

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BSc DEGREE EXAMINATION DECEMBER 2024
(Fifth Semester)

Common to Branches – MATHEMATICS & MATHEMATICS WITH COMPUTER APPLICATIONS

MAJOR ELECTIVE COURSE – I ASTRONOMY

Time: Three Hours

Maximum: 50 Marks

SECTION-A (5 Marks)

Answer ALL questions

ALL questions carry EQUAL marks (5 x 1 = 5)

- 1 The earth rotates about a diameter from west to east in ___ hours 56 minutes 4 seconds of apparent solar time. This period is called a sidereal day.
(i) 23 (ii) 24
(iii) 22 (iv) 21
- 2 The celestial bodies which rise shortly before sunrise in the same locality of the horizon where the sun rises are called _____.
(i) visible stars (ii) morning stars
(iii) evening starts (iv) circumpolar stars
- 3 If a ray of light passes from one medium to another its course is deviated either towards or away from the normal at the point of incidence. This deviation is called _____ of light.
(i) light band (ii) retraction
(iii) ray band (iv) refraction
- 4 The direction in which a body is seen from the centre of the sun is called its _____.
(i) curve direction (ii) geocentric direction
(iii) heliocentric direction (iv) multi direction
- 5 The sidereal month is the period of one complete revolution of the moon around the earth relative to any fixed star. It is about ___ days, 7 hours, 43 minutes.
(i) 27 (ii) 24
(iii) 31 (iv) 21

SECTION - B (15 Marks)

Answer ALL Questions

ALL Questions Carry EQUAL Marks (5 x 3 = 15)

- 6 a Show that the right ascension α and declination δ of the sun will always be connected by the equation $\tan \delta = \tan \omega \sin \alpha$.
OR
b Find the azimuth of a star at rising.
- 7 a Find the latitude of the place at which the longest day is twice as long as the shortest day.
OR
b The angle of depression of the sun's upper limb at setting is observed from an eminence to be d , and from a neighbouring eminence h feet higher to be $d + \Delta d$, where Δd is expressed in seconds of arc. Prove that the earth's radius in feet is $\frac{h \cos d \cot d}{\Delta d \sin 1''}$ approximately.

Cont...

- 8 a The altitude of a star is observed and found to be the angle whose sine is $\frac{5}{13}$, calculate the true position of the star, assuming the amount of refraction at an altitude of 45° to be $58''.2$
OR
b If the moon's horizontal parallax is $57'$ and her angular diameter be $32'$. Find her radius and her distance from the earth (earth's radius = 4000 miles).
- 9 a Write the Kepler's laws of planetary motion.
OR
b Given mean time = $5^h 12^m 20^s$ p.m and the equation of time on the day was $5^m 25^s$. Find the apparent time.
- 10 a Find the relation between sidereal and synodic months.
OR
b Prove that one eclipse must occur near a node.

SECTION -C (30 Marks)

Answer ALL questions

ALL questions carry EQUAL Marks

(5 x 6 = 30)

- 11 a Trace the changes in the co-ordinates of the sun in the course of year.
OR
b If the altitude of a star is equal to the latitude of the place of observation, show that the hour angle and azimuth arc respectively, $\cos^{-1} \left[\tan \phi \tan \left(\frac{\pi}{4} - \frac{\delta}{2} \right) \right]$ and $2 \sin^{-1} \left[\sec \phi \sin \left(\frac{\pi}{4} - \frac{\delta}{2} \right) \right]$
- 12 a Find the time taken by a star to rise from a small vertical distance x'' below the horizon.
OR
b If the evening twilight ends when the sun is 18° below the horizon show that at the equator the duration of evening twilight is given by $\frac{12}{\pi} \sin^{-1} (\sin 18^\circ \sec \delta)$ hours.
- 13 a Explain Cassini's formula.
OR
b Show that the geocentric parallax of the sun is $\frac{\sin P \sin z'}{1 - \sin P \cos z'}$ where P is its horizontal parallax and z' its geocentric zenith distance.
- 14 a Write Newton's deduction from Kepler's laws.
OR
b If the eccentricity of earth's orbit be zero show that the equation of time in minutes would be $\frac{720}{\pi} \tan^{-1} \frac{(1 - \cos \omega) \tan \lambda}{1 + \cos \omega \tan^2 \lambda}$ where ω is obliquity and λ the sun's longitude.
- 15 a Discuss the different phases of moon using the formula.
OR
b Explain: Solar Eclipse.

Z-Z-Z

END