

KATHMANDU UNIVERSITY
End Semester Examination [C]
November/December, 2023

Marks Scored:

Level : B.E.

Year : II

Course : MATH 205

Semester : I

Exam Roll No.:

Time: 30 mins.

F. M. : 20

Registration No.:

Date **27 NOV 2023**

SECTION "A"

[10Q. × 1 = 10 marks]

Fill in the blank space(s) by the most appropriate word(s) or symbol(s).

1. If the origin is transferred to (a, b) and the axes are turned through an angle 45° , then the transformation will be given by the relations $x =$ _____.
2. The equation of the directrix of the conic $\frac{1}{r} = 1 + e\cos\theta$ is given by _____.
3. The general equation of second degree $ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0$ represents a parabola if _____.
4. Two points such that the polar of each with respect to a conic passes through the other are called _____ points.
5. If α, β, γ be the angles which a line makes with the co-ordinate axes, then $\sin^2 \alpha + \sin^2 \beta + \sin^2 \gamma - 2 =$ _____.
6. The value of k so that the line $\frac{x}{3} = \frac{y+3}{a} = \frac{z-5}{4}$ is parallel to the plane $2x - 5y + z = 3$ is _____.
7. The intercepts made by the plane $x + 2y + z - 2 = 0$ on the co-ordinate axes are _____.
8. The center of the sphere $5x^2 + 5y^2 + 5z^2 + 2ux + 2vy + 2wz + d = 0$ is at _____.
9. The extremities of the axis of any circle of a sphere are called _____ of the circle.
10. The inclination of two arcs of great circles at their point of intersection on the surface of the sphere is called _____.

SECTION "B"

[10 Q. × 1 = 10 marks]

Fill in the blank space (s) by choosing the most appropriate answer from among the given ones.
Do not tick the answers.

11. For the removal of the xy term from $ax^2 + 2hxy + ay^2$, the rectangular axes must be turned through the angle _____
[π , $\frac{\pi}{2}$, $\frac{\pi}{4}$, 0]

12. If the axis of the conic $\frac{l}{r} = 1 + e \cos \theta$ makes an angle $\frac{\pi}{4}$ with the initial line, the equation of the conic becomes _____
 [$\frac{l}{r} = e \cos \frac{\pi}{4}$; $\frac{l}{r} = 1 + e \cos(\theta + \frac{\pi}{4})$;
 $\frac{l}{r} = 1 - e \cos \frac{\pi}{4}$; $\frac{l}{r} = 1 + e \cos(\theta - \frac{\pi}{4})$]
13. The projection of a line on the axes are 1, 2, 2. Find the length of the line. _____
 [2; 3; 6; 7]
14. The equation of pair of tangents from the point (x_1, y_1) to the general conic is
 [$SS_1 = T^2$; $TS_1 = S^2$; $S_1 = T^2$; $T = S_1$]
15. The center of the conic $x^2 - 4xy + y^2 - 2x - 20y - 11 = 0$ _____
 [(7, -4); (-7, 4); (-7, -4); (7, 4)]
16. Direction cosines of a line normal to the plane $x - y + z = 2$ are proportional to
 [1, -1, -2; 1, -1, 1; $\frac{1}{2}, \frac{1}{2}, \frac{1}{2}$; $\frac{1}{\sqrt{3}}, \frac{1}{\sqrt{3}}, \frac{1}{\sqrt{3}}$]
17. The two planes represented by $ax^2 + by^2 - cz^2 + 2fyz + 2gzx + 2hxy = 0$ will be perpendicular to each other if _____
 [$a + b - c = 0$; $a + b + c = 0$;
 $f^2 = ah + bg$; $f^2 + g^2 + h^2 = ab + bc + ca$]
18. If $S_1 = 0, S_2 = 0$ are two spheres then $S_1 - S_2 = 0$ represents _____
 [circle; sphere; line; ellipse]
19. All those great circles which pass through the _____ of a given circle are called *secondaries* to the given circle.
 [pole; polar; spherical angle; spherical radii]
20. The arc of a great circle drawn from a pole of a great circle to any point in its circumference is a _____
 [circle; semicircle; quadrant; secondary]