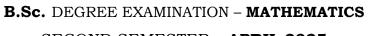
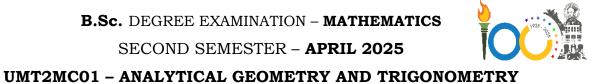
## LOYOLA COLLEGE (AUTONOMOUS) CHENNAI – 600 034





## SECOND SEMESTER - APRIL 2025

Date: 25-04-2025	Dept. No.	Max. : 100 Marks
Time: 09:00 AM - 12:00 PM		

	SECTION A - K1& K2 (CO1)				
Q.No	Levels	Answer ALL the Questions (10 x 2 = 20)			
1		Define an asymptote of the hyperbola.			
2	•	Write the polar of $(x_1, y_1)$ with respect to the hyperbola.			
3	K1	Find the equation of the sphere with centre (1,-1,2) and radius 3.			
4	-	Find the centre and radius of the sphere $x^2+y^2+z^2-2x-3y+4z+5=0$ .			
5	-	Write the condition for the general equation of 2 <sup>nd</sup> degree to represent a cone.			
6		What is right circular cylinder?			
7	K2	If $x = cos\theta + isin\theta$ , write the expansion of $x^4 - \frac{1}{x^4}$ .			
8		Write the expansion for $cosn\theta$ .			
9		Express three results of relations between circular and hyperbolic functions.			
10		Write the formula for $sinh^{-1}x$ , $tanh^{-1}x$ .			
	SECTION B- K3& K4 (CO2)				
		Answer ALL the Questions $(4 \times 10 = 40)$			
11		Obtain the asymptotes of $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ .			
		[OR]			
12	K3	Find the pole of lx+my+n=0 with respect to $xy = c^2$ and deduce the condition for lx+my+n=0			
13	N.S	and $l'x + m'y + n' = 0$ to be conjugate lines.  Obtain the equations of the tangent planes to the sphere $x^2+y^2+z^2+2x-4y+6z-7=0$ which passes			
		through the line $6x-3y-2z=0=3z+2$ .			
		[OR]			
14		Justify that the plane $4x-3y+6z-35=0$ is a tangent plane to the sphere $x^2+y^2+z^2-y-2z-14=0$ and find			
		the point of contact.			
15		Prove that the equation $2x^2+2y^2+7z^2-10yz-10zx+2x+2y+26z-17=0$ represents a cone whose			
		vertex is (2,2,1).			
		[OR]			
16	K4	Determine the equation of the right circular cylinder of radius 3 with axis as $\frac{x-1}{2} = \frac{y-3}{2} = \frac{z-5}{2}$ .			
17	IX4	Express $\frac{\sin 7\theta}{\sin \theta}$ as a polynomial in (i) $\cos \theta$ , (ii) $\sin \theta$ .			
		[OR]			
18		If $Sin(A+iB)=x+iy$ justify that (i) $x=sinAcoshB$ (ii) $\frac{x^2}{sin^2\theta} - \frac{y^2}{cos^2\theta} = 1$ (iii) $\frac{x^2}{cosh^2\theta} - \frac{y^2}{sinh^2\theta} = 1$ .			
	1				

	SECTION C – K5 & K6 (CO3)				
	Answer ALL the Questions (2 x 20 = 40				
19		Determine the equation of the sphere which pass through the circle $x^2+y^2+z^2=5$ , $x+2y+3z=5$ and			
	K5	touch the plane $4x+3y=15$ .			
		[OR]			
20		(a) Prove that $\frac{\cos 7\alpha}{\cos \alpha} = 64\cos^6 \alpha - 112\cos^4 \alpha + 56\cos^2 \alpha - 7$ .			
		(b) Expand $\sin^3 \theta \cos^5 \theta$ in a series of sines of multiples of $\theta$ . (10+10)			
21		Explain cylinder and derive the equation of a cylinder with a given generator and a given guiding			
	K6	curve. Also deduce the equation of the sphere when the generators are parallel to z-axis.			
		[OR]			
22		(a) If $\tan \frac{\alpha}{2} = \tanh \frac{u}{2}$ , then show that $\sinh u = \tan \alpha$ and $u = \log \tan \left(\frac{\pi}{4} + \frac{\alpha}{2}\right)$ .			
		(b) Obtain real and imaginary parts of $tan^{-1}(x+iy)$ . (10+10)			

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