LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.C.A., B.SC. DEGREE EXAMINATION – **COMPUTER APPLICATIONS & COMP.SCI.**

FIRST SEMESTER – **NOVEMBER 2018**

MT 1103 – MATHEMATICS FOR COMPUTER SCIENCE

Date: 24-10-2018 Dept. No. Max. : 100 Marks

Time: 01:00-04:00

PART-A

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

1. State Cayley Hamilton theorem.
2. Find the sum and product of the eigen values of $A=\begin{vmatrix}2 & 1 & 1\\ 1 & 2 & 1\\ 0 & 0 & 1\end{vmatrix}$.
3. Prove that $\cosh^2 x-\sinh^2 x=1$.
4. If α and β are the roots of $2x^2 + 3x + 5 = 0$, find $\alpha+\beta$ and $\alpha\beta$.
5. Evaluate $\int \tan^2 x\, dx$.
6. Evaluate $\int xe^x\, dx$
7. Form the partial differential equation by eliminating the arbitrary constants from $z = ax + by + a + b$.
8. Find the complementary function for $\left(D^2+2D+1\right)y=0$.
9. Write the formula for Simpson's 3/8 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 the matrix $A=\begin{vmatrix}2 & 1 & 1\\ 1 & 2 & 1\\ 0 & 0 & 1\end{vmatrix}$.
12. Show that $\frac{\cos 5\theta}{\cos\theta}=1-12\sin^2\theta+16\sin^4\theta$.
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 $\left(\frac{1}{4},\frac{1}{4}\right)$.
15. Evaluate $\int \frac{5dx}{6x^2-x-1}$.
16. Solve $\int_0^1\int_x^{\sqrt{x}}(x^2+y^2)dydx$ $\int_0^1\int_1^2(x^2+y^2)dxdy$.
17. Solve the equation $\left(D+7D+12\right)y=e^{2x}+6$.**Error! Digit expected.**.
18. Find by Newton - Raphson method, the real root of $x^3-5x+3=0$, correct to three decimal places.

PART - C

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

19. 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.

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

(ii) Using reduction formula evaluate $\int \cos^7 x dx$. **(13+7)**

21. (i) If $\sin u = \left(\frac{x^2+y^2}{x+y} \right)$, show that $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} = \tan u$.

(ii) Solve $p\tan x + q\tan y = \tan z$. **(10+10)**

22. Evaluate $\int_{-3}^{3} x^4 dx$ with h=1, by using (i) Trapezoidal rule, (ii) Simpson's 1/3 rule,

(iii) Simpson's 3/8 rule. Verify your results by actual integration.

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