LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION –COMPUTER SCIENCE

FIRST SEMESTER – APRIL 2018

MT 1103– MATHEMATICS FOR COMPUTER SCIENCE

Date: 28-04-2018
Time: 09:00-12:00

Dept. No.

Max. : 100 Marks

PART-A

Answer ALL the questions: (10 x 2=20)

1. Define Symmetric Matrix.

2. Write down the expansion of $\cos 5\theta$ in terms of $\cos\theta$.

3. If α and β are the roots of $2x^2 + 3x + 5 = 0$, find $\alpha+\beta$ and $\alpha\beta$.

4. Evaluate $\int x\, e^x dx$.

5. Find partial differential coefficients of $u = \sin(ax + by + cz)$ with respect to x, y and z.

6. Evaluate $\int (2x + 1)^3\, dx$.

7. Solve $(D^2 + 4D + 4)y = 0$.

8. Solve the equation $y_2 + 2y_1 + y = 0$.

9. Write the formula for Trapezoidal rule.

10. Write Newton's backward difference formula for first and second order derivatives.

PART-B

Answer any FIVE questions: (5 x 8=40)

11. Find the eigen values and eigen vectors of $\begin{pmatrix} 2 & 2 & 0 \\ 2 & 1 & 1 \\ -7 & 2 & -3 \end{pmatrix}$.

12. Show that $\dfrac{\sin 6\theta}{\sin\theta} = 32\cos^5\theta - 32\cos^3\theta + 6\cos\theta$.

13. Solve $6x^5 - x^4 - 43x^3 + 43x^2 + x - 6 = 0$.

14. What is the radius of curvature of the curve $x^4 + y^4 = 2$ at the point (1, 1).

15. Evaluate: $\int x^2 \cos 2x dx$.

16. Solve: $\int_0^1 \int_1^2 (x^2 + y^2)dxdy$.

17. Solve the equation $\left(D^2 + 2D + 1\right)y = e^{-x} + 3$.

18. Find by Newton-Raphson method, the real root of $x^3 - 2x - 5 = 0$, correct to three decimal places.

PART-C

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

19. (i) Verify Cayley-Hamilton theorem for the matrix $A = \begin{bmatrix} 1 & 0 & 3 \\ 2 & 1 & -1 \\ 1 & -1 & 1 \end{bmatrix}$ and hence find its inverse.

   (ii) Separate into real and imaginary parts of $sin(x + iy)$.   **(15+5)**

20. (i) Evaluate: $\int \frac{2x+1}{x^2+3x+1} dx$.
   (ii) Evaluate: $\int cos^6 x \, dx.$ **(15+5)**

21. (i) If $\boldsymbol{u = tan^{-1}\left(\frac{x^2-y^2}{x-y}\right)}$, prove that $\boldsymbol{x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} = \sin 2\, u}$.
   (ii) Solve $\boldsymbol{p^2 + q^2 = npq}$.   **(10+10)**

22. (i) Solve $x^3 - 3x + 1 = 0$ upto 3 decimals by using Regula - falsi method.
   (ii) Evaluate $\int_0^{10} \frac{1}{1+x^2} dx$ using Trapezoidal rule with $h = 1$.   **(10+10)**

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