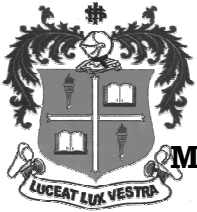


LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034



B.Sc. DEGREE EXAMINATION – MATHEMATICS

SECOND SEMESTER – APRIL 2013

MT 2100/2101 - MATHEMATICS FOR COMPUTER SCIENCE & APPLI.

Date : 06/05/2013
Time : 9:00 - 12:00

Dept. No.

Max. : 100 Marks

Part A

Answer ALL the questions. All questions carry equal marks

(10x2=20)

1. Define skew-symmetric matrix, give an example.
2. Show that $\begin{pmatrix} \cos \theta & \sin \theta \\ -\sin \theta & \cos \theta \end{pmatrix}$ is orthogonal.
3. Write the expansion of $\sin(n\theta)$.
4. Prove that $\cosh^2 x - \sinh^2 x = 1$.
5. Find the first order partial derivatives of $U = x^2 y^3 + xy^2 + y$.
6. Determine the quadratic equation having $2 - \sqrt{3}$ as a root.
7. Prove that $\int_0^{\frac{\pi}{2}} \cos^n x dx = \int_0^{\frac{\pi}{2}} \sin^n x dx$.
8. Evaluate: $\int_0^a \int_0^b (x^2 + y^2) dx dy$.
9. Solve $(D^2 + 5D + 8)y = 0$.
10. Write the formula for Simpson's $1/3^{\text{rd}}$ rule.

PART B

Answer any FIVE questions. All questions carry equal marks

(5 X 8 = 40)

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11. Find the eigenvalues of the matrix $A = \begin{pmatrix} 2 & 0 & 1 \\ 0 & 2 & 0 \\ 1 & 0 & 2 \end{pmatrix}$.
 12. Using Bernoulli's formula evaluate (i) $\int x^3 \cos x dx$.
(ii) $\int x^4 e^{2x} dx$. **(4+4)**
 13. Prove that $32 \cos^6 \theta = \cos 6\theta + 6 \cos 4\theta + 15 \cos 2\theta + 10$.
 14. Verify Euler's theorem for the function $U = x^3 + y^3 + z^3 + 3xyz$.
 15. If the sum of two roots of the equation $x^4 + px^3 + qx^2 + rx + s = 0$ equals the sum of the other two, prove that $p^3 + 8r = 4pq$.

16. Solve the equation $x^4 + 2x^3 - 16x^2 - 22x + 7 = 0$, which has a root $2 + \sqrt{3}$.

17. Solve $(D^2 - 2D + 1)y = e^{2x} + 2$.

18. Find the root of the equation $x^3 - 5x + 3 = 0$ by Newton-Raphson method.

PART C

Answer any TWO questions. All questions carry equal marks

(2 X 20 = 40)

19. Verify Cayley-Hamilton theorem for $A = \begin{pmatrix} 1 & 0 & 3 \\ 2 & 1 & -1 \\ 1 & -1 & 1 \end{pmatrix}$. Hence find its inverse.

20. (a) Prove that $\frac{\sin 7\theta}{\sin \theta} = 7 - 56\sin^2 \theta + 112\sin^4 \theta - 64\sin^6 \theta$.

(b) Solve the reciprocal equation $6x^5 + 11x^4 - 33x^3 - 33x^2 + 11x + 6 = 0$. (10 + 10)

21. (a) Solve $(D^2 - 2D + 2)y = e^x x^2 + x$.

(b) From the following table, evaluate $\int_{0.6}^2 y dx$ by using (i) Trapezoidal rule and

(ii) Simpson's 1/3rd rule.

x	0.6	0.8	1.0	1.2	1.4	1.6	1.8	2.0
y	1.23	1.58	2.03	4.32	6.25	8.36	10.23	12.45

(12+8)

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

(b) Evaluate $\int_0^{\frac{\pi}{2}} \frac{1}{1+\sqrt{\tan x}} dx$. (12+8)
