National University of Computer and Emerging Sciences

Islamabad Campus

0145

Digital Logic Design (EE1005)

Sessional-I Exam

Course Instructor(s):
Mrs. Mehreen Javed, Mr. Muhammad Sohail Abbas
Section(s): DS(A,B), AI(A,B,C)

Total Time (Hrs): 1
Total Marks: 45
Total Questions: 5

Date: Feb 24, 2025

Roll No _____ Course Section AI- _____ Student Signature _____

Do not write below this line.

Attempt all the questions.

There are no mistakes in the paper, please don't bother your invigilator.
If in question a part is dependent on the previous one then you must make sure that the previous part is correct, otherwise you won't get marks for the next part at all.

[CLO 1: Explain the concept of digital Number systems]

Q1: Convert the 8-bit **gray code** to its equivalent **BCD (Binary-Coded Decimal)** representation. **[5 marks]**

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[CLO 1: Explain the concept of digital Number systems]
Q2: Use the given symbol and perform the operation below using diminished radix complement. You must not use actual numbers. If you do, you will get **zero** marks. **[5 marks]**

Number	0	1	2	3	4
Symbol	#	$	*	@	%

@#*#%$.#$%
- *@$#*@.#%

[CLO 2: Analyze combinational and sequential logic circuits]
Q3: Convert the given Boolean function into its standard form (Canonical Sum of Products). Construct the corresponding Karnaugh Map (K-map), identify all Prime Implicants, and determine the Essential Prime Implicants. **[5+5=10 marks]**

$$F(A,B,C,D)=A+BC$$

[CLO 2: Analyze combinational and sequential logic circuits]
Q4: Simplify the given equation using K-MAP. Your answer should be in POS form.

$$\prod_{(A,B,C)}(0,3,4)$$

Given that don't care conditions are following, **[7 Marks]**

$$d(A,B,C)=\prod(1,5,7)$$

[CLO 2: Analyze combinational and sequential logic circuits]

Q5: Perform the analysis of given circuit below. **[3+5+5+5=18 Marks]**

a. Find Boolean expression for **Y**.
b. You must Simplify Boolean expression using Boolean algebra rules.
c. Make sure to verify via truth table.
d. Redraw circuit and convert it to equivalent **NAND** gate circuit.