

HG(3) — Math (8)
Trigo. & Astro.
Spl.(Sc. & Arts)

course - B.Sc Part-III

Subject → Maths

Year → 8 (Astronomy)

2020

Time : 3 hours

Full Marks : 70

Pass Marks : 32

Candidates are required to give their answers in their own words as far as practicable.

The questions are of equal value.

Answer any five questions.

- (a) Prove that the sines of a spherical triangle are proportional to the sines of the opposite sides.
- (b) In a spherical triangle ABC, if θ be the arc bisecting the angle A and terminated by the opposite side, prove that $2 \cot \theta \cos \frac{A}{2} = \cot b + \cot c$.

- (a) Prove the cotangent formula in a spherical triangle.
- (b) In a spherical triangle, prove that

$$\tan \frac{A - B}{2} = \frac{\sin \frac{a - b}{2}}{\sin \frac{a + b}{2}} \cot \frac{C}{2}$$

- (a) In a spherical triangle ABC, in which $\angle C = \frac{\pi}{2}$, prove that

$$\sin^2 a + \sin^2 b - \sin^2 c = \sin^2 a \cdot \sin^2 b$$

- (b) In a spherical triangle if $A = \frac{\pi}{5}$, $B = \frac{\pi}{3}$ and

$$C = \frac{\pi}{2} \text{ then show that } a + b + c = \frac{\pi}{2}.$$

- Write the system of co-ordinates for locating a point on the celestial sphere. Explain.
- (a) Establish Bradley's formula.
- (b) What are the effects of refraction on right ascension and declination?

6. (a) If V be the true anomaly and E be the eccentric anomaly, show that

$$\tan \frac{V}{2} = \sqrt{\frac{1+e}{1-e}} \tan \frac{E}{2}$$

- (b) If $e = \sin \phi$, prove that the relation between true anomaly V and eccentric anomaly E is

$$\tan \frac{V}{2} = \tan \left\{ 45 + \frac{\phi}{2} \right\} \tan \frac{E}{2}$$

7. Describe Meridian circle and explain the three errors in measuring the right ascension and declination of heavenly bodies.
8. (a) Show that the difference between the apparent time and the mean time is the equation of time.
- (b) If Θ is the longitude of the sun and α its right ascension, then show that the greatest value of $\alpha - \Theta$ occurs when $\tan \Theta = (\sec \epsilon)^{\frac{1}{2}}$ and $\tan \alpha = (\cos \epsilon)^{\frac{1}{2}}$ where ϵ is the obliquity of ecliptic.

9. Find the effect of aberration on right ascension and declination.
10. Determine the effect of Parallax in latitude and longitude.

