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-L)** | Summer Semester - 2025

Course Number: EEE 4416 | Full Marks: 20

Course Title: Simulation Lab | Time: 35 minutes

Question – 01

Ugly numbers are those whose prime factors are 2, 3, or 5. Write a script to find the nth ugly number.

Examples:

- 6 is ugly → 2 × 3
- 8 is ugly → 2 × 2 × 2
- 14 is not ugly → it has a prime factor 7

Test case – 01

- Input: 1
- Output: 1

Test case – 02

- Input: 20
- Output: 36

Test case – 03

- Input: 200
- Output: 16200

Test case – 04

- Input: 250
- Output: 38880

Question – 02

Write a function termed **'is_cap'** that takes a string as input and returns a logical true or false based on whether each word starts with a capital letter or not.

Test case – 01

- Input: 'Kingdom of heaven'
- Output: 0

Test case – 02

- Input: 'SOS – Save Our Souls'
- Output: 1

Test case – 03

- Input: 'once upon a time'
- Output: 0

Test case – 04

- Input: 'We were, indeed, on a break'
- Output: 0

Test case – 05

- Input: 'Everything They Have Built Will Fall, And From The Ashes Of Their World, We Will Build A Better One.'
- Output: 1

Question – 03

Write a function called **'draw_L'** that takes an integer 'n' as input and returns an 'L' shaped square matrix of size n. 'n' has to be > 4 and odd.

Test case – 01

- Input: 2
- Output: 'Input must be greater than 2 and an odd number'

Test case – 02

- Input: 5
- Output:

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

Test case – 03

- Input: 7
- Output:

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

Test case – 04

- Input: 220
- Output: 'Input must be greater than 2 and an odd number'

Question – 4

Create a function named **run_length_encode** that performs Run-Length Encoding (RLE) on a given input string. The function should:

- Return a new string where each group of consecutive repeating characters is represented by the character followed by the number of times it repeats.
- Work only with lowercase alphabetic characters (no special characters or numbers).
- Return a string in the same order as they appear in the input.

Test case – 01

- Input: ‘aaaabbbcc’
- Output: ‘a4b3c2’

Test case – 02

- Input: ‘a’
- Output: ‘a1’

Test case – 03

- Input: ‘’
- Output: ‘’

Test case – 04

- Input: ‘abcdabcd’
- Output: ‘a1b1c1d1a1b1c1d1’