LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

M.Sc. DEGREE EXAMINATION – **MATHEMATICS**

SECOND SEMESTER – **APRIL 2015**

MT 2963 - MATLAB PROGRAMMING

Date : 25/04/2015   Dept. No. [   ]   Max. : 100 Marks
Time : 01:00-04:00

Answer ALL Questions.

1. **(a)** Explain the order of precedence in MATLAB. **(5)**

(OR)

(b) Describe the four windows of MATLAB desktop.

(c) (i) Write MATLAB commands to evaluate the following mathematical expressions:

(1) $y = 6x^3 + \frac{4}{x}$ (2) $y = 2\frac{\sin x}{5}$ (3) $y = 7\left(x^{\frac{1}{3}}\right) + 4\, x^{0.58}$

(4) $r = \frac{1}{\frac{1}{a}+\frac{1}{b}+\frac{1}{c}+\frac{1}{d}}$ (5) $y = ab\frac{1}{c}\frac{f^2}{2}.$

(ii) Write MATLAB commands for the following:

(1) To create a row vector u with entries 1, 3, 5 and 7

(2) To create a column vector v with entries 2, 4, 6 and 8

(3) To create a vector w which is the transpose of u

(4) To combine vectors v and w

(5) To generate an array of numbers from 0 to 10 with equal spacing 0.05 **(10+5)**

(OR)

(d) (i) Create a structure array with at least two sets of student details which contains the following data: (a) Name (b) Department number (c) e-mail id (d) phone number.

(ii) Explain the uses of the following MATLAB commands: clc, clear, colon, semicolon, ellipsis. **(10+5)**

2. **(a)** Explain the relational and logical operators in MATLAB. **(5)**

(OR)

(b) Write the MATLAB commands to execute the following.

(i) $\log_{10} 25$ (ii) $\sqrt[3]{25}$ (iii) e^2 (iv) $\log_e e^y$ (v) $\sin^{-1}\frac{1}{2}$ in terms of radian measure

(c) Explain branching and looping in MATLAB. **(15)**

(OR)

(d) (i) Using MATLAB, determine how long it will take to accumulate at least Rs.10 000 in a bank account if you deposit Rs.500 initially and Rs.500 at the end of each year, if the account pays 5 percent annual interest.

(ii) Write a function M-file, using the switch structure to compute the total elapsed days in a year, given the number (1-12) of the month, the day, and an indication of whether the year is a leap year. **(7+8)**

3. **(a)** Write a description on the following MATLAB commands.

   (i) Plot   (ii) title   (iii) fplot   (iv) hold   (v) print **(5)**

(OR)

(b) Explain the method of labeling curves in the figure.

(c) (i) Construct a chess board using MATLAB.

(ii) Explain the following 3-dimentional plotting functions:
(1) Contour   (2) mesh   (3) surf   (4) surfc **(7+8)**

(OR)

(d) (i) Explain subplot with an example.

(ii) Explain the method to change the plot colour, line styles and data markers. **(5 +10)**

4. **(a)** Use the matrix inverse method to solve the following system by MATLAB.
   $3x - 4y = 5$; $6x - 10y = 2$. **(5)**

(OR)

(b) Let X ={ 11, 7, 9, 4, 8, 6, 10, 22}. Write the MATLAB commands to compute mean, mode, median, variance, standard deviation of X.

(c) (i) Use the rref, pinv, left division method and matrix inverse method to solve the following set of equations. $3x_1 + 2x_2 - 9x_3 = -65$, $-9x_1 - 5x_2 + 2x_3 = 16$, $6x_1 + 7x_2 + 3x_3 = 5$.

(ii) In a data, the number of times 91, 92, 93, 94, 95 and 96 appeared 13, 15, 22, 19, 17 and 14 respectively. Obtain the absolute frequency histogram. **(10+5)**

(OR)

(d) Given a system $Ax = b$ where $A = \begin{bmatrix} 8 & 2 \\ 4 & 3 \end{bmatrix}$ $x = \begin{bmatrix} x_1 \\ x_2 \end{bmatrix}$ $b = \begin{bmatrix} 5 \\ 7 \end{bmatrix}$. Write the MATLAB commands to compute the following: (i) rank of A (ii) rank of [A , b] (iii) determinant of A (iv) inverse of A (v) using pseudo inverse method solve the system (vi) row reduced echelon form of [A , b]. **(15)**

5. (a) Find complementary function, particular integral and general solution of the equation
$$\frac{d^2y}{dx^2} + 4\frac{dy}{dx} + 9y = e^{3x}.$$
(5)

(OR)

(b) Write the MATLAB commands to compute limit, left limit and right limit of a function $f(x) = x^2 + 3x + 2$ at $x = 4$.

(c) Compute the following by using MATLAB commands. (i) $\frac{d}{dx}(sin2x)$ (ii) $\int cosx\, dx$ (iii) $\sum_{n=0}^{7} cos(\pi n)$ (iv) Taylor's series of $tan(x)$ up to degree 8 (v) $\int_1^5 \int_2^3 (x^2 + y^2)dx\, dy$. **(15)**

(OR)

(d) (i) Describe the following MATLAB commands.

(1) polyder(p)　　　　(2) polyder(p1,p2)　　　　(3) [num , den]= polyder(p1,p2).

(ii) Evaluate the following by using MATLAB.

(1) $\frac{\partial^2}{\partial y^2}(xsin(xy))$　　(2) $\lim_{x \to 0} \frac{sin(x+h)-sin(x)}{h}$　　(3) area under the sin(x) curve from $x = 0$ to $x = \pi$. **(9+6)**

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