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-A**) | 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_H'** that takes an integer 'n' as input and returns an 'H' shaped square matrix of size. 'n' has to be > 2.

Test case – 01

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

Test case – 02

- Input: 5
- Output:

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

Test case – 03

- Input: 4
- Output:

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

Test case – 04

- Input: 6
- Output:

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

Question – 03

An **Armstrong** number (also called a **narcissistic** number) is a number that is equal to the sum of its own digits, **each raised to the power of the number of digits.**

For instance,

- 153 is a narcissistic number since –

$$1^3 + 5^3 + 3^3 = 1 + 125 + 27 = 153$$

- 85 is not a narcissistic number since –

$$8^2 + 5^2 = 64 + 25 = 89$$

Write a function called **'armstrong_num'** that takes an integer as input and returns a logical true/false given whether the number is a narcissistic number or not.

Test case – 01

- Input: 371
- Output: true

Test case – 02

- Input: 9474
- Output: true

Test case – 03

- Input: 30000
- Output: false

Test case – 04

- Input: 4210818
- Output: true

Test case – 05

- Input: 99887766
- Output: false

Test case – 06

- Input: 24
- Output: false

Question – 4

Write a function '**maxConsecutiveOnes**' that takes as input a character vector **s** consisting only of '0' and '1', and returns the length of the longest run of consecutive '1' characters in **s**.

Test case no	Input s	Expected Output y
1	'01111001000000100010111'	4
2	'110100111'	3
3	'0000'	0
4	'1010101'	1
5	'1111000111110'	5
6	'' (empty string)	0