LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION – **COMPUTER SCI. & APPL.**

FIRST SEMESTER – NOVEMBER 2014

MT 1103 - MATHEMATICS FOR COMPUTER SCIENCE

Date : Dept. No. Max. : 100 Marks

Time :

Part A

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

1. If 2 and 3 are the eigenvalues of $A = \begin{bmatrix} 3 & 10 & 5 \\ -2 & -3 & -4 \\ 3 & 5 & 7 \end{bmatrix}$, find the eigen values of A^{-1}.
2. Write down the expansion of $\cos 3\theta$ in terms of $\cos\theta$.
3. Solve the equation $x^3 + 6x + 20 = 0$, one of the roots being 1+3i.
4. State Euler's theorem on homogeneous function.
5. Evaluate $\int x\, e^x \, dx$.
6. Evaluate $\int_0^1 \int_0^2 xy^2 dydx$.
7. Solve $(D^2 + 4D + 4)\, y = 0$.
8. Find the complete integral of $z = px + qy + c\sqrt{(1 + p^2 + q^2)}$.
9. Write the formula for Simpson's rule.
10. Write Newton's forward difference formula for first and second order derivatives.

Part B

Answer any FIVE questions: **(5 x8 = 40)**

11. Find the eigen values and eigen vectors of $A = \begin{bmatrix} 2 & 2 & 0 \\ 2 & 1 & 1 \\ -7 & 2 & -3 \end{bmatrix}$.
12. Show that $\frac{\sin 6\theta}{\sin\theta} = 32\cos^5\theta - 32\cos^3\theta + 6\cos\theta$.
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 $\int \frac{5dx}{6x^2 - x - 1}$.
16. Evaluate: a) $\int_0^2 \int_x^{x^2} e^{\frac{y}{x}} dydx$, b) $\int_0^a \int_0^{\sqrt{a^2 - x^2}} dydx$.
17. Solve the equation $(D^2 + 2D + 1)y = e^{-x} + 3$.

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

Part C

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

19. a) Verify Cayley-Hamilton theorem for the matrix $A = \begin{bmatrix} 2 & 1 & 1 \\ 0 & 1 & 0 \\ 1 & 1 & 2 \end{bmatrix}$.

b) Show that $A = \frac{1}{3}\begin{bmatrix} 2 & 2 & 1 \\ -2 & 1 & 2 \\ 1 & -2 & 2 \end{bmatrix}$ is orthogonal. (15+5)

20. a) Evaluate: $\int \frac{2x+1}{x^2+3x+1} dx$.

b) Evaluate: $\int \cos^6 x \, dx$. (15+5)

21. (a) If $= tan^{-1}\left(\frac{x^3-y^3}{x-y}\right)$, prove that $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} = \sin 2u$.

(b) Solve $p^2 + q^2 = npq$. (10+10)

22. (a) Solve $x^3 - 3x + 1 = 0$ upto 3 decimals by using Regula-falsi method.

(b) Evaluate $\int_0^{10} \frac{1}{1+x^2} dx$ using trapezoidal rule with $h = 1$. (10+10)

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