GALGOTIAS UNIVERSITY

ADMISSION NUMBER

School of Basic Sciences

Bachelor of Science Honours in Chemistry
Semester End Examination - Jun 2024

Duration : 180 Minutes
Max Marks : 100

Sem II - C1UC103T - Trigonometry and Analytical Geometry

General Instructions
Answer to the specific question asked
Draw neat, labelled diagrams wherever necessary
Approved data hand books are allowed subject to verification by the Invigilator

1)	Apply definition of inverse hyperbolic function to prove that $sinh^{-1} z = log[z + \sqrt{(z^2 + 1)}]$	K1(3)
2)	Obtain the directricx of the equation of a $conic \frac{l}{r} = 1 + cos\theta$	K2(4)
3)	Find the distance of the point(1,-2,3) from the plane x-y+z=5 measured parallel to the line whose direction ratios are 2,3,-6	K2(6)
4)	The plane ABC whose equation is $\frac{x}{a} + \frac{y}{b} + \frac{z}{c} = 1$ meets the axes OX,OY,OZ in A,B,C respectively. Find the equation of the sphere OABC.	K3(6)
5)	Build the image of the point (1,3,4) in the plane 2x-y+z+3=0	K3(6)
6)	Show that the spheres $x^2 + y^2 + z^2 = 64 \; and \; x^2 + y^2 + z^2 - 12x + 4y - 6z + 48 = 0$ touch internally and find their point of contact.	K3(9)
7)	Put in symmetrical form, the equations of the line 3x+2y-z-4=0 ,4x+y-2z+3=0. Also find the equation to a plane through (2,1,4) and perpendicular to the given line.	K3(9)
8)	If a variable line in two adjacent positions has direction cosines are l,m,n, & $l + \delta l, m + \delta m, n + \delta n$. Show that the small angle $\delta\theta$ between the two positions is given by $\delta\theta^2 = \delta l^2 + \delta m^2 + \delta n^2$	K4(8)
9)	FinFind the lenth and the equations of the shortest distance between the lines $\frac{x-1}{2} = \frac{y-2}{3} = \frac{z-3}{4}$; $\frac{x-2}{3} = \frac{y-4}{4} = \frac{z-5}{5}$. Find also its equation .	K4(12)
10)	Determine the equation of the cone whose vertex is (***α,β,γ***) and base $ax^2 + by^2 = 1, z = 0$	K5(10)
11)	Develop the equation of the plane passing through the intersection of the planes x+y+z=6 2x+3y+4z+5=0 and the point (1,1,1)?	K5(15)

OR

Formulate the polar equation of a conic the focus being the pole . K5(15)

12) A variable plane makes intercepts on the coordinate axes, the sum of whose squares is constant and equal to k2 . Show that the locus of the foot of the perpendicular from origin the plane is K6(12)

$(x^{-2}+y^{-2}+z^{-2})(x^2+y^2+z^2)=k^2$

OR

A plane meets the coordinate axes in points A,B,&C such that the centroid of triangle ABC is the point (***α,β,γ***) . Prove that the equation of the plane ABC is $\frac{x}{\alpha}+\frac{y}{\beta}+\frac{z}{\gamma}=3$ K6(12)