



**NBO-003-027801**

Seat No. \_\_\_\_\_

**M. Sc. (ECI) (Sem. VIII) (CBCS) Examination**

**April / May – 2017**

**Paper-29 : Introduction to MATLAB**

**Faculty Code : 003**

**Subject Code : 027801**

Time :  $2\frac{1}{2}$  Hours]

[Total Marks : 70

- 1 Answer the following in brief : (any 7 out of 10, each carry 2 marks) 14
- (1) How can we project 3D plot into 2D in MatLab ? Explain it with suitable MatLab command and example.
  - (2) Explain the disp() regarding MatLab in brief.
  - (3) Explain the substitute command with suitable example in brief.
  - (4) Compute the left and right limit of  $\lim_{x \rightarrow 0} \frac{\sin(x)}{x}$ .
  - (5) What is the use of dolve command in matlab ? Explain in brief.
  - (6) What is parametric plot ? Explain it with example of plotting circle.
  - (7) What is the difference between transpose and ctranspose command of MATLAB ?
  - (8) Explain array concatenation in MatLab in brief with suitable example.
  - (9) Write the difference between function and expression.
  - (10) How to generate Taylor polynomial of  $\log x$  at  $x=0$  up to degree 9 ?

2 Answer the following in brief : (any 2 out of 3, each carry 7 marks) 14

(1) Plot the sphere whose surface cannot be represented by  $z = f(x, y)$  and whose equation is given as

$x^2 + y^2 + z^2 = 1$ . Explain the procedure of plotting with suitable equations and MatLab commands. You do not need to draw the sphere.

(2) Solve (symbolically) the following system of linear equations using MATLAB command solve and method

$$x = A \setminus b$$

$$3x + 4y + 5z = 2$$

$$2x - 3y + 7z = -1$$

$$x - 6y + z = 3$$

(3) What is a function regarding MatLab ? Explain difference between built-in and user defined function. Design a user define function  $x^2 + 2x + 1$  using function handle method and inline function designing method and explains the difference between them.

3 Answer the following in brief : (each carry 7 marks) 14

(1) How we can combine multiple plot on single graph ? Explain it with suitable example of cosine wave with frequency varies from  $\pi$  to  $4\pi$ .

(2) Find the derivative of the following functions :

(i)  $f(x) = 6x^3 - 5x^2 + 2x - 3$

(ii)  $f(x) = \frac{2x-1}{x^2+1}$

(iii)  $f(x) = \sin(3x^2 + 2)$

(iv)  $f(x) = \sin^{-1}(2x+3)$

(v)  $f(x) = (1+x^4)^{\frac{1}{2}}$

(vi)  $f(x) = x^r$

(vii)  $f(x) = \tan^{-1}(x^2 + 1)$

**OR**

3 Answer the following : (each carry 7 marks) 14

(1) Create Function-M file that

- (i) Finds Factorial of any input number 'n'.
- (ii) Computes  $\sin(x)/x$  for  $x = 10^{(-b)}$ .

Also enter the suitable comments which returns suitable answer when typing help.

(2) Find the integral of the following functions :

(i)  $f(x) = \int_0^{\pi/2} \cos x \, dx$

(ii)  $f(x) = \int x \sin(x^2) \, dx$

(iii)  $f(x) = \int \sin(3x) \sqrt{1 - \cos(3x)} \, dx$

(iv)  $f(x) = \int x^2 \sqrt{x+4} \, dx$

(v)  $f(x) = \int_{-\infty}^{\infty} e^{-x^2} \, dx$

(vi)  $f(x) = \int_0^1 \sqrt{x^3 + 1} \, dx$

(vii)  $f(x) = \int_0^{\pi} e^{\sin x} \, dx$

4 Answer the following : (each carry 7 marks) 14

(1) Explain the following MatLab commands regarding 2D array with suitable example.

- Magic
- max
- sum
- diag
- fliplr
- prod
- length

(2) Plot the function  $x^3 + 2x^2 + 3x + 5$ :

- (i) Using string method in ezplot.
- (ii) Using function handle method in ezplot.
- (iii) Using plot function.
- (iv) Add title 'a parabola'.
- (v) Add x-axis title 'x-axis'.
- (vi) Add y-axis title 'y-axis'.
- (vii) Set range of x-axis -2 to 2 and y-axis 0 to 10.

5 Answer the following : (any 2 out of 4, each carry 7 marks) 14

- (1) Design an animation of vibrating string using MatLab.  
Record that animation as movie in AVI format.
- (2) Use plot or ezplot, as appropriate, to graph the following functions :
  - (i)  $y = x^3 - x$  for  $-4 \leq x \leq 4$
  - (ii)  $y = \sin\left(\frac{1}{x^2}\right)$  for  $-2 \leq x \leq 2$
  - (iii)  $y = \tan\left(\frac{x}{2}\right)$  for  $-\pi \leq x \leq \pi$  and  $-10 \leq y \leq 10$ .
- (3) Plot the lemniscate  $x^2 - y^2 = (x^2 + y^2)^2$ .
  - (i) Using contour command.
  - (ii) Using ezcontour command.
  - (iii) Add title text "The lemniscate  
 $(x^2 + y^2)^2 - x^2 - y^2$ ".
  - (iv) Add text "inflacio'n point" at point (0, 0).
  - (v) Set x-axis range from -1.1 to 1.1 and y axis range same as x-axis range.
- (4) Explain the following command with suitable examples :
  - (i) Syms
  - (ii) Expand
  - (iii) Log
  - (iv) Exp
  - (v) Factor
  - (vi) vpa
  - (vii) Simplify