C. ABDUL HAKEEM COLLEGE (AUTONOMOUS),
MELVISHARAM - 632 509.
SEMESTER EXAMINATIONS, NOVEMBER - 2018

B.Sc., MATHEMATICS   **SEMESTER I**

U18MMA102 – DIFFERENTIAL CALCULUS AND

3 - D GEOMETRY

Time: Three Hours   Maximum: 75 Marks

SECTION - A (10 X 2 = 20 Marks)

Answer **ALL** Questions.

1. Find the nth derivative of $\log(ax+b)$.

2. If $x = r\cos\theta, y = r\sin\theta$ then find Jacobian.

3. Write p-r equation.

4. Write the formula for angle between radius vector and tangent.

5. Find the asymptotes of the curve $x^2y-y-x=0$.

6. Define asymptote.

7. Find the equation of the plane making intercepts a,b,c with coordinate axes.

8. Find the equation of the plane passing through the point(2,-4,5) and parallel to the plane $4x+2y-7z+6=0$.

9. Find the equation of the line joining the point (1,-1,2) and (4,2,3).

10. Find the symmetrical form of the given equation of the straight line $2x-3y+3z=4$, $x+2y-z=-3$.

SECTION - B (5 X 5 = 25 Marks)

Answer **ALL** Questions.

11. a) Find the nth derivative of $\sin x \cos 2x \sin 3x$.

(Or)

b) If $y = \sin^{-1} x$, then prove that $(1-x^2)y_{n+2} - (2n+1)xy_{n+1} - n^2y_n = 0$.

12. a) Find the radius of curvature for the curve $y^2 = x^3 + 8$ at $(-2,0)$.

(Or)

b) Prove that the radius of curvature at any point of the cycloid $x = a(\theta + \sin\theta)$, $y = a(1-\cos\theta)$ is $4a\cos\frac{\theta}{2}$.

13. a) Find the asymptotes of the curve $x^3 + 2x^2y - xy^2 - 2y^3 + 4y^2 + 2xy + y - 1 = 0$.

(Or)

b) Find the asymptotes of $(x+y)^2(x+2y+2) = x+6y-3$.

14. a) Find the angle between the planes $2x+4y-6z=11$ and $3x+6y+5z+4=0$.

(Or)

b) Find the equation of the plane through the intersection of the planes $3x-y+2z-4=0$ and $x+y+z-2=0$ and passing through the point (2,2,1).

15. a) Find the point where the line joining the points (2,-3,1) and (3,-4,-5) cuts the plane $2x+y+z=7$.

(Or)

b) Find the equation to the plane through the line $\frac{x-1}{3} = \frac{y-4}{2} = \frac{z-4}{-2}$ and parallel to the line $\frac{x+1}{3} = \frac{y-1}{-4} = \frac{z+2}{1}$.

Answer ANY THREE Questions.

16. Find the maximum or minimum of the function $2(x^2-y^2)-x^4+y^4$.

17. Find the pedal equation of the curves

    (i) $r = a(1 - \cos\theta)$ (ii) $\frac{l}{r} = 1 + e\cos\theta$.

18. Find the rectilinear asymptotes of the curve

    $xy(x^2-y^2) + (x-y)(x^2-y^2) + 2y^2(x-1) = 0$ and prove that the finite point of intersection of the asymptotes in the curve lie on a rectangular hyperbola.

19. Find the equation of the plane passing through the line of intersection of the planes $2x+y+3z-4=0$ and $4x-y+5z-7 =0$ and is perpendicular to the plane $x+3y-4z+6=0$.

20. Show that the lines $\frac{x-5}{4} = \frac{y-7}{4} = \frac{z+3}{-5}$ and $\frac{x-8}{7} = \frac{y-4}{1} = \frac{z-5}{3}$ are coplanar and find their common points.

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