LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

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

FIRST SEMESTER – **NOVEMBER 2013**

MT 1103 - MATHEMATICS FOR COMPUTER SCIENCE

Date : 07/11/2013 Dept. No. Max. : 100 Marks

Time : 1:00 - 4:00

Part A

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

1. Express $\cos 5\theta$ in terms of $\cos\theta$.
2. Find the equation whose roots are equal in magnitude but opposite in sign to the roots of the equation $x^{10} - 12x^8 + 40x^4 - 15x + 20 = 0$.
3. If α and β are the roots of $2x^2 + 3x + 5 = 0$, find $\alpha + \beta$.
4. Integrate $\sqrt{3 - 5x}$.
5. Evaluate $\int (2x + 1)^3 \, dx$.
6. Solve $(D^2 + 5D + 8)y = 0$.
7. Find the general solution of Clairaut's equation $y = xp + p^2$.
8. Solve the equation $\frac{d^2y}{dx^2} + 2\frac{dy}{dx} + y = 0$.
9. Write Simpson's $\frac{1}{3}^{rd}$ rule.
10. State Trapezoidal rule.

Part B

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

11. Find the eigen values and eigen vectors of $\begin{pmatrix} 2 & 2 & 0 \\ 2 & 1 & 1 \\ -7 & 2 & -3 \end{pmatrix}$.
12. Prove that $\cos 8\theta = 1 - 32\sin^2\theta + 160\sin^4\theta - 256\sin^6\theta + 128\sin^8\theta$.
13. Solve the equation $6x^5 - x^4 - 43x^3 + 43x^2 + x - 6 = 0$.
14. Find the radius of curvature of the curve $xy^2 = a^3 - x^3$ at $(a, 0)$.
15. Evaluate the double integral $\int_0^1 \int_1^2 (x^2 + y^2) \, dxdy$.
16. Solve the equation $(D^2 + 2D + 1)y = e^{-x} + 3$.
17. Find by Newton-Raphson method, the real root of $x^3 - 2x - 5 = 0$, correct to three decimal places.
18. A river is 80 feet wide. The depth 'd' in feet at a distance x feet from one bank is given by the following table:

X	0	10	20	30	40	50	60	70	80
D	0	4	7	9	12	15	14	8	3

Find approximate the area of cross section of the river using Simpson's rule.

Part C

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

19. (a) Test the consistency of the following system of equations and hence solve it $x + y + z = 6$; $x + 2y - 2z = -3$; $2x + 3y + z = 11$. (10)

(b) Separate into real and imaginary parts of (i) $\sin(x + iy)$ (ii) $\tan(x + iy)$. (4+6)

20. (a) Solve $6x^6 - 35x^5 + 56x^4 - 56x^2 + 35x - 6 = 0$.

(b) If $u = tan^{-1}\left(\frac{x^3+y^3}{x-y}\right)$, prove that $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} = sin\, 2u$. (10+10)

21. (a) Integrate $\frac{2x+1}{x^2+3x+1}$ with respect to x.

(b) Solve the equation $\left(D^2 + 5D + 4\right)y = x^2 + 7x + 9$. (10+10)

22. (a) Solve $x = y + a log\, p$.

(b)Evaluate $\int_0^{10} \frac{dx}{1+x^2}$ using trapezoidal rule and Simpson's rule. (5+15)