LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc. & B.C.A. DEGREE EXAMINATION – COMPUTER SCI. & APPLI.

FIRST SEMESTER – NOVEMBER 2015

MT 1103 - MATHEMATICS FOR COMPUTER SCIENCE

Date : 11/11 /2015   Dept. No.   Max. : 100 Marks
Time : 01:00-04:00

Part A

Answer ALL questions: **(10X2 =20)**

1. If 2 and 8 are the eigenvalues of $A = \begin{pmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{pmatrix}$ find the third Eigen value.

2. State Cayley Hamilton theorem.

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

4. Diminish the roots of $x^4 - 5x^3 + 7x^2 - 4x + 5 = 0$ by 2 and find the transformed equation.

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

6. Evaluate $\int_0^{\frac{\pi}{2}} \sin^{10} x\, dx$.

7. Form the partial differential equations by eliminating the arbitrary constants from $z = (x^2 + a)(y^2 + b)$.

8. Find the complementary function for $(D^2 + 2D + 1)\, y = 0$.

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 x8 = 40)**

11. Find the eigenvalues and eigenvectors of $A = \begin{pmatrix} 3 & 1 & 4 \\ 0 & 2 & 3 \\ 0 & 0 & 5 \end{pmatrix}$.

12. If $u = \sin^{-1}\left(\dfrac{x^2 + y^2}{x + y}\right)$, show that $x\dfrac{\partial u}{\partial x} + y\dfrac{\partial u}{\partial y} = \tan u$.

13. Solve $x^4 - 10x^3 + 26x^2 - 10x + 1 = 0$.

14. Find the radius of curvature of the curve $\sqrt{x} + \sqrt{y} = 1$ at the point $\left(\dfrac{1}{4}, \dfrac{1}{4}\right)$.

15. Evaluate $\int \dfrac{x^2+2x+5}{x^2+1}dx$.

16. Evaluate: $\int \sin^6 x\, dx$.

17. Solve the equation $\dfrac{d^2y}{dx^2} - 3\dfrac{dy}{dx} - 4y = e^{-x} + e^{3x}$.

18. Find the positive root of $x^4 - x = 10$ correct to three decimal places using Newton-Raphson method.

Part C

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

19. a) Verify Cayley-Hamilton theorem for the matrix $A = \begin{pmatrix} 1 & 0 & 3 \\ 2 & 1 & -1 \\ 1 & -1 & 1 \end{pmatrix}$ and find A^4.

20. a) Evaluate $\int \dfrac{3x+1}{2x^2-x+5}dx$.

    b) Separate into real and imaginary parts $\tan(x+iy)$.   (15+5)

21. (a) Solve the equation $\left(D^2 + 5D + 4\right)y = x^2 + 7x + 9$.

    (b) Find the general solution of $x(z^2 - y^2)p + y(x^2 - z^2)q = z(y^2 - x^2)$.   (12+8)

22. Evaluate $\int_0^{10} \dfrac{dx}{1+x^2}$ with h=1, by using (i) Trapezoidal rule, (ii) Simpson's 1/3 rule,(iii) Simpson's 3/8 rule.

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