

# Unit 3 - Week 1: Introduction to Higher Surveying and Coordinate System & Reference Frame

**Course outline**

How does an NPTEL online course work?

**Week 0: Prerequisite**

**Week 1: Introduction to Higher Surveying and Coordinate System & Reference Frame**

- Lec 1: Introduction to Higher Surveying
- Lec 2: Understanding reference system, reference frame, and coordinate system for Earth
- Lec 3: Coordinate and datum transformations

**Quiz : Assignment 1**

Weekly feedback form for week 1

Assignment 1 : Solutions

**Week 2: Coordinate System and Reference Frame & Time and Astronomy**

**Week 3: Time and Astronomy & Error, Accuracy, and Adjustments Computations**

**Week 4: Error, Accuracy, and Adjustments Computations**

**Week 5: Error, Accuracy, and Adjustments Computations, GPS & Photogrammetry**

**Week 6: Photogrammetry**

**Week 7: Photogrammetry**

**Week 8: Photogrammetry & LIDAR (LIDARgrammetry)**

**Week 9: RADAR (RADARgrammetry)**

**Week 10: RADAR (RADARgrammetry)**

**Week 11: RADAR (RADARgrammetry) & Hydrographic Survey**

**Week 12: Hydrographic Survey & Navigation**

**Download Videos**

## Assignment 1

The due date for submitting this assignment has passed. **Due on 2020-02-12, 23:59 IST.**  
 As per our records you have not submitted this assignment.

- Assignment 1
- 1) Consider following two statements about the limitations of conventional surveying (combination of planimetric (2D) and vertical (1D) survey):  
 Statement 1: Conventional measurements for large areas are not accurate. Statement 2: Limitations can be removed if used with Higher Surveying. **1 point**
- a. Both statement 1 and statement 2 are false  
 b. Statement 1 is true , statement 2 is false  
 c. Statement 1 is false , statement 2 is true  
 d. Both statement 1 and statement are true.
- No, the answer is incorrect.**  
 Score: 0  
**Accepted Answers:**  
 d. Both statement 1 and statement are true.
- 2) Consider following two statements: Statement 1: Origin of reference system is used to establish a reference system. Statement 2: Orientations of reference axes are not a prerequisite to establish a reference system. **1 point**
- a. Both statement 1 and statement 2 are false  
 b. Statement 1 is true , statement 2 is false  
 c. Statement 1 is false , statement 2 is true  
 d. Both statement 1 and statement are true.
- No, the answer is incorrect.**  
 Score: 0  
**Accepted Answers:**  
 b. Statement 1 is true , statement 2 is false
- 3) Arrange the following concepts in order of their application to survey an area. 1. Establishing a control network 2. Reconnaissance survey 3. Check lines 4. Redundant measurements **1 point**
- a. 1,2,3,4  
 b. 2,4,3,1  
 c. 2,1,4,3  
 d. 1,2,4,3
- No, the answer is incorrect.**  
 Score: 0  
**Accepted Answers:**  
 c. 2,1,4,3
- 4) If offset is measured at 110° (instead of 90°), what kind of error it will contribute? **1 point**
- a. Systematic error  
 b. Gross error  
 c. Random error  
 d. Systematic and gross error
- No, the answer is incorrect.**  
 Score: 0  
**Accepted Answers:**  
 d. Systematic and gross error
- 5) Consider following two statements: Statement 1: Resection determines the coordinates of unknown point by observing unknown point from known point. Statement 2: Intersection determines the coordinates of unknown point by observing known point from unknown point. **1 point**
- a. Both statement 1 and statement 2 are false  
 b. Statement 1 is true , statement 2 is false  
 c. Statement 1 is false , statement 2 is true  
 d. Both statement 1 and statement are true.
- No, the answer is incorrect.**  
 Score: 0  
**Accepted Answers:**  
 a. Both statement 1 and statement 2 are false
- 6) In a levelling exercise, observations are taken at two stations A and B from one location of instrument. If staff reading at A is 1.5 m and the RLs of A and B are 100.5 m and 99.9 m, respectively, what should be the staff reading at B? **1 point**
- a. 0.09 m  
 b. 0.9 cm  
 c. 0.09 cm  
 d. 0.9 m
- No, the answer is incorrect.**  
 Score: 0  
**Accepted Answers:**  
 d. 0.9 m
- 7) Read the following statements and choose the correct option about GPS: If one needs to measure tree diameter and tree height of all trees in a forest (size approximately 1500 sq. km) then GPS surveying is not appropriate due to: Statement 1: The interference of satellite signals interrupt height measurements. Statement 2: Data collected will be point data so the tree heights cannot be measured. **1 point**
- a. Both statement 1 and statement 2 are false  
 b. Statement 1 is true , statement 2 is false  
 c. Statement 1 is false , statement 2 is true  
 d. Both statement 1 and statement are true.
- No, the answer is incorrect.**  
 Score: 0  
**Accepted Answers:**  
 d. Both statement 1 and statement are true.
- 8) Earth's equatorial plane changes its position due to: **1 point**
- a. Wobbling effect  
 b. Coriolis effect  
 c. Rotational effect  
 d. Centrifugal effect
- No, the answer is incorrect.**  
 Score: 0  
**Accepted Answers:**  
 a. Wobbling effect
- 9) How can you fix a reference frame to artificial satellite, which is revolving around Earth? **1 point**
- a. Attaching a non-inertial frame to the satellite  
 b. Attaching a non-inertial frame to an observer on Earth  
 c. Attaching a non-inertial frame to an astronaut in space station  
 d. Attaching a non-inertial frame to a nearby satellite
- No, the answer is incorrect.**  
 Score: 0  
**Accepted Answers:**  
 a. Attaching a non-inertial frame to the satellite
- 10) Theoretically, geoid is the: **1 point**
- a. Surface joining the terrain surface on Earth  
 b. Surface joining equal gravitational potential  
 c. Surface joining the ocean surfaces on Earth  
 d. Surface joining three points on the Earth surface
- No, the answer is incorrect.**  
 Score: 0  
**Accepted Answers:**  
 b. Surface joining equal gravitational potential
- 11) Why sea surface of a particular region is not the best geoid? **1 point**
- a. Due to influences of local sea bed topography on sea level  
 b. Due to pollution of sea water  
 c. Due to effective bed friction of sea bed and sea level  
 d. Due to amplitude of earthquakes on sea level
- No, the answer is incorrect.**  
 Score: 0  
**Accepted Answers:**  
 a. Due to influences of local sea bed topography on sea level
- 12) Read following two statements and choose the correct answer. Suppose we use ellipsoid of North America for surveying an area in India: Statement 1: Heights measured will indicate orthometric height. Statement 2: Heights measured will not be perpendicular to the ellipsoid. **1 point**
- a. Statement 1 is true and Statement 2 is false  
 b. Both Statement 1 and Statement 2 are false  
 c. Both Statement 1 and Statement 2 are true  
 d. Statement 1 is false and Statement 2 is true
- No, the answer is incorrect.**  
 Score: 0  
**Accepted Answers:**  
 d. Statement 1 is false and Statement 2 is true
- 13) Consider following two statements: Statement 1: Geocentric Terrestrial Reference Frame and Geodetic Terrestrial Reference Frame has the same origin. Statement 2: Geocentric Terrestrial Reference Frame and Geodetic Terrestrial Reference Frame may have same orientation of their axes. **1 point**
- a. Statement 1 is true and Statement 2 is false  
 b. Both Statement 1 and Statement 2 are false  
 c. Both Statement 1 and Statement 2 are true  
 d. Statement 1 is false and Statement 2 is true
- No, the answer is incorrect.**  
 Score: 0  
**Accepted Answers:**  
 d. Statement 1 is false and Statement 2 is true
- 14) If the geoidal undulation is given as 50 m and the orthometric height is given as 50 m then the ellipsoidal height is given by **1 point**
- a. 100 m  
 b. 0 m  
 c. 150 m  
 d. 50 m
- No, the answer is incorrect.**  
 Score: 0  
**Accepted Answers:**  
 a. 100 m
- 15) Point location in space also changes with the change of reference frame. **1 point**
- a. True  
 b. False  
 c. Depends on the orientation of the reference axes  
 d. Depends on the distance of the point from the reference axes
- No, the answer is incorrect.**  
 Score: 0  
**Accepted Answers:**  
 b. False
- 16) While performing coordinate transformation for a point (x, y, z) to new coordinates (x', y', z'), it is rotated by 0° about Z axis, 30° about X axis, and 60° about Y axis, then the rotation parameters (ω, φ, κ) are respectively: **1 point**
- a. 30°, 60°, 0°  
 b. 60°, 30°, 0°  
 c. 0°, 30°, 60°  
 d. 60°, 0°, 30°
- No, the answer is incorrect.**  
 Score: 0  
**Accepted Answers:**  
 a. 30°, 60°, 0°
- 17) When we change unit (i.e. from 'cm' to 'm'). Statement 2- Scale in coordinate transformation changes when we the shape of the body is enlarged or shrunk. **1 point**
- a. Both statement 1 and statement 2 are true  
 b. Statement 1 is true , statement 2 is false  
 c. Statement 1 is false , statement 2 is true  
 d. Both statement 1 and statement 2 are false
- No, the answer is incorrect.**  
 Score: 0  
**Accepted Answers:**  
 c. Statement 1 is false , statement 2 is true
- 18) If you are to measure the latitude, longitude and height of a star from the Earth surface, what kind of coordinate system will you use\_\_\_\_\_? **1 point**
- a. Linear coordinate system  
 b. Polar coordinate system  
 c. Geographical coordinate system  
 d. Both Linear and Polar coordinate system
- No, the answer is incorrect.**  
 Score: 0  
**Accepted Answers:**  
 c. Geographical coordinate system
- 19) A point where a person is standing is considered as origin. Another point located on the top of a building, which is approximately 20 km is to be measured. Which coordinate system should be preferred? **1 point**
- a. Curvilinear coordinate system  
 b. Linear coordinate system  
 c. Polar coordinate system  
 d. Both Linear and Polar coordinate system
- No, the answer is incorrect.**  
 Score: 0  
**Accepted Answers:**  
 a. Curvilinear coordinate system
- 20) While doing datum transformation from WGS 84 reference frame to Everest 1830, if we do only rotational transformation, how many parameter transformation should be considered? **1 point**
- a. 4  
 b. 3  
 c. 2  
 d. 1
- No, the answer is incorrect.**  
 Score: 0  
**Accepted Answers:**  
 a. 4