

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)
BSc DEGREE EXAMINATION MAY 2026
(Fifth Semester)

Branch - MATHEMATICS

MAJOR ELECTIVE COURSE – I ASTRONOMY

Time: Three Hours

Maximum: 75 Marks

SECTION-A (10 Marks)

Answer ALL questions

ALL questions carry EQUAL marks

(10 × 1 = 10)

Module No.	Question No.	Question	K Level	CO
1	1	The celestial latitude of the sun is always _____ (a) 0 (b) 90 (c) 180 (d) 360	K1	CO1
	2	If the upper transit is north of zenith the star is said to be _____ (a) due east (b) due west (c) due south (d) due north.	K2	CO1
2	3	For a star to be circumpolar from a given latitude, its distance from the pole must be (a) Greater than the observer's latitude (b) Exactly equal to the observer's latitude (c) Less than the observer's latitude (d) Independent of the observer's latitude	K1	CO2
	4	How can we call the time when centre of the sun is 6° below the horizon? (a) Astronomical twilight (b) nautical twilight (c) civil twilight (d) twilight	K2	CO2
3	5	Why do planets generally not twinkle, unlike stars? (a) Planets are too far away (b) Planets are not point sources of light (c) Planets emit light continuously (d) Planets do not refract light	K1	CO3
	6	Stars appear to be at a higher position in the sky than they actually are because of: (a) Scattering of light (b) Dispersion of light (c) Atmospheric reflection (d) Atmospheric refraction	K2	CO3
4	7	What does Kepler's Third Law relate? (a) The gravitational force to the distance. (b) The velocity of the planet to its position. (c) The square of the orbital period to the cube of the semi-major axis. (d) The planet's mass to its orbital shape	K1	CO4
	8	According to Kepler's First Law, where is the Sun located relative to a planet's elliptical orbit? (a) At the center of the orbit. (b) At one of the foci of the ellipse. (c) At both foci. (d) Anywhere along the semi-minor axis	K2	CO4
5	9	The distance of the moon is _____ times of the earth's radius. (a) 90 (b) 80 (c) 70 (d) 60	K1	CO5
	10	Which phase of the Moon is required for a solar eclipse to occur? (a) Full Moon (b) New Moon (c) First Quarter (d) Last Quarter	K2	CO5

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SECTION - B (35 Marks)

Answer ALL questions

ALL questions carry EQUAL Marks

(5 × 7 = 35)

Module No.	Question No.	Question	K Level	CO
1	11.a.	Define Equinoxes and solstices.	K2	CO1
		(OR)		
	11.b.	At a place in north latitude ϕ two stars A and B (declinations δ and δ_1 respectively) rise at the same moment and A transits when B is setting, Show that $\tan \phi \tan \delta = 1 - 2 \tan^2 \phi \tan^2 \delta_1$.		
2	12.a.	Show that at an equinox in latitude ϕ , a mountain whose height is $\frac{1}{n}$ of the earth's radius will catch sun's rays in the morning $\frac{12}{\pi \cos \phi} \sqrt{\frac{2}{n}}$ hours before the sun raise at the base.	K2	CO2
		(OR)		
	12.b.	A star crosses the meridian of a place at 4h 12m on the 21 st March. When will it appear to be i) a morning star ii) an evening star.		
3	13.a.	Derive the tangent formula for refraction.	K3	CO3
		(OR)		
	13.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).		
4	14.a.	Write and explain Kepler's laws of planetary motion.	K4	CO4
		(OR)		
	14.b.	Calculate the eccentricity of Earth's orbit around the sun.		
5	15.a.	Determine the condition for the totality of a lunar eclipse.	K5	CO5
		(OR)		
	15.b.	Determine the time, duration and magnitude of a lunar eclipse.		

SECTION - C (30 Marks)

Answer ANY THREE questions

ALL questions carry EQUAL Marks

(3 × 10 = 30)

Module No.	Question No.	Question	K Level	CO
1	16	Show that the latitude of a place is equal to the sum of the declination and meridian zenith distance of a body.	K2	CO1
2	17	If α and β are the angles subtended between a star and the visible horizon at two heights a and b in the same vertical line, show that the radius of the earth is equal to $\left[\frac{\sqrt{2b} - \sqrt{2a}}{\beta - \alpha} \right]^2$ nearly.	K2	CO2
3	18	Derive the cassini's formula.	K3	CO3
4	19	Derive Newton's Deductions from Kepler's laws.	K4	CO4
5	20	Determine the maximum and minimum number of eclipses in a year.	K5	CO5