LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

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

FIRST SEMESTER – **APRIL 2019**

MT 1502– ALGEBRA AND CALCULUS - I

Date: 03-04-2019 Dept. No. Max. : 100 Marks

Time: 01:00-04:00

Section – A

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

1) Write the Leibnitz formula for the n^{th} derivative of a product.

2) Write the formula for polar subnormal and polar sub tangent.

3) Write the conditions for the maximum and minimum of functions of two variables.

4) Write the formula for the centre of curvature.

5) Write the formula for radius of curvature in polar coordinates.

6) What is an asymptote to the given curve?

7) Determine the quadratic equation having 3- 2i as a root.

8) If $\propto and\ \beta$ are roots of $2x^2 + 3x + 5 = 0$. Find $\propto + \beta, \propto \beta$

9) State Newton's theorem on the sum of powers of the roots.

10) Show that the equation $x^4 + 3x - 1 = 0$ has two real and two imaginary roots.

Section – B

Answer any five questions : **(5x8=40 Marks)**

11) Find the radius of curvature to the curve $\sqrt{x} + \sqrt{y} = 1$ at (¼ , ¼).

12) Find the angle of intersection of cardiods $r = a\ (1 + cos\theta) and\ r = b\ (1 - cos\theta)$.

13) Find the maximum and minimum values of the function

$$2(x^2 - y^2) - x^4 + y^4$$

14) Find the coordinates of the centre of curvature of the curve xy=2 at the point (2,1).

15) Find $\alpha^5 + \beta^5 + \gamma^5$, where α, β, γ are the roots of the equation $x^3 - 1 = 0$.

16) Solve $x^3 - 6x - 9 = 0$ by Cardon's method.

17) Find the condition that the roots of the equation $ax^3 + 3bx^2 + 3cx + d = 0$ may be in geometric progression.

18) Show that the roots of the equation $x^3 + px^2 + qx + r = 0$ are in Arithmetical progression if $2p^3 - 9pq + 27r = 0$.

Section – C

Answer any Two questions : **(2 x 20 = 40 Marks)**

19) If $y = \sin(m \sin^{-1}x)$ Prove that

$(1-x^2)y_{n+2} - (2n+1)xy_{n+1} + (m^2 - n^2)y_n = 0$

20) Find the Evolute of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$

21) Find by Hormer's method that the root of the equation $x^3 - 3x + 1 = 0$ which lies between 1 and 2 correct to two decimal places.

22) Solve the reciprocal equation $6x^5 - x^4 - 43x^3 + 43x^2 + x - 6 = 0$.

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