LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

**B.Sc.** DEGREE EXAMINATION – **MATHEMATICS**

FIRST SEMESTER – **NOVEMBER 2012**

# MT 1503 - ANALYTICAL GEOMETRY OF 2D,TRIG. & MATRICES

Date : 10/11/2012 Dept. No. Max. : 100 Marks

Time : 1:00 - 4:00

**PART - A**

**Answer all questions: (10 x 2 = 20)**

1. Write down the expression of cos *4θ* in terms of cos*θ* and sin*θ*.
2. Give the expansion of sin*θ*in ascending powers of *θ*.
3. Express sin *ix* and cos*ix* in terms of sin *hx* and cos*hx*.
4. Find the value of *log(1 + i).*
5. Find the characteristic equation of A = .
6. If the characteristic equation of a matrix is , what are its eigen values?
7. Find pole of *lx + my + n = 0* with respect to the ellipse 
8. Give the focus, vertex and axis of the parabola 
9. Find the equation of the hyperbola with centre (6, 2), focus (4, 2) and e = 2.
10. What is the polar equation of a straight line?

**PART – B**

**Answer any five questions. (5 X 8 = 40)**

1. Expandcos*6θ* in terms of sin*θ* .
2. If sin*θ* = 0.5033 show that*θ* is approximately .
3. Prove that .
4. If tany = tanα tanhβ ,tanz = cotα tanhβ, prove that tan (y+z) = sinh2βcosec2α.
5. Verify Cayley Hamilton theorem for A = 
6. Prove that the eccentric angles of the extremities of a pair of semi-conjugate diameters of an ellipse differ by a right angle.
7. Find the locus of poles of all tangents to the parabola with respect to 
8. Prove that any two conjugate diameters of a rectangular hyperbola are equally inclined to the asymptotes.

**PART – C**

**Answer any two questions: (2 X 20 = 40)**

1. (i) Prove that .

(ii) Prove that .

1. (i) Prove that  if 

(ii) Separate into real and imaginary parts *tanh(x + iy)*.

1. Diagonalise A = 
2. (i) Show that the locus of the point of intersection of the tangent at the extremities of a pair of

conjugate diameters of the ellipse is the ellipse 

(ii) Show that the locus of the perpendicular drawn from the pole to the tangent to the circle *r = 2a*

*cosθ* is*r = a(1+cosθ)*.

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