LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION – **MATHEMATICS**

FIRST SEMESTER – **APRIL 2016**

MT 1501 – GRAPHS, DIFF. EQU., MATRICES & FOURIER SERIES

Date: 03-05-2016 Dept. No. Max. : 100 Marks
Time: 01:00-04:00

Part A

Answer all the Questions: [10X2=20marks]

1. Find the slope of the line $3x = 5y - 6$.
2. Define Linear Functions.
3. Write the normal equations of y = ax + b.
4. Reduce $y = ae^{bx}$ to the linear law where a and b are constants.
5. Solve $y_{n+2} + 2y_{n+1} + y_n = 0$.
6. Find the order and degree of the difference equation.
   $y_{n+2} - 4y_{n+1} + 8y_n = 3^n$
7. State Cayley – Hamilton theorem.
8. Define Symmetric and Skew – symmetric matrices.
9. Find the constant a_0 of the Fourier series for the function f(x) = x in 0 ≤ $x \leq 2\pi$.
10. Define half range Fourier Cosine series.

Part B

Answer any FIVE questions: [8X5=40 Marks]

11. The total cost c in Rs. for output x is given by $c = \frac{2x}{3} + \frac{35}{2}$.

    Find: a) Cost when output is 4 units.

    b) Average cost of output is 10 units.

    c) Marginal cost when output is 3 units.

12. Fit a straight line y = ax+ b to the following data by method of group averages

x	0	5	10	15	20	25
y	12	15	17	22	24	30

13. Use the method of least squares to fit a straight line to the following data.

x	1	2	3	4	5
y	14	27	40	55	68

14. Solve $y_{n+2} - 3y_{n+1} + 2y_n = 5^n + 2^n$.

15. Form the difference equation by eliminating a and b from the equation $y_n = a2^n + b3^n$.

16.Find the Eigen values and Eigen vectors of the matrix A $=\begin{pmatrix} 4 & 1 \\ 3 & 2 \end{pmatrix}$.

17. Calculate A^4 when A = $\begin{pmatrix} 1 & 3 \\ 2 & 4 \end{pmatrix}$.

18. Obtain the Fourier expansion of f(x)=x in $-\pi \le x \le \pi$.

Part C

Answer any TWO questions: [2X20=40 Marks]

19.a) Graph the function f(x)= $x^2 - 6x + 7$ by completing of the square.

b) Fit a Straight line to the following data:

x	1	2	3	4	6	8
y	2.4	3	3.6	4	5	6

(10+10)

20. Diagonelize the matrix $\begin{pmatrix} 2 & -2 & 3 \\ 1 & 1 & 1 \\ 1 & 3 & -1 \end{pmatrix}$.

21. a)Expand f(x)=$\frac{(\pi - x)}{2}$ in $(0,2\pi)$ as a Fourier series.

b) Solve the difference equation

$u_{n+2} - 7u_{n+1} + 12u_n = 2^n$. (10 +10)

22. Verify Cayley – Hamilton theorem for A= $\begin{pmatrix} 1 & 0 & 3 \\ 2 & 1 & -1 \\ 1 & -1 & 1 \end{pmatrix}$.

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