KATHMANDU UNIVERSITY
End Semester Examination [C]
April/May, 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 : 04 APR 2023

SECTION "A"
[10 Q. × 1 = 10 marks]

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

1. If the origin is transferred to $(a, 0)$ and the axes are tuned through an angle θ, then the transformation will be given by the relations $x =$ _____, $y =$ _____ .

2. When the axis of the conic $\frac{\ell}{r} = 1 + e\cos\theta$ makes an angle $\frac{\pi}{3}$ with an initial line, the equation of the conic becomes _____.

3. Two points such that the polar of each with respect to a conic passes through the other are called _____Points.

4. The points $(0, -1, 2)$ and $(7, 2, -1)$ lie on the _____ side(s) of the plane $5x + 2y - 3z - 4 = 0$.

5. If the line $\frac{x+2}{k} = \frac{y-3}{5} = \frac{z-5}{3}$ is parallel to the plane $x + 3y + z = 3$, then $k =$ _____.

6. Lines which are not parallel and which do not intersect at a point are called _____.

7. The equation $x^2 + y^2 + z^2 - 2bx + 2by + 2bz + d = 0$, represents a sphere with center = _____.

8. Equation of tangent plane at $(0, 0, 0)$ of a sphere $x^2 + y^2 + z^2 + 2x + 2y + 2z = 0$ is _____.

9. Let ABC be a spherical triangle and $A'B'C'$ be its polar triangle, then $A' =$ _____.

10. All those great circles which pass through the poles of a given circle are called _____ to the given circle.

SECTION "B"

[10 Q.× 1 = 10 marks]

Fill in the blank space(s), **DO NOT TICK**, by choosing the most appropriate answer from among the given ones.

11. The conic $\frac{l}{r} = 1 + e\cos\theta$ represents a Ellipse if .....
[e = 0; e = 1; e < 1; e >1]

12. If the plane $2x - 2y + z = 12$ touches the sphere $x^2 + y^2 + z^2 = a^2$ then the value of a is .....
[1; 4; 8; 2]

13. If $A_1B_1C_1$ is the polar triangle of a spherical triangle ABC, then b_1= .....
[π-B; B_1; $\pi-B_1$; π-b]

14. If cosα, cosβ, and cosγ are the directions cosines of a straight line then $\sin^2\alpha + \sin^2\beta + \sin^2\gamma - 2$ is equal to .....
[1; 2; 0; 3]

15. The equation $2x^2 + 2y^2 - 4xy - 2x - 1 = 0$ represents.....
[Ellipse; Hyperbola; Parabola; Straight lines]

16. If d_1 and d_2 are both positive and the origin lies in the acute angle between the planes $a_1x + b_1y + c_1z + d_1 = 0$ and $a_2x + b_2y + c_2z + d_2 = 0$ then the value of $a_1a_2 + b_1b_2 + c_1c_2$ is .....
[Negative; Positive; 0; None of these]

17. The inclination of two arcs of great circles at their points of intersection on the surface of the sphere is called :.....
[Spherical angle; Spherical radius; Pole; Angular distance]

18. If the lines $x = ay + b, z = cy + d$ and the line $x = a_1y + b_1, z = c_1y + d_1$ are perpendicular, then .....
[$aa_1+cc_1+1=0$; $aa_1+bb_1=1$; $aa_1+bb_1=0$; $aa_1=bb_1$]

19. The angle between the planes $3x - 4y + 5z = 0$ and $2x - y - 2z = 5$ is .....
[π/3; π/2; π/6; π/4]

20. The radius of the sphere $x^2 + y^2 + z^2 - 2x + 4y - 6z + 11 = 0$.....
[5; 4; $\sqrt{5}$; 3]