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LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.C.A. DEGREE EXAMINATION

THIRD SEMESTER –APRIL 2003

**CA 3100/CAP 100 APPLICABLE MATHEMATICS**

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07.04.2003

Max.: 100 Marks

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9.00 – 12.00

**PART – A**

(10 × 2 = 20 Marks)

Answer ALL the questions.

01. Show that  $\frac{1}{1.2} + \frac{1}{2.2^2} + \frac{1}{3.2^3} + \dots = \log 2$ .

02. Define characteristic equation and eigen values.

03. Write down the expansion of  $\cos 8\theta$  using Demoivre's theorem.

04. If  $\alpha, \beta, \gamma$  one the roots of the equation  $x^3 - 7x + 6 = 0$  find the value of  $\alpha^3 + \beta^3 + \gamma^3$ .

05. If  $u = \frac{xy}{x+y}$ , show that  $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = u$ .

06. Write the Cartesian formula for radius of curvature.

07. Find  $\int \frac{dx}{x^2 + 2x - 3}$ .

08. Evaluate  $\int x^3 \cos 2x dx$ .

09. Solve  $pq = x$ .

10. Find the solution of  $(D^2 - 6D + 13)y = 0$ .

**PART – B**

(5 × 8 = 40 Marks)

Answer ALL the questions

11. Find the inverse of the matrix using Cayley – Hamilton theorem

$$\begin{pmatrix} 1 & -1 & 2 \\ -2 & 1 & 3 \\ 3 & 2 & -3 \end{pmatrix}$$

(OR)

Find the sum to infinity of the series

12. If the sum of two roots of the equation  $x^4 + px^3 + qx^2 + rx + s = 0$  equals the sum of the other two prove that  $p^3 + 8r = 4pq$ .

(OR)

Express in terms of  $\cos \theta$ .

13. Find the radius of curvature at the point to the curve to the curve .

(OR)

Find the maximum and minimum value of the function  $f(x,y) = x^2 y^2 - x^2 - y^2$ .

14. Evaluate  $\iint xy dx dy$  taken over the positive quadrant of the circle  $x^2 + y^2 = a^2$

(OR)

Integrate with respect to x.

15. Solve  $(y + z)p + (z + x)q = x + y$ .

(OR)

Find the solution of

**PART – C**

(2 × 20 = 40 Marks)

*Answer any TWO questions*

16. a) Find the eigen values and eigen vectors of the matrix

b) Sum the series to infinity

17. a) Show that  $\cos^5 \theta \sin^7 \theta = [\sin 12\theta - 2\sin 10\theta - 4\sin 8\theta + 10 \sin 6\theta + 5 \sin 4\theta - 20\sin 2\theta]$ .

b) Diminish by 1, the roots of  $x^4 - 4x^3 - 7x^2 + 22x + 24 = 0$  and hence solve it.

17. a) By changing the order of integration, evaluate

b) Solve  $(D^2 + 4D + 5) y = e^x + x^3 + \cos 2x$ .

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