QP CODE: 21103215

21103215

Reg No : ....

Name : ....

B.Sc DEGREE (CBCS) REGULAR / REAPPEARANCE EXAMINATIONS, DECEMBER 2021

Second Semester

Core Course - MM2CRT01 - MATHEMATICS - ANALYTIC GEOMETRY, TRIGONOMETRY AND DIFFERENTIAL CALCULUS

(Common for B.Sc Computer Applications Model III Triple Main, B.Sc Mathematics Model I, B.Sc Mathematics Model II Computer Science)

2017 ADMISSION ONWARDS

56B57354

Time: 3 Hours | Max. Marks : 80

Part A

*Answer any **ten** questions.*

*Each question carries **2** marks.*

1. Show that two tangents can be drawn from any point to an ellipse.
2. What is the director circle of an ellipse and a hyperbola? Write its standard equation.
3. Derive the equation of chord of contact of the parabola $y^2 = 4ax$.
4. If P and D are the extremities of semi-conjugate diameters of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$, show that the locus of the middle point PD is $\frac{x^2}{a^2} + \frac{y^2}{b^2} = \frac{1}{2}$.
5. Find the polar equation of the conic having the axis of the conic makes an angle α with the initial line.
6. Find the equation for a line in polar coordinates when the line does not pass through the pole.
7. Prove that $\sin 3x = 3 \sin x - 4 \sin^3 x$.
8. Prove that $\sinh(-x) = - \sinh x$
9. Factorize $x^6 + 2 x^3 \cos 120^o + 1$
10. Find the n^{th} derivative of sinxsin2xsin3x.
11. Using Leibnitz's theorem find the n^{th} derivative of e^{3x}sin5x.
12. Evaluate $lim_{x\to 0}(sinx)^{tanx}$.

(10×2=20)

Part B

*Answer any **six** questions.*

*Each question carries **5** marks.*

13. Show that the locus of the mid-points of chords of a parabola which subtend a right angle at the vertex is another parabola of half the latus rectum of the original parabola.
14. Find the locus of the poles of chords of a parabola subtending a right angle at the vertex.
15. Show that the conjugate lines through a focus of an ellipse are at right angles.
16. Prove that the tangents at the ends of a pair of conjugate diameters of the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ form a parallelogram of constant area.
17. Find the equation of the tangent at α to the conic $\frac{l}{r}=1+e\cos(\theta-\gamma)$.
18. If A + iB = c tan(x + iy), then prove that $tan2x=\frac{2cA}{c^2-A^2-B^2}$
19. Sum the series $sinh\alpha-\frac{1}{2}sinh2\alpha+\frac{1}{3}sinh3\alpha-\ldots$
20. Find the n^th^ derivative of $(ax+b)^m$ and hence find the n^th^ derivative of $\frac{1}{ax+b}$.
21. Find the limit of $\frac{1+sinx-cosx+log(1-x)}{xtan^2x}$, as $x\to 0$.

(6×5=30)

Part C

*Answer any **two** questions.*

*Each question carries **15** marks.*

22. Find th econdition that teh line lx + my + n = 0 is a tangent to a) the parabola $y^2 = 4ax$ b) the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ c) the hyperbola $\frac{x^2}{a^2}-\frac{y^2}{b^2}=1$.
23. Transform to polar coordinates:
    (a) $(5,4)$ (b) $(9,\frac{5}{2})$ (c) $(6,-1)$.
24. Sum the series
    (i) $ccos\alpha-\frac{1}{3}c^3cos(\alpha+2\beta)+\frac{1}{5}c^5cos(\alpha+4\beta)-\ldots.$
    (ii) $sin\alpha sin\beta+\frac{1}{2}sin2\alpha sin2\beta+\frac{1}{3}sin3\alpha sin3\beta+\ldots$
25. (a) If $y=(tan^{-1}x)^2$, prove that $(x^2+1)^2y_2+2x(x^2+1)y_1=2$.
    (b) If $x=sint, y=sinpt$, prove that $(1-x^2)\frac{d^2y}{dx^2}-x\frac{dy}{dx}+p^2y=0$.
    (c) If $y=e^{-x}cosx$, prove that $y_4+4y=0$.

(2×15=30)