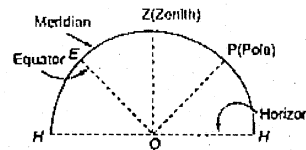


Astronomy

- Q.1 Spring tides are caused when
 (a) sun and moon are in line with earth
 (b) solar tidal force acts opposite to lunar tidal force
 (c) solar tidal force and lunar tidal force both coincide
 (d) none of these
- Q.2 The solar tidal force divided by lunar tidal force is
 (a) $\frac{1}{3}$ (b) $\frac{1}{2}$
 (c) $\frac{3}{4}$ (d) $\frac{5}{4}$
- Q.3 For a circumpolar star, declination must be
 (a) equal to colatitude
 (b) more than colatitude
 (c) less than colatitude
 (d) any of the above
- Q.4 For a star at its upper transit, the local sidereal time is equal to
 (a) H.A. of the star
 (b) Declination of the star
 (c) R.A. of the star
 (d) None of the above
- Q.5 The limiting minimum declination of a circumpolar star having latitude 40° N is
 (a) 40° (b) 50°
 (c) 90° (d) 0°
- Q.6 Consider the following statements:
 At the two transits of a star over a meridian,
 1 co-declination remains the same
 2 co-altitude does not remain same
 3 hour angle differs by 12 hours
 Of these statements
 (a) 1, 2 and 3 are correct
 (b) 2 and 3 are correct

- (c) 1 and 2 are correct
 (d) 1 and 3 are correct

- Q.7 In the figure shown below, the latitude of the place of observation will be equal to declination of the star plus its co-altitude when the position of the star on the meridian is between



- (a) horizon and pole
 (b) horizon and equator
 (c) equator and zenith
 (d) Pole and zenith

- Q.8 Circumpolar stars
 (a) rotate round the north pole
 (b) rotate round the celestial pole
 (c) remain always above the horizon
 (d) are seldom seen near the pole star
- Q.9 A star may culminate at zenith if its declination is
 (a) greater than the longitude of the place
 (b) less than the latitude of the place
 (c) equal to the latitude of the place
 (d) none of these
- Q.10 When a star is between the pole and the horizon, the relationship between latitude (λ), zenith distance (z) and declination (δ) is
 (a) $0 = z + \delta$
 (b) $0 = \delta - z$
 (c) $0 = 180^\circ - (z + \delta)$
 (d) $0 = (z + \delta) - 180^\circ$
- Q.11 The vertices of an astronomical triangle would include:

- (a) zenith, pole and heavenly body
 (b) azimuth, zenith, pole
 (c) azimuth, pole and heavenly body
 (d) azimuth, zenith and heavenly body

- Q.12 Following statements pertain to the position of the Sun when it lies over the first point of Aries
 1. Its hour angle is zero
 2. Its right ascension is zero
 3. Its declination is zero
 Of these statements
 (a) 1 and 3 are correct
 (b) 2 and 3 are correct
 (c) 1 and 2 are correct
 (d) 1, 2 and 3 are correct

- Q.13 Match List-I (Declination of the sun) with List-II and select the correct answer using the codes given below the lists:

- List-I
 A. Zero and tends to change from -ve to +ve.
 B. Zero and tends to change from +ve to -ve.
 C. $+23^\circ 27'$
 D. $-23^\circ 27'$

- List-II
 1. At the first point of Libra
 2. At the first point of Aries
 3. At winter solstice
 4. At summer solstice

- Codes:
 A B C D
 (a) 2 1 3 4
 (b) 2 1 4 3
 (c) 1 2 3 4
 (d) 1 2 4 3

- Q.14 Match List-I with List-II and select the correct answer using the codes given below the lists:
- List-I
 A. Star at elongation
 B. Star at prime vertical
 C. Star at horizon
 D. Star at culmination
- List-II
 1. The astronomical triangle is evidently right-angled at zenith

2. Its altitude will be zero and zenith distance will be equal to 90°
 3. When it crosses the observer's meridian
 4. When it is at its greatest distance as or west of meridian

- Codes:
 A B C D
 (a) 4 1 2 3
 (b) 1 4 2 3
 (c) 4 1 3 2
 (d) 1 4 3 2

- Q.15 A star has a declination of 55° N. Its upper culmination is in the zenith of the place. The altitude of the lower culmination is
 (a) 55° (b) 35°
 (c) 70° (d) 20°

- Q.16 A star is observed at its upper culmination when it is north of zenith. The latitude of the place of observation is 30° N and declination of the star is 50° N. The zenith distance of the star is
 (a) 10° (b) 20°
 (c) 40° (d) 80°

- Q.17, In the declination of a star is $70^\circ 10'$ N and the latitude of the observer is $48^\circ 50'$ N, then the values of the Zenith distance and the altitude of the star at the lower culmination will be respectively
 (a) 60° and 30°
 (b) $109^\circ 50'$ and $40^\circ 10'$
 (c) 120° and 60°
 (d) $20^\circ 20'$ and $30^\circ 00'$

- Q.18 The relationship between tropical year TY and sidereal year SY is
 (a) $TY > SY$ (b) $TY < SY$
 (c) $TY > SY$ (d) any of the above

- Q.19 Declination and Right Ascension will be 0° and 12 hours for the sun, when it lies over the
 (a) first point of Libra
 (b) first point of Aries
 (c) summer solstice
 (d) winter solstice

- Q.20 The sun's declination remains north in the period between

- (a) March 21 to June 21
- (b) June 21 to September 21
- (c) September 21 to December 21
- (d) both (a) and (c)

Q.21 If θ and δ be the latitude of an observer and declination of a heavenly body respectively, the upper culmination of the body will be south of zenith if its zenith distance, is

- (a) $\delta - \theta$
- (b) $0 - \delta$
- (c) $0 + \delta$
- (d) $\frac{0 + \delta}{2}$

Q.22 The difference in longitudes of two places expressed in time is equal to the difference in their

- (a) sidereal time
- (b) apparent solar time
- (c) mean solar time
- (d) all the above

Q.23 Which one of the following methods would give accurate results in determining the direction of the observer's meridian?

- (a) Observation of circumpolar stars on the same vertical
- (b) Observation of circumpolar stars at culmination
- (c) Extra-meridian observation of a circumpolar star
- (d) Observation of the sun at equal altitudes

Q.24 If the equation of time is $-13^{\circ} 28.5''$, then Greenwich apparent time corresponding to zero hour Greenwich mean time on a day is

- (a) $13^{\circ} 28.5''$
- (b) $45^{\circ} 31.5''$
- (c) $23^{\text{h}} 46^{\text{m}} 31.5^{\text{s}}$ of some day
- (d) $23^{\text{h}} 46^{\text{m}} 31.5^{\text{s}}$ of previous day

Q.25 The sun's declination remains north in the period between

- (a) March 21 to June 21
- (b) June 21 to September 21
- (c) September 21 to December 21
- (d) both (a) and (c)

Q.26 Which one of the following survey is required in the observation of stars?

- (a) Astronomical survey
- (b) Cadastral survey
- (c) Aerial survey
- (d) Photogrammetric survey

Q.27 Given that δ denotes declination, θ the latitude of the place of observation and α the altitude of a star at the prime vertical, then

- (a) $\sin \alpha = \sin \delta \cos \theta$
- (b) $\sin \theta = \sin \delta \csc \alpha$
- (c) $\cos \alpha = \cos \delta \sin \theta$
- (d) $\sin \delta = \sin \alpha \cos \theta$

Q.28 A star is observed at its western elongation. If the latitude of place of observation is θ , the declination of star is δ , altitude of star at elongation is α , then the hour angle of star is given by

- (a) $\cos H = \cos \delta \sec \theta$
- (b) $\cos H = \tan \theta \cot \delta$
- (c) $\cos H = \tan \delta \cot \alpha$
- (d) $\cos H = \tan \delta \cot \theta$

Q.29 Consider the following statements:

At the two transits of star over a meridian

1. Co-declination remains same
 2. Co-altitude does not remain same
 3. Hour angle differs by 12 hours
- Which of these statements are correct?
- (a) 1, 2 and 3
 - (b) 2 and 3
 - (c) 1 and 2
 - (d) 1 and 3

Q.30 Circumpolar stars are those stars

- (a) which are visible at the poles only
- (b) which are in the plane of equator
- (c) which are always above the horizon and do not set
- (d) none of the above

Q.31 The great circle which the sun appears to describe on the celestial sphere with the earth as centre, in the course of a year, is called

- (a) Hour circle
- (b) Celestial meridian
- (c) Celestial Ecliptic
- (d) Prime vertical

Q.32 A transit is oriented by setting its vernier A to read the back azimuth of the preceding line. A

back sight on the preceding transit station taken and transit is rotated about its vertical axis. The vernier A reads

- (a) azimuth of the forward line
- (b) bearing of the forward line
- (c) back bearing of the forward line
- (d) equal to 360° azimuth of the forward line

Q.33 The standard time meridian in India is $82^{\circ} 30' \text{ E}$. If the standard time at any instant is 20 hours 10 minutes, the local mean time for the place at a longitude of 20° E would be

- (a) 4 h PM
- (b) 4 h 10 m PM
- (c) 1 h 20 m PM
- (d) 0 h 20 m AM

Q.34 At any instant, the standard is 20 hours 10 minutes. Assuming standard time meridian in India is $82^{\circ} 30' \text{ E}$, the local mean time for the place at longitude of 20° E would be

- (a) 3 h 10 m PM
- (b) 4 h PM
- (c) 4 h 10 m PM
- (d) 3 h PM

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Answers Astronomy

- | | | | | | | | | | |
|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 1. (c) | 2. (b) | 3. (b) | 4. (c) | 5. (b) | 6. (a) | 7. (c) | 8. (c) | 9. (c) | 10. (c) |
| 11. (a) | 12. (b) | 13. (d) | 14. (a) | 15. (d) | 16. (b) | 17. (a) | 18. (b) | 19. (a) | 20. (d) |
| 21. (a) | 22. (d) | 23. (a) | 24. (d) | 25. (d) | 26. (a) | 27. (b) | 28. (b) | 29. (a) | 30. (c) |
| 31. (c) | 32. (a) | 33. (a) | 34. (b) | | | | | | |

Explanations Astronomy

4. (c)
When star is at its upper transit, Hour angle (H) is equal to zero.

5. (b)
The declination of circumpolar star is always greater than co-latitude of the place of observation, so limiting declination = co-latitude = $90^{\circ} - 40^{\circ} = 50^{\circ}$

15. (d)
When star's upper culmination is in zenith, polar distance = co-latitude and declination = latitude
At lower culmination, Zenith distance = $180^{\circ} - (\text{latitude} + \text{declination})$
= $180^{\circ} - 2 \times 55^{\circ} = 70^{\circ}$
Hence altitude = $90^{\circ} - 70^{\circ} = 20^{\circ}$

17. (a)
At lower culmination,
Zenith distance = $(90^{\circ} - 0) + (90^{\circ} - \delta)$
= $(90^{\circ} - 49^{\circ} 50') + (90^{\circ} - 70^{\circ} 10') = 60^{\circ}$
 \therefore Altitude = $90^{\circ} - 60^{\circ} = 30^{\circ}$

18. (b)
Tropical year = 365.2422 mean solar days
Sidereal year = 365.2564 mean solar days

26. (a)
Cadastral survey is used to plot the details such as boundaries of fields, houses and property lines in rural and urban areas. These are also known as public land surveys.
Photogrammetry is used to produce a mosaic or map by compiling the photographs. Aerial survey covers photogrammetry and photo-interpretation both.

30. (c)
The stars having polar distances less than the latitude of the place of observation are known as circumpolar stars. These always remain above the horizon and therefore do not set.
Hence option (c) is correct

31. (c)
The sun is considered to possess a rotary motion around its own axis, but with respect to earth it is

considered to be at rest. The sun has two apparent motions, one with respect to the earth and the other with respect to the stars. As regards the former, the apparent path of the sun is a result of the real motions of the earth and is in the plane of earth's orbit. Since this plane passes through the centre of celestial sphere, it intersects the latter in a great circle known as 'Ecliptic'.

Hence option (c) is correct.

33. (a)

Std time = LMT \pm difference in longitude in time W/E, between the given place and the standard meridian.

Since longitude of place is 20°E , it is the west of standard meridian

Hence standard time = LMT + Difference in longitudes in time difference in longitudes

$$= 82^\circ 30' - 20^\circ = 62^\circ 30' = 4^{\text{h}} 10^{\text{m}}$$

$$\therefore \text{LMT} = 20 \text{ hours } 10 \text{ minutes} - 4 \text{ hours } 10 \text{ minutes} \\ = 16 \text{ hours} = 4^{\text{h}} \text{ PM}$$

34. (b)

Difference in longitude

$$= 82^\circ 30' - 20^\circ = 62^\circ 30'$$

$$1 \text{ hour} = 15^\circ, 1 \text{ m} = 15'$$

$$\therefore 62^\circ = 4 \text{ h } 8 \text{ m}$$

$$\therefore 62^\circ 30' = 4 \text{ h } 10 \text{ m}$$

Local mean time

$$= \text{Standard time} - \text{difference in longitude}$$

$$= 20 \text{ h } 10 \text{ m} - 4 \text{ h } 10 \text{ m}$$

$$= 16 \text{ h} = 4 \text{ h PM}$$

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