B.A./B.Sc 4th Semester (Honours) Examination, 2019 (CBCS)

Subject : Mathematics

Paper : BMH4SEC 23

(MATLAB Programming)

Time: 2 Hours **Full Marks: 40**

The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable.

Group-A

Marks : 10

1. Answer *any five* questions: 2×5=10

(a) What will be the output of the following MATLAB commands?

$\gg r = [8\ 12\ 9\ 4\ 23\ 19\ 10]$

$\gg s = r <= 10$

(b) Explain MATLAB Commands '*clc*' and 'clear XYZ'.

(c) Write a 'for' loop that will print the real numbers from 1·5 to 3·1 with step 0·2.

(d) Use MATLAB Commands to evaluate the following expression.

$(\sqrt{2} - 4i)(\sqrt{3} + 3i)$

(e) Explain the MATLAB Commands '*ceil*(x)' and '*floor*(x)'.

(f) What will be the output of the following MATLAB Commands?

$\gg a = eye\ (3,3);$

$\gg b = [4\ 5\ 6];$

$\gg a(:,3) = b';$

$\gg disp(a)$

(g) What are the purposes of MATLAB Command Window and the Figure Window?

(h) Explain the format of the MATLAB Commands '*fplot*' and '*legend*'.

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(b) Do the following operations on matrix

$$G = \begin{pmatrix} 2 & 6 & 0 & 5 & 3 & 7 \\ 3 & 9 & 1 & 0 & 0 & 2 \\ 0 & 0 & 1 & 2 & 6 & 3 \\ 1 & 5 & 3 & 4 & 7 & 0 \\ 0 & 0 & -1 & 1 & -3 & 2 \\ 3 & 0 & 0 & 1 & 5 & 3 \end{pmatrix}$$

Group-B

Marks : 10

2. Answer *any two* questions: 5×2=10

(a) Explain script file and function file in MATLAB with example. 3+2=5

(b) Write the MATLAB program to plot the function $y(x) = 4x^4 - 25x^2 + 12$, and its first and second order derivatives for $-5 \leq x \leq 5$ in the same figure.

(c) Let 'a' and 'b' be two matrices with required ordering. Write down the difference among a/b, $a\backslash b$ and $a \cdot/b$ with proper examples.

(d) What will be displayed, when you run the following codes?

(i) $\gg a = 0;$

$\gg$ while $a < 10$

$\gg a = a + 3;$

$\gg$ end

$\gg$ disp(a)

(ii) $\gg B$ = [*ones* (3) *zeros* (3,2); *zeros*(2, 3) 4**eye*(2)] 2½+2½=5

Group-C

Marks : 20

3. Answer *any two* questions: 10×2=20

(a) (i) Explain '*if-else if-else*' statements in MATLAB with proper example.

(ii) Create a vector of five random integers in the range from –10 to 10 and then perform each of the following using loops.

(I) subtract 3 from each element.

(II) Find the maximum and minimum elements.

(iii) Explain '*fopen*' and '*fread*' file commands in MATLAB. 3+(2+1+1)+3=10

(b) Do the following operations on matrix

$$G = \begin{pmatrix} 2 & 6 & 0 & 5 & 3 & 7 \\ 3 & 9 & 1 & 0 & 0 & 2 \\ 0 & 0 & 1 & 2 & 6 & 3 \\ 1 & 5 & 3 & 4 & 7 & 0 \\ 0 & 0 & -1 & 1 & -3 & 2 \\ 3 & 0 & 0 & 1 & 5 & 3 \end{pmatrix}$$

by MATLAB Command :

(i) Delete the last row and column from the matrix.

(ii) Replace $G(5, 5)$ by 4. What is the value of $G(1, 4)$?

(iii) What is the size and value of $G(:, 1:2:5)$?

(iv) What is the value of $G(3, :)$ and $G(:, 3)$?

(v) What is the value of G(3, :) = [ ]? 2+2+3+2+1=10

(c) (i) Write a MATLAB program to solve the following systems of linear equations.

$$\begin{aligned} 2x + 3y + 4z &= 5 \\ x + y + 4z &= 10 \\ -2z + 3x + 4y &= 0 \end{aligned}$$

(ii) Write a MATLAB program that will find the following expression for given n.

$$S = \frac{1}{1!} + \frac{1}{2!} + \frac{1}{3!} + \cdots + \frac{1}{n!}$$

(iii) Write a MATLAB statements to calculate the value of $y(t)$ from the following:

$$y(t) = \begin{cases} -3t^2 + 5, & t \geq 0 \\ 3t^2 + 5, & t < 0 \end{cases}$$

for values of t between –9 and 9 with step-size 0·5. 3+4+3=10

(d) (i) Write *M*-file to evaluate the function $y(x) = x^2 - 3x + 2$ for all values of x between 2 and 3 with step size 0·1. Do this twice, once with a '*for loop*' and then with vector operation.

(ii) Create a 6×6 matrix in which the elements of middle two rows and columns are 3's and rest are 4's using MATLAB Commands '*eye(n)*', '*ones(n)*' and '*zeros(m,n)*'.

(iii) Construct the function of the squares and cubes of the elements of vector in MATLAB.

4+4+2=10