PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BSc DEGREE EXAMINATION DECEMBER 2025
(Fifth Semester)

Common to Branches – MATHEMATICS & MATHEMATICS WITH COMPUTER
APPLICATIONS

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.	Qn No.	Question	K Level	CO
1	1	When will the sun comes to the first point of Libra? (a) March 21 (b) June 21 (c) September 23 (d) December 23	K1	CO1
	2	How will you call the potion of upper transit if a star when it is on the southern side of the zenith ? (a) due east (b) due west (c) due north (d) due south	K2	CO1
2	3	A circumpolar star is a star that, as viewed from a specific location on Earth, (a) Rises in the east and sets in the west every night (b) Remains visible throughout the entire year, regardless of its location (c) Never sets below the horizon and appears to circle around a celestial pole (d) Is always found directly overhead at the observer's zenith	K1	CO2
	4	How can we call the time when the sun is at the depth of 18^0 below the horizon ? (a) Astronomical twilight (b) nautical twilight c) civil twilight (d) twilight	K2	CO2
3	5	Which of these celestial phenomena is caused by atmospheric refraction? (a) The twinkling of stars (b) The flattening of the sun at sunrise/sunset (c) Both (a) and (b) (d) Neither (a) nor (b)	K1	CO3
	6	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	K2	CO3
4	7	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	K1	CO4
	8	Kepler's Second Law, the Law of Areas, states that a planet's orbital line covers: (a) Equal distances in equal time intervals. (b) Equal areas in equal time intervals. (c) Equal speeds in equal time intervals. (d) Equal volumes in equal time intervals.	K2	CO4
5	9	The linear diameter of the section of the moon is _____ miles. (a) 7613 (b) 2361 (c) 2163 (d) 2136	K1	CO5

5	10	What are the three main types of solar eclipses? (a) Total, partial, and annular (b) Total, partial, and penumbral (c) Annular, penumbral, and blood moon (d) Partial, full, and new	K2	CO5

SECTION - B (35 Marks)
Answer ALL questions
ALL questions carry EQUAL Marks $(5 \times 7 = 35)$

Module No.	Qn No.	Question	K Level	CO
1	11.a.	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 $\tan\phi\,\tan\delta = 1 - 2\tan^2\phi\,\tan^2\delta_1$.	K2	CO1
		(OR)		
	11.b.	Find the relation between R.A and Longitude of the Sun.		
2	12.a.	Define Dip of horizon and derive an expression for Dip.	K2	CO2
		(OR)		
	12.b.	Show that the latitude of a place is equal to the arithmetic mean of the meridian altitudes of a circumpolar star.		
3	13.a.	Write a short note on Geocentric parallax.	K3	CO3
		(OR)		
	13.b.	Compute the coefficient of refraction k satisfying the tangent formula $r = k \tan z$.		
4	14.a.	If v_1 and v_2 are the velocities of the earth at perihelion and aphelion, Examine that $v_1(1-e) = v_2(1+e)$ where e is the eccentricity of earth's orbit.	K4	CO4
		(OR)		
	14.b.	Write the Kepler's laws of planetary motion.		
5	15.a.	If θ and ϕ are the semi vertical angles of the shadow and the cone of penumbra cast by the earth and if s be the semi diameter of the sun, Prove that $2\sin s = \sin\theta + \sin\phi$.	K5	CO5
		(OR)		
	15.b.	Determine the angle between a direct common tangent and the line of centre of two circles.		

SECTION -C (30 Marks)
Answer ANY THREE questions
ALL questions carry EQUAL Marks $(3 \times 10 = 30)$

Module No.	Question No.	Question	K Level	CO
1	16	Describe Celestial Meridian.	K2	CO1
2	17	Find the number of consecutive nights having Twilight throughout night.	K2	CO2
3	18	Taking the correction for refraction in the form $k\,\tan z$, show that when the zenith distance of the moon is $\cos^{-1}\left(\frac{k}{p}\right)$. The horizontal diameter is unaltered and when the zenith distance is $\cos^{-1}\left(\frac{k}{p}\right)^{\frac{1}{3}}$ the vertical diameter is unaltered by the combined effect of refraction and parallax ; P being the horizontal parallax of the moon.	K3	CO3
4	19	If $e = \sin\theta$, Examine that when powers of e are neglected the value of u satisfying Kepler's equation is given by $\tan u = \sec\phi\,\tan 2x$ where $\tan x = \tan(45^0 + \frac{\theta}{2})\tan\frac{m}{2}$.	K4	CO4
5	20	If the inferior ecliptic limits be $\pm\beta$ and if the moon revolves n times as fast as the sun , and its nodes regress θ for every revolution the moon makes round the earth, Prove that the minimum number of solar eclipses occurring at or near a node is $\frac{2(n-1)\beta}{n\theta + 2\pi}$.	K5	CO5

Z-Z-Z   END