

International Islamic University Chittagong
Department of Electrical and Electronic Engineering
B. Sc. Engineering in EEE
Midterm Examination, Autumn 2022

Course Code: **EEE 2407**

Course Title: **Digital Electronics**

Time: 1 hour 30 minutes

Full Marks: 30

- (i) Answer all the questions. The figures in the right-hand margin indicate full marks.
(ii) Course Outcomes (COs) and Bloom's Levels are mentioned in additional Columns.

Course Outcomes (COs) of the Questions	
CO1	Will have knowledge on Number system, Boolean algebra and different types of Combinational and Sequential circuits.
CO2	Analyze different digital electronics circuits in terms of different systems of Boolean expression and their simplification, truth table, state table etc.
CO3	Solve various problems related to digital electronics and design circuits like adder, comparator, converter, decoder, encoder, ROM, PLA, counter, register etc.

Bloom's Levels of the Questions						
Letter Symbols	R	U	Ap	An	E	C
Meaning	Remember	Understand	Apply	Analyze	Evaluate	Create

- 1) a) Convert the following numbers from given base to octal: CO1 Ap 3
(i) $(41.6875)_{10}$ (ii) $(1D6C.FD2)_{16}$ (iii) $(1110101000.1101)_2$
- 1) b) Express the Boolean function $F=A+B'C$ in a sum of minterms. CO1 E 3
- 1) c) "Biquinary code has error detection properties"-Explain the statement. CO1 An 2
- 1) d) What is ASCII code? How much memory (in byte) is required to store the text "Digital Electronics"? CO1 R 1+1
E

OR

- 1) a) What do you understand by minterm and maxterm? Convert the BCD number 011111000001 into decimal and find if there is/are any error. CO1 R 2+2
An
- 1) b) i. Explain 1's and 2's complement. CO1 Ap 1.5
ii. Proof the following theorem of boolean algebra: CO1 Ap 4.5
(a) $(x+y)' = x'y'$ (b) $x+xy = x$ (c) $x(x+y)=x$

- 2) a) What is universal gate and why they are called so? Implement the following function with NAND gates: CO1 An 1+2
An

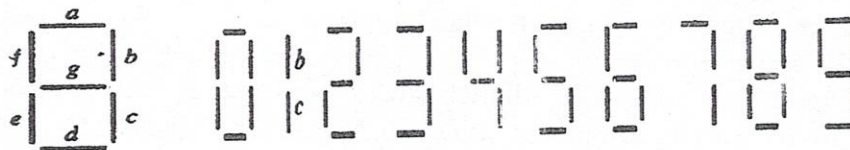
$$F(x,y,z) = \Sigma(0,6)$$

- 2) b) i. Draw an OR gate and an AND gate using NOR gate only. CO1 Ap 3
 ii. Simplify the following Boolean functions using Karnaugh map method: CO1 An 2+2
An

a. $F = A'B'C' + A'B'C + A'BC' + ABC'$

b. $F(x,y,z) = \Sigma(0, 2, 4, 5, 6)$

- 3) a) A BCD to seven-segment decoder is a combinational circuit that accepts a decimal digit in BCD and generates the appropriate outputs for the selection of segments in a display indicator used for displaying the decimal digit. The seven output of the decoder (a,b,c,d,e,f,g) select the corresponding segments in the display as shown in Fig.1(a). The numeric designation chosen to represent the decimal digit is shown in Fig.1(b). Design the BCD to seven segment decoder circuit. CO3 C 7



a: Segment designation

b: Numerical designation for display

Fig.1

- 3) b) Implement the basic logic gates by using only NAND gates. CO2 Ap 3