the ratio of the two orbital periods"

7- The first sub-frame of GPS message contains information about satellite health condition.

8- The ephemeris lets the receiver calculate where the satellite was located at time of reception.

9-**Present** the least square observation equation **and** the content of each of the matrices and vectors for satellites **E,N,O,V** and receiver **A**.

10- Wide Area is one of the DGPS techniques. **Draw** a diagram showing the technique then **construct** the observation equation equations for WADGPS for the receiver **S** and four satellites **A,B,C and D**.

11-

There are Single Double and Triple methods for carrier phase observation equation.

Write the equations, **draw** the diagrams and **what** are the mitigated and unmitigated biases and errors **of** the double and triple technique **only**.

12- **Compare** between the two NRTK techniques: Virtual Reference Station and Master Auxiliary Concept.

13- GPS is widely used for the purpose of surveying and mapping. **Discuss** the applications of GPS for these purposes.

14- **What** are the aims of the "on-the-fly" carrier phase ambiguity resolution technique? **List** 4 methods of the "on-the-fly" technique that are currently used.

15- **Compare** between PPP and Relative Positioning **in terms of** satellite dependent errors, atmospheric related errors and reference frame **only**.

16- Nowadays, receivers are capable of receiving GNSS signals from multi satellite positioning systems. **What** are the advantages and limitations of using multi-constellation satellite positioning?

17- **What** are pseudolites? **When** are they used? **support** your answer with a diagram.

18- by diagrams, show the concept of GNSS positioning

19- what are the main current GNSS?

20- which GNSS is better and why?

21- compare between GPS and Galileo

22- compare between GLONASS and Galileo system

23- differentiate between GPS and GLONASS systems

24- Inertial Navigation System is integrated with GPS for some applications. **How** it works? **What** are the advantages and limitation so of the system? **State how** the integration of INS with GPS could help improve navigation process?

25- **State** whether the following statements are TRUE or FALSE and why:

1- GPS segments are three: space segment, control segment and user segment.

2- GPS receiver needs to be connected to at least 5 satellites to get the position accurately.

3- Satellites are receiving the signal from the user which is a one-way communication.

4-The intersection of the signal from three satellites will assign the user position within 2 points..

5- Each satellite has a unique code which is not recognized by the receiver.

6- Kepler's third law is: "The cube of the ratio of the two semi-minor axis of the orbital ellipses of any two satellites is equal to the square of the ratio of the two orbital periods"

7- The first sub-frame of GPS message contains information about time.

8- The ephemeris lets the receiver calculate where the satellite was located at time of reception.

26- **Compare** between the two NRTK techniques: Area Correction Parameters and Master Auxiliary Concept.

27- explain the use of GNSS system for Agriculture

28- explain the use of GPS system for marine applications

29- what are the applications of GNSS in surveying field

30- Discuss the use of Galileo for navigation

31- What are PPP correction models?

32- **Compare** between PPP and Relative Positioning **in terms of** satellite dependent errors, atmospheric related errors and reference frame **only**.

33- Receivers are capable of receiving GNSS signals. **What** are the advantages and limitations of using GNSS satellite positioning instead of GPS?

34- With the Aid of a diagram **explain What** are pseudolites? **Why** are they used?

35- IMU with GPS integration is used widely. **What** are the advantages and limitation so of the system? **State how** the integration of INS with GPS could help improve navigation process?

36- **Explain** in detail the use of DGPS considering methods, advantages and limitations only.

37- There are Single Double and Triple methods for carrier phase observation equation. **Write** the equations, **draw** the diagrams and **what** are the mitigated and unmitigated biases and errors **of** the double and triple technique **only**.

38- compare between handheld GNSS receiver and surveying high grade GNSS receiver

39- explain RTK concept

40- explain the concept of stand alone positioning

41- **Explain** in detail the use of GPS for recreation.

42- With the Aid of a diagram **explain What** are pseudolites? **Why** are they used?

43- How does GNSS differ from traditional navigation methods?

44- What are the main components of a GNSS system?

45- How many satellite constellations are currently operational for GNSS?

46- What is the purpose of augmentation systems in GNSS?

47 How does GNSS contribute to precision agriculture?

48 What is the difference between GLONASS and GPS?

49 How does GNSS assist in disaster management and emergency response?

50 What is the role of ground control stations in GNSS?

51 How does GNSS help in marine navigation?

52 What is the importance of satellite orbit geometry in GNSS accuracy?

53 How does GNSS contribute to the aviation industry?

54 What advancements are expected in future GNSS technology?

55 Can GNSS be used for time synchronization?

56How does GNSS aid in surveying and mapping?

57 What challenges does urban canyon effect pose for GNSS?

58What are the security concerns associated with GNSS?

59- How does GNSS improve transportation systems?

60- What is the role of the European Space Agency (ESA) in GNSS?

61 How does GNSS benefit the telecommunications sector?

62 What are the different types of GNSS signals?

63How does GNSS contribute to search and rescue operations?

64What are the key features of the BeiDou GNSS system?

65How does GNSS enable autonomous vehicles?

66 How does GNSS help in monitoring environmental changes?

67 What are the different types of GNSS augmentation systems?

68 How does GNSS assist in geological exploration?

69 What role does GNSS play in the field of geodesy?

70 How does GNSS contribute to the functioning of smart cities?

71 What is the role of user equipment in GNSS?

72How does GNSS benefit the field of meteorology?

- 73 What is the impact of space weather on GNSS signals?
- 74 How does GNSS contribute to the oil and gas industry?
- 75 What role does GNSS play in location-based services?
- 76 How does GNSS help in asset tracking and management?
- 77 What are the implications of GNSS for privacy and surveillance?
- 78 How does GNSS assist in the field of archaeology?
- 79 What are the different types of GNSS antennas?
- 80 How does GNSS enable precision timing for financial transactions?
- 81 What are the potential implications of GNSS for international relations?
- 82 How does GNSS contribute to wildlife conservation efforts?
- 83 What are the main challenges facing the adoption of GNSS in developing countries?
- 84 How does GNSS help in disaster recovery efforts?
- 85 What are the ethical considerations surrounding the use of GNSS?
- 86- How does GNSS contribute to the field of sports performance analysis?
- 87- What are the potential security vulnerabilities of GNSS?
- 88- How does GNSS assist in border security and surveillance?
- 89- What role does GNSS play in infrastructure monitoring?
- 90- How does GNSS contribute to the field of archaeology?
- 91- What are the implications of GNSS for national defense and military operations?

92- Select the correct answers

1. What is the primary purpose of GNSS technology?
 - a) Weather prediction
 - b) Global navigation and positioning
 - c) Agricultural irrigation
 - d) Underwater exploration

2. How many satellite constellations are currently operational for GNSS?
 - a) One
 - b) Two
 - c) Three
 - d) Four

3. Which of the following is NOT a component of a GNSS system?
 - a) Ground control stations
 - b) Satellite dishes
 - c) User equipment
 - d) Satellites

4. What is the role of augmentation systems in GNSS?
 - a) To decrease accuracy
 - b) To improve accuracy
 - c) To increase signal interference
 - d) To reduce satellite visibility

5. Can GNSS work indoors?
 - a) Yes
 - b) No

93- select the correct answer:

1. What factors can affect the accuracy of GNSS signals?

- a) Temperature
- b) Atmospheric conditions
- c) Multipath interference
- d) All of the above

2. What are the main applications of GNSS technology?

- a) Agriculture
- b) Marine navigation
- c) Disaster management
- d) All of the above

3. What is the significance of the Galileo GNSS system?

- a) It's the oldest GNSS system
- b) It's the most accurate GNSS system
- c) It's the European GNSS system
- d) It's the only GNSS system for military use

4. How do GNSS receivers determine position?

- a) By triangulating signals from satellites
- b) By measuring the Earth's magnetic field
- c) By using sonar technology
- d) By analyzing cloud formations

5. What is the difference between GPS and GNSS?

- a) GPS is more accurate than GNSS
- b) GNSS is a collective term for all global navigation satellite systems, including GPS
- c) GPS is only used in military applications
- d) GNSS is primarily used for weather forecasting

94- select the correct choice:

1. How does differential GNSS improve accuracy?

- a) By using advanced encryption algorithms
- b) By comparing signals from multiple receivers
- c) By correcting for signal distortions caused by atmospheric conditions and other factors
- d) By increasing the number of satellites in orbit

2. Can GNSS signals be jammed or spoofed?

- a) Yes
- b) No

3. What are the main applications of GNSS technology?

- a) Agriculture
- b) Marine navigation
- c) Disaster management
- d) All of the above

4. What is the role of ground control stations in GNSS?

- a) To control the satellites

- b) To receive and process signals from satellites
- c) To provide power to the satellites
- d) To launch the satellites into orbit

5. How does GNSS help in marine navigation?
- a) By providing real-time position information
 - b) By predicting ocean currents
 - c) By mapping underwater terrain
 - d) By communicating with marine animals

95- select the correct answer:

1. What is the importance of satellite orbit geometry in GNSS accuracy?
 - a) It has no impact on accuracy
 - b) It affects the number and geometry of satellites visible to a receiver
 - c) It determines the color of the satellites
 - d) It increases the speed of satellite signals
2. How does GNSS contribute to the aviation industry?
 - a) By providing real-time weather updates
 - b) By improving aircraft navigation and tracking
 - c) By controlling air traffic
 - d) By reducing fuel consumption
3. What advancements are expected in future GNSS technology?
 - a) Increased accuracy
 - b) Enhanced resistance to jamming and spoofing
 - c) Expanded coverage in urban areas
 - d) All of the above
4. Can GNSS be used for time synchronization?
 - a) Yes
 - b) No
5. How does GNSS aid in surveying and mapping?
 - a) By providing accurate position data
 - b) By generating 3D maps
 - c) By analyzing soil samples
 - d) By monitoring wildlife populations

96- select the correct answer:

1. What are the security concerns associated with GNSS?
 - a) Signal jamming and spoofing
 - b) Unauthorized access to sensitive information
 - c) Interference from other electronic devices
 - d) All of the above
2. How does GNSS improve transportation systems?
 - a) By optimizing route planning

- b) By reducing traffic congestion
 - c) By tracking vehicles in real-time
 - d) All of the above
3. What is the role of the European Space Agency (ESA) in GNSS?
- a) To operate the GPS system
 - b) To develop and maintain the Galileo GNSS system
 - c) To launch satellites for the GLONASS system
 - d) To provide weather forecasts
4. How does GNSS benefit the telecommunications sector?
- a) By providing accurate timing for network synchronization
 - b) By increasing internet speed
 - c) By reducing the cost of satellite phones
 - d) By improving call quality
5. What are the different types of GNSS signals?
- a) L1 and L2
 - b) Red and blue
 - c) Alpha and beta
 - d) AM and FM

97- select the correct answer:

1. How does GNSS contribute to search and rescue operations?
- a) By providing precise location information for distress signals
 - b) By predicting natural disasters
 - c) By deploying rescue drones
 - d) By analyzing seismic data
2. What are the key features of the BeiDou GNSS system?
- a) High accuracy and global coverage
 - b) Low cost and low power consumption
 - c) Military-grade encryption
 - d) All of the above
3. How does GNSS enable autonomous vehicles?
- a) By providing real-time navigation data
 - b) By controlling the vehicle's speed
 - c) By detecting obstacles in the road
 - d) By communicating with other vehicles
4. How does GNSS help in monitoring environmental changes?
- a) By tracking changes in sea levels
 - b) By measuring air quality
 - c) By monitoring deforestation
 - d) All of the above
5. What are the different types of GNSS augmentation systems?
- a) WAAS and EGNOS
 - b) Alpha and beta

- c) GPS and GLONASS
- d) AM and FM

98- select the correct answer:

1. How does GNSS assist in geological exploration?
 - a) By mapping underground mineral deposits
 - b) By predicting earthquakes
 - c) By analyzing rock formations
 - d) By monitoring volcanic activity

2. What role does GNSS play in the field of geodesy?
 - a) By measuring the Earth's shape and gravitational field
 - b) By studying the behavior of glaciers
 - c) By tracking migratory patterns of birds
 - d) By predicting tsunamis

3. How does GNSS contribute to the functioning of smart cities?
 - a) By optimizing traffic flow
 - b) By managing energy consumption
 - c) By coordinating public transportation
 - d) All of the above

4. What is the role of user equipment in GNSS?
 - a) To control the satellites
 - b) To receive and process signals from satellites
 - c) To launch the satellites into orbit
 - d) To analyze weather patterns

5. How does GNSS benefit the field of meteorology?
 - a) By providing real-time weather updates
 - b) By monitoring atmospheric pressure
 - c) By tracking hurricanes
 - d) All of the above

99- select the correct answer:

1. What is the impact of space weather on GNSS signals?
 - a) It has no impact
 - b) It can disrupt satellite communications
 - c) It improves signal strength
 - d) It increases satellite visibility

2. How does GNSS contribute to the oil and gas industry?
 - a) By monitoring pipelines
 - b) By tracking tanker ships
 - c) By predicting oil spills
 - d) All of the above

3. What role does GNSS play in location-based services?
 - a) By providing accurate location information for mobile devices
 - b) By delivering restaurant recommendations

- c) By analyzing traffic patterns
- d) By predicting earthquakes

4. How does GNSS help in asset tracking and management?

- a) By monitoring the movement of vehicles and equipment
- b) By tracking endangered species
- c) By managing inventory levels
- d) All of the above

5. What are the implications of GNSS for privacy and surveillance?

- a) Increased privacy
- b) Decreased surveillance
- c) Potential for unauthorized tracking
- d) None of the above

100- select the correct answer:

1. How does GNSS contribute to the field of archaeology?

- a) By mapping ancient ruins
- b) By analyzing artifacts
- c) By studying ancient navigation techniques
- d) All of the above

2. What are the potential security vulnerabilities of GNSS?

- a) Signal jamming and spoofing
- b) Unauthorized access to sensitive information
- c) Interference from other electronic devices
- d) All of the above

3. How does GNSS assist in border security and surveillance?

- a) By tracking the movement of people and vehicles
- b) By monitoring wildlife migration
- c) By predicting terrorist attacks
- d) By controlling immigration policies

4. What role does GNSS play in infrastructure monitoring?

- a) By detecting structural weaknesses in buildings and bridges
- b) By monitoring power grids
- c) By analyzing traffic patterns
- d) All of the above

5. What are the implications of GNSS for national defense and military operations?

- a) Increased vulnerability to enemy attacks
- b) Enhanced navigation and targeting capabilities
- c) Decreased reliance on satellite communications
- d) None of the above

101 Can GNSS work indoors?

102 What factors can affect the accuracy of GNSS signals?

103 What are the different types of errors encountered in GNSS?

104 How does differential GNSS improve accuracy?

- 105 What is the role of atomic clocks in GNSS satellites?
- 106 How do GNSS receivers determine position?
- 107 What is the difference between GPS and GNSS?
- 108 How do GNSS receivers handle multipath interference?
- 109 Can GNSS signals be jammed or spoofed?
- 110 What are the main applications of GNSS technology?
- 111 What is the significance of the Galileo GNSS system?