B. Sc. in EEE
Summer semester

Date: July 2025

ISLAMIC UNIVERSITY OF TECHNOLOGY (IUT)
ORGANISATION OF ISLAMIC COOPERATION (OIC)
DEPARTMENT OF ELECTRICAL AND ELECTRONIC ENGINEERING

Lab Quiz - **02 (Set-K)** | Summer Semester - 2025

Course Number: EEE 4416 | Full Marks: 20

Course Title: Simulation Lab | Time: 35 minutes

Question – 01

- Create an array of random integers within the range 25 and size (1, 16).
- Reshape the array into a 2D matrix of size (8, 2) by placing the first 8 elements in the 1st column and the remaining 8 elements in the 2nd column.
- Create a new column vector containing the row-wise summation of the above matrix.
- Add the column vector to the original matrix (3rd column).
- Sort the entire matrix in descending order.

Test Case:

- **Output:**
  - [5 7 15 23 16 9 13 19 20 24 8 1 14 25 11 12]
  - R = [5 20
    7 24
    15 8
    23 1
    16 14
    9 25
    13 11
    19 12]

Question – 02

Write a function called **'draw_K'** that takes an integer 'n' as input and returns a 'K' shaped square matrix of size (2*n – 1, n). 'n' has to be > 3.

Test case – 01

- Input: 2
- Output: 'Input must be greater than 3

Test case – 02

- Input: 5
- Output:

```
[1  0  0  0  1
 1  0  0  1  0
 1  0  1  0  0
 1  1  0  0  0
 1  0  0  0  0
 1  1  0  0  0
 1  0  1  0  0
 1  0  0  1  0
 1  0  0  0  1]
```

Test case – 03

- Input: 4
- Output:

```
[1  0  0  1
 1  0  1  0
 1  1  0  0
 1  0  0  0
 1  1  0  0
 1  0  1  0
 1  0  0  1]
```

Question – 03

An **Evil number** is a non-negative integer that has an **even number of 1s** in its binary representation.
Write a function called **'evil_num'** that takes an integer as input. If the input is indeed an evil number, the function should return 'evil'. If not, the function should return 'odious'.

- You can use 'dec2bin' function for decimal to binary conversion.

Test case – 01

- Input: 9
- Output: 'evil'

Test case – 02

- Input: 27
- Output: 'evil'

Test case – 03

- Input: 97
- Output: 'odious'

Test case – 04

- Input: 9778
- Output: 'evil'

Test case – 05

- Input: 9779
- Output: 'odious'

Test case – 06

- Input: 4
- Output: 'odious'

Question – 4

Write a function named **'non_fib'** to find the nth term of the sequence of numbers not in the Fibonacci sequence.

Fibonacci numbers: 0, 1, 1, 2, 3, 5, 8, 13, 21, ...

Non-Fibonacci numbers: 4, 6, 7, 9, 10, 11, 12, 14, ...

Test case – 01

- Input: 1
- Output: 4

Test case – 02

- Input: 5
- Output: 10

Test case – 03

- Input: 8
- Output: 14

Test case – 04

- Input: 100
- Output: 110