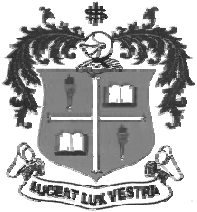


**LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034**



**B.Sc. DEGREE EXAMINATION – COMPUTER SCIENCE**

**SECOND SEMESTER – NOVEMBER 2013**

**MT 2100 - MATHEMATICS FOR COMPUTER SCIENCE**

Date : 06/11/2013

Dept. No.

Max. : 100 Marks

Time : 1:00 - 4:00

**PART A**

Answer **ALL** the questions:

**10x2 = 20**

1. Define symmetric matrix with an example.
2. Prove that  $\tanh 2x = \frac{2 \tanh x}{1 + \tanh^2 x}$ .
3. Remove the fractional coefficients from the equation  $x^3 - \frac{1}{4}x^2 + \frac{1}{3}x - 1 = 0$ .
4. Find the partial differential coefficients of  $u = \sin(ax + by + cz)$ .
5. Evaluate  $\int (2x + 1)^3 dx$ .
6. Write down the Bernoulli's formula for integration.
7. Solve  $p^2 - 3p + 2 = 0$ .
8. Find the general solution of Clairaut's equation  $y = xp + p^2$ .
9. Solve  $(D^2 + 5D + 8)y = 0$ .
10. Write the formula for Simpson's 1/3<sup>rd</sup> rule.

**Part B**

Answer any **FIVE** questions:

**5 x 8 = 40**

11. Test for consistency and hence solve  $x - 2y + 3z = 2, 2x - 3z = 3, x + y + z = 0$ .
12. Find the eigen values of the matrix  $A = \begin{pmatrix} 2 & 0 & 1 \\ 0 & 2 & 0 \\ 1 & 0 & 2 \end{pmatrix}$ .
13. Prove that  $\frac{\cos 7\theta}{\cos \theta} = 64 \cos^6 \theta - 112 \cos^4 \theta + 56 \cos^2 \theta - 7$ .
14. Prove that  $\int_0^{\frac{\pi}{2}} \frac{(\sin x)^{3/2}}{(\sin x)^{3/2} + (\cos x)^{3/2}} dx = \frac{\pi}{4}$ .
15. Using Bernoulli's formula evaluate (i)  $\int x^4 e^{2x} dx$ . (ii)  $\int x^3 \cos x dx$
16. Solve the equation  $(D^3 - 3D^2 + 4D - 2)y = e^x$ .
17. Solve  $z = p^2 + q^2$ .
18. Determine the root of  $xe^x - 3 = 0$  correct to three decimals using, Regula Falsi method.

**PART C**

Answer any **TWO** questions:

**2x20 = 40**

19. (i) Find all the characteristic roots and the associated characteristic vectors of the matrix

$$A = \begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{bmatrix}$$

(ii) If  $\cos(x + iy) = \cos \theta + i \sin \theta$ , then prove that  $\cos 2x + \cosh 2y = 2$ . **(14+6)**

20. (i) Solve the reciprocal equation  $6x^5 + 11x^4 - 33x^3 - 33x^2 + 11x + 6 = 0$ .

(ii) Find the radius of curvature of the curve  $xy^2 = a^3 - x^3$  at the points  $(a, 0)$ . **(12+8)**

21. (a) Prove that  $\int_0^{\pi/4} \log(1 + \tan \theta) d\theta = \frac{\pi}{8} \log 2$ .

(b) Solve the equation  $(D^2 + 5D + 4)y = x^2 + 7x + 9$ . **(8+12)**

22. (a) Using Newton-Raphson method find the root of the equation  $x \log_{10} x = 1.2$

(b) (ii) Evaluate  $\int_0^{-10} \frac{dx}{1+x^2}$  using trapezoidal rule. **(14+6)**

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