

Mid-West University
Examinations Management Office

End Semester Exam-2082

Level: B.Ed. / V Semester

FM: 60

Time: 3 hrs

PM: 30

Sub: **Analytical Solid Geometry (MATH452)**

Candidates are requested to give their answers in their own words as far as practicable.

Attempt All the Questions.

Group 'B'

6 × 5 = 30

1. Find the equation of the plane containing the lines through the origin with direction cosines proportional to (2,1,-2) and (5, 2,-3).
2. Find the angle between the line $\frac{x-x_1}{l} = \frac{y-y_1}{m} = \frac{z-z_1}{n}$ and the plane $ax+by+cz+d=0$.
3. Find the equation of the straight line through the point (1,2,3) and parallel to the line of intersection of the planes $x-2y+z=3$ & $4x+4y-5z=2$.

Or

Define plane. Find the equation of the plane through the point (2,-3,4) and parallel to the plane $2x-6y-7z=6$.

4. Find the equation of a sphere of which the circle $x^2 + y^2 + z^2 + 10y - 4z - 8 = 0$, $x + y + z = 3$ is a great circle.
5. Show that $4x^3 - y^2 + 2z^2 + 2xy - 3yz + 12x - 11y + 6z + 4 = 0$ represents the equation of a cone with vertex (-1,-2,-3).
6. Find the condition that the plane $lx+my+nz=p$ should touch the central conicoid $ax^2+by^2+cz^2=1$.

Or

Show that the plane $x+2y+3z=2$ touches the conicoid $x^2-2y^2+3z^2=2$. Also find the point of contact.

Group 'C'

2 × 10 = 20

7. Define general equation of a sphere. A sphere of radius k passes through the origin and meets the axes at A, B, and C. Prove that the centroid of the triangle ABC lies on the sphere $9(x^2 + y^2 + z^2) = 4k^2$.
8. Define enveloping cone. Find the equation of the enveloping cone with vertex at (α, β, γ) whose generators touch the sphere $x^2 + y^2 + z^2 = a^2$.

Or

Find the tangent planes for the ellipsoid $\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2} = 1$ which are parallel to $lx+my+nz=0$. If 2r be the distance between the planes, show that a line through origin and perpendicular to the planes lies on the cone $x^2(a^2-r^2)+y^2(b^2-r^2)+z^2(c^2-r^2)=0$.

THE END

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Roll No.

Group 'A'

10×1=10

Tick (✓) the Best Answer.

1. The equation of plane passing through (x_1, y_1, z_1) is given by....

- (a) $ax_1 + by_1 + cz_1 + d = 0$
 (b) $a(x - x_1) + b(y - y_1) + c(z - z_1) + d = 0$
 (c) $a(x - x_1) + b(y - y_1) + c(z - z_1) = 0$
 (d) $\frac{x-x_1}{l} = \frac{y-y_1}{m} = \frac{z-z_1}{n}$

2. Angle between a line and plane is given by...

- (a) $\cos\theta = al + bm + cn$ (b) $\cos\theta = a_1a_2 + b_1b_2 + c_1c_2$
 (c) $\cos\theta = \frac{al+bm+cn}{\sqrt{a^2+b^2+c^2}\sqrt{l^2+m^2+n^2}}$ (d) $\sin\theta = \frac{al+bm+cn}{\sqrt{a^2+b^2+c^2}\sqrt{l^2+m^2+n^2}}$

3. Which of the followings is the value of k the line $\frac{x+1}{1} = \frac{y+3}{3} = \frac{z-2}{-2}$ intersect with the plane $3x+4y+5z=5$?

- (a) 1 (b) 2
 (c) 3 (d) 4

4. Which of the followings is not an example for curve symmetric about y axis?

- (a) $y^2 = 4ax$ (b) $x^2 = 4ay$
 (c) $x^2 = ay$ (d) $x^2 = 2ay$

5. If $u^2 + v^2 + w^2 - d = 0$ is the radius of the sphere...
 (a) Point sphere (b) Real sphere
 (c) Imaginary sphere (d) Virtual sphere

6. What is the centre of sphere whose general equation is $x^2+y^2+z^2+2ux+2vy+2wz+d=0$?

- (a) (u, v, w) (b) $(2u, 2v, 2w)$
 (c) $(-u, -v, -w)$ (d) $(u, 0, w)$

7. The condition that the cone $ax^2 + by^2 + cz^2 + 2fyz + 2gzx + 2hxy = 0$ has three mutually perpendicular generators is...

- (a) $x^2 + z^2 = a$ (b) $x^2 + y^2 = a^2$
 (c) $y^2 + x^2 = a^2$ (d) $a+b+c=0$

8. The locus of the tangent line to a given surface in a given direction is called....

- (a) Cylinder (b) Enveloping cylinder
 (c) Right circular cylinder (d) Enveloping cone

9. The standard equation of central coincide is...

- (a) $\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2} = 1$ (b) $ax^2+by^2+cz^2=1$
 (c) $\frac{x^2}{a^2} + \frac{y^2}{b^2} - \frac{z^2}{c^2} = 1$ (d) $-\frac{x^2}{a^2} - \frac{y^2}{b^2} + \frac{z^2}{c^2} = 1$

10. The line $\frac{x-\alpha}{l} = \frac{y-\beta}{m} = \frac{z-\gamma}{n}$ may intersect conicoid $ax^2+by^2+cz^2=1$ in....

- (a) One point (b) Two point
 (c) Three point (d) None