NATIONAL INSTITUTE OF TECHNOLOGY, KURUKSHETRA
THEORY EXAMINATION

B.Tech : 2nd | Semester: 4th
Paper Code : MEPC-213 | Branch: Mechanical
Title : Introduction to MATLAB | Session : May 2025

Q1 (a) Find five errors (Factorial of a Number) (2.5)

```
n = input('Enter a number: ');
fact = 0;
for i = 1:n
   fact = i * fact;
   disp('Factorial of', n, 'is', fact);
end

if n < 0
   disp('Factorial is not defined');
else if n == 0
   disp('Factorial is 1');
end
```

(b) What will be output (1)

```
a = 5;
b = 3;
result = (a ~= b)
```

(c) Write a command to convert angle from degree to radian (1)

(d) A = [10, 20, 30;
40, 50, 60;
70, 80, 90];

Suppose linear index m=5. Write a command to find its corresponding row and column indices (1.5)

(e) Give single command to replace all negative elements in the matrix A with zero? (1)

(f) What will be the output of the following code? (1)

```
x = 5;
if x > 3 && x < 10
```

```
  disp('In range')
else
  disp('Out of range')
end
```

(g) How do you preallocate a row vector of 10 zeros for better performance in a loop? (1)

(h) How can you check whether a variable x exists in the workspace? (1)

Q2 (a) Write a MATLAB script that iterates over the numbers from 1 to 20. The script should display only the odd numbers and skip the even numbers using the `continue` statement. (3)

(b) Write a MATLAB script that checks whether a given number or string is a palindrome. A palindrome is a number or string that reads the same forward and backward. (7)

Q3. Write a script `triangle_checker.m` that: (5)

- Takes input of three sides of a triangle.
- Uses a subfunction `triangle(a, b, c)` to:
  - Check if the sides form a valid triangle.
  - If valid, compute the area
  - Also classify the triangle as:
    - Equilateral
    - Isosceles
    - Scalene
- Display appropriate messages.

(b) Write a MATLAB script that uses the built-in function `fzero` to find a root of the function:

$$f(x) = x^3 - 5x + 1$$

- Define the function using a function handle .Use `fzero` with an initial guess of 1.Display the root found.

Q(a) Create a bar graph showing the number of students in five engineering departments: ME, CSE, ECE, CE, and EE, with Axis Labels and Title (2)

(b) Display a mesh plot for z=sin(x)·cos(y) (3)

(c) Use `subplot` to display three plots in a single figure: (5)

- $y = x^2$
- $y = \sqrt{x}$
- $y = \log(x)$, for $x = 1$ to 10

Q5(a) Write a MATLAB script to store data of 3 books in a structure array `books`, with fields: `Title`, `Author`, `Price`, and `Year`. Display the title of the book with the highest price. (5)

(b) Create a cell array `C` containing the following data: (5)

- A string `'NIT Kurukshetra'`
- A numeric array `[10 20 30]`
- A 2x2 matrix `[1 2; 3 4]`
- A logical value `true`

extract:

- The second element as a numeric array
- The string value as a character vector