

Unit 5 - Week 3: Time and Astronomy & Error, Accuracy, and Adjustments Computations

Course outline

How does an NPTEL online course work?

Week 0: Prerequisite

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

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

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

○ Quiz : Assignment 3

● Lec 1:Time

● Lec 2:Application of concepts of astronomy and time

● Lec 3:Fundamental concepts of error, accuracy, and error propagation

● Weekly feedback form for week 3

○ Assignment 3: solutions

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

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Assignment 3

The due date for submitting this assignment has passed. **Due on 2020-02-19, 23:59 IST.**
 As per our records you have not submitted this assignment.

- 1) The hour angle of Vernal Equinox at a place A is 275° and the hour angle of a star at the place A is 190°. The hour angle of Vernal Equinox at the place B is 190° and the hour angle of the star at the place B is 275°. Are the longitudes of the place equal? **1 point**
- a. Yes
 b. No
 c. Longitude changes with respect to hour angle
 d. Longitude is independent of hour angle of star
- No, the answer is incorrect.**
 Score: 0
 Accepted Answers:
 b. No
- 2) If we are on a planet which spins about its own axis and it takes approximately 24 hours to reach the opposite position after crossing the initial position, then what is the length of solar day on the planet? **1 point**
- a. 12 hours
 b. 16 hours
 c. 15 hours
 d. 18 hours
- No, the answer is incorrect.**
 Score: 0
 Accepted Answers:
 b. 16 hours
- 3) If it is given that ($1^\wedge=6$ sec) on a planet, then what is the value of a solar day on the planet? **1 point**
- a. 48 hours
 b. 60 hours
 c. 36 hours
 d. 24 hours
- No, the answer is incorrect.**
 Score: 0
 Accepted Answers:
 c. 36 hours
- 4) Calculate the apparent solar time if the Hour angle of the true sun is 20° and the measurement is done by astronomic time. **1 point**
- a. 13h 19.8m
 b. 14h 19.8m
 c. 13h 59.8m
 d. 14h 59.8m
- No, the answer is incorrect.**
 Score: 0
 Accepted Answers:
 a. 13h 19.8m
- 5) Consider following two statements: Statement 1: In apparent sidereal time, Vernal Equinox is corrected for precession only. Statement 2: In mean sidereal time, Vernal Equinox is corrected for both precession and nutation. **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:
 d. Both statement 1 and statement 2 are false
- 6) Convert 9h 30m 35s sidereal time interval to mean solar time interval. It is given that the total retardation in sidereal time interval is 9.8296s per hour. **1 point**
- a. 10h 29m 33s
 b. 10h 33m 33s
 c. 9h 29m 33s
 d. 9h 33m 33s
- No, the answer is incorrect.**
 Score: 0
 Accepted Answers:
 c. 9h 29m 33s
- 7) If the G.M.T. of transit of the Vernal Equinox on a particular day is 13h 20m 50s, find the L.M.T. of transit of the Vernal Equinox at a place with longitude = 30° E. It is given that the sidereal clock gains 9.8296s per hour of longitude. **1 point**
- a. 13h 21m
 b. 13h 12m
 c. 13h 15m
 d. 13h 51m
- No, the answer is incorrect.**
 Score: 0
 Accepted Answers:
 a. 13h 21m
- 8) If the declination of a star, (δ) is 60° and reduced astronomic latitude, ($[\Phi]^\wedge$) is 60° then comment on the nature of star. **1 point**
- a. Non-rising star
 b. Rising star
 c. Non-setting star
 d. Setting star
- No, the answer is incorrect.**
 Score: 0
 Accepted Answers:
 c. Non-setting star
- 9) The angle between the line, which is tangent to Earth surface and the line joining observer point to a Sun/star is given as 60°. The corrected altitude of the Sun is 61° and the radius of the Earth is taken as 6400 km. Find the terrain height of the observer. **1 point**
- a. 3.8 km
 b. 4.2 km
 c. 6.8 km
 d. 7.2 km
- No, the answer is incorrect.**
 Score: 0
 Accepted Answers:
 a. 3.8 km
- 10) Consider following two statements: Statement 1: Semi diameter correction for Sun is required because when we sight the Sun through a quadrant of theodolite, the line of sight refracts in atmosphere and measures less angle. Statement 2: We can avoid corrections for semi diameter of Sun when Sun is sighted in all four quadrants of the theodolite. **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
- 11) Sun observations are made at a particular place with reduced astronomic latitude ($[\Phi]^\wedge$) equal to 45°. If the corrected altitude (δ) is 30°, and declination (δ) is 20°. Calculate the corrected time of watch. **1 point**
- a. 2 hrs 31.8 mins
 b. 3 hrs 31.8 mins
 c. 4 hrs 31.8 mins
 d. 5 hrs 31.8 mins
- No, the answer is incorrect.**
 Score: 0
 Accepted Answers:
 c. 4 hrs 31.8 mins
- 12) Consider following two statements: Statement 1: Star having declination $\delta > (90^\circ - \Phi^\wedge)$ are non-rising star. Statement 2: Star having declination $\delta < (90^\circ - \Phi^\wedge)$ are non-rising star. Statement 3: Stars having $-(90^\circ - \Phi^\wedge) < \delta < (90^\circ - \Phi^\wedge)$ are rising and setting star. **1 point**
- a. Statement 1 is true but statement 2 and statement 3 are false
 b. Statement 1 and statement 2 are true but statement 3 is false
 c. Statement 1 is false but statement 2 and statement 3 is true
 d. Statement 1 and statement 2 are false but statement 3 is true
- No, the answer is incorrect.**
 Score: 0
 Accepted Answers:
 c. Statement 1 is false but statement 2 and statement 3 is true
- 13) The altitudes of a star at upper and lower culminations were observed as 60° and 20°, respectively, at a place in Northern Hemisphere. These values are already corrected for refraction. What is the declination of the star? **1 point**
- a. 50°
 b. 60°
 c. 70°
 d. 80°
- No, the answer is incorrect.**
 Score: 0
 Accepted Answers:
 c. 70°
- 14) A star is to be observed at its lower and upper culminations at a place in approximate latitude of 70° S. The star has a declination of 50° S. what are the approximate apparent altitudes of the star at which it should be sighted in order that accurate observations may be taken from it. **1 point**
- a. 30° and 60°
 b. 70° and 10°
 c. 50° and 80°
 d. 30° and 70°
- No, the answer is incorrect.**
 Score: 0
 Accepted Answers:
 d. 30° and 70°
- 15) While measuring the length of an iron bridge in summer, it was found that the length was 2 km, while in winter it was found 1.9 km. Which type of error that is introduced in this case? **1 point**
- a. Random error
 b. Systematic error
 c. Inevitable error
 d. Both random and systematic error
- No, the answer is incorrect.**
 Score: 0
 Accepted Answers:
 d. Both random and systematic error
- 16) Given Mean of Four Observations: **1 point**
- Mean $(x_1 + x_2 + x_3 + x_4)/4$,
 The True Value is $(x_1 + x_2 + x_3 + x_4)/4.4$,
 Statement 1: Precision is approximately $(x_1 + x_2 + x_3 + x_4)/4.4$,
 Statement 2: Accuracy is $(x_1 + x_2 + x_3 + x_4)/44$
- 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
- 17) We are trying to estimate the area of a circle by measuring the radius multiple times. If the ratio of error in perimeter to that of area of a circle is 0.76. Then what is the radius of the circle? **1 point**
- a. 2.147 units
 b. 1.147 units
 c. 2.947 units
 d. 1.947 units
- No, the answer is incorrect.**
 Score: 0
 Accepted Answers:
 b. 1.147 units
- 18) Consider following two statements: Statement 1: We observe a phenomenon that how an ambient condition influences the plumb direction indicated by plumb bob. However, we cannot estimate it mathematically. It means that this error is not systematic error. Statement 2: A systematic error, that cannot be estimated should be classified as random error because using characteristics of random error, we can always estimate a systematic error. **1 point**
- a. Statement 1 is true and statement 2 is false
 b. Both statement 1 and statement 2 are true
 c. Statement 1 is false and statement 2 is true
 d. Both statement 1 and statement 2 are false
- No, the answer is incorrect.**
 Score: 0
 Accepted Answers:
 d. Both statement 1 and statement 2 are false
- 19) Consider following two statements: Statement 1: Random errors cannot be eliminated because these are very small compared to original measurement. Statement 2: It is not possible to eliminate each and every random error in a set of measurements of a variable but one can estimate their values (minimum or maximum). **1 point**
- a. Statement 1 is true and statement 2 is false
 b. Both statement 1 and statement 2 are true
 c. Statement 1 is false and 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 and statement 2 is true
- 20) Consider following two statements: Statement 1: Replicated measurements are set of measurements that are performed at same location (place) but at different times (or places). Statement 2: Repeated measurements are set of measurements that are performed at same location (place) but at different time. **1 point**
- a. Statement 1 is true and statement 2 is false
 b. Both statement 1 and statement 2 are true
 c. Statement 1 is false and statement 2 is true
 d. Both statement 1 and statement 2 are false
- No, the answer is incorrect.**
 Score: 0
 Accepted Answers:
 d. Both statement 1 and statement 2 are false