

SIR ARTHUR LEWIS COMMUNITY COLLEGE
ENGINEERING AND THE CIRCULAR ECONOMY
ACADEMIC YEAR (2024/2025) - SEMESTER TWO
END OF SEMESTER EXAMINATION

LECTURER(S) : **Mr Kendall Numa**

PROGRAMME TITLE : **Computer Systems Engineering
Electronics Engineering**

COURSE TITLE : **Digital Principles & Technology**

COURSE CODE : **ELE211**

LEVEL : **Associate Degree/ Year Twos**

PAPER : **Alternate**

DATE : **Tuesday, 27th May 2025**

COMMENCEMENT TIME : **9:00a.m.**

DURATION : **TWO (2) HOURS**

INVIGILATOR(S) : **-**

ROOM(S) : **VAR-0R-02**

GENERAL INFORMATION AND INSTRUCTIONS

- This paper consist of **Two (2) Sections**. You are required to answer all questions on the foolscap provided.
- **Section A** consist of eight (8) questions. You are required to **answer ALL questions**. Marks are awarded accordingly.
- **Section B** consist of three (3) questions. You are required to **answer ANY TWO (2) questions**. Marks are awarded accordingly.
- All questions are to be attempted on the foolscap paper provided.
- The number in the brackets “[]” next to each question are the marks allocated.
- Students must sign **IN** and **OUT** on the examination class list.
- Students must **not** write their names on their answer sheets, only their ID number
- Please number your responses accurately.

**DO NOT TURN THIS COVER SHEET UNTIL
YOU ARE TOLD TO DO SO!!!**

SECTION A

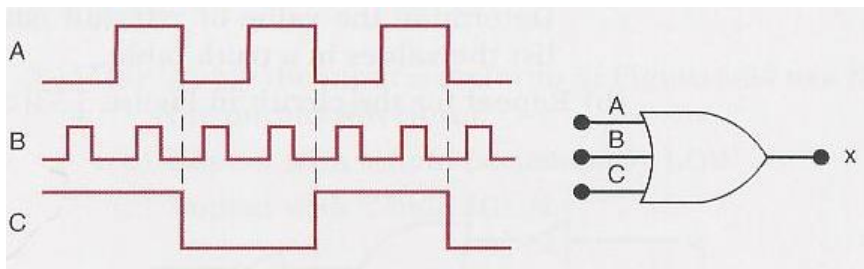
Answer ALL questions on the fooscap provided. (Marks are awarded accordingly).

1. Complete the following table:

Inputs			Outputs					
A	B	C	XOR	NAND	OR	XNOR	NOR	AND
1	0	1						
0	0	1						
1	1	0						
0	1	0						
0	0	0						
1	0	0						

[6]

2. Draw the output **waveform** for the diagram shown below.



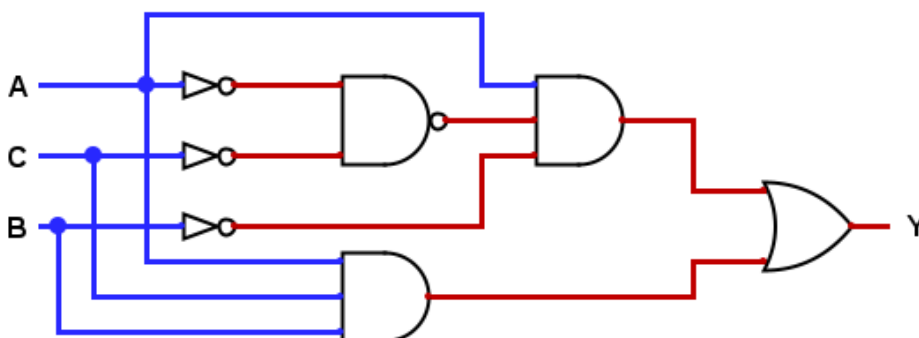
[4]

3. Draw the **logic circuit diagram** for the following Boolean expression:

$$Y = \overline{A + B + \overline{C}D\overline{E}} + \overline{B}C\overline{D}$$

[4]

4. Write the **Boolean expression** and **truth table** for the logic circuit diagram shown below:



[14]

5. Simplify the following Boolean expression using the rules and theorems of Boolean

Algebra: $Y = \overline{A}C\overline{A}B\overline{D} + \overline{A}B\overline{C}\overline{D} + A\overline{B}C$

[4]

6. Simplify the following Boolean expression using the Karnaugh Maps Method:

$$Y = \overline{C}(\overline{A}\overline{B}\overline{D} + D) + A\overline{B}C + \overline{D}$$

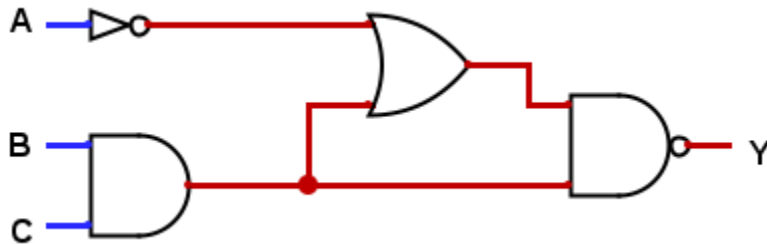
[6]

7. Write the following expression in its Boolean form:

$$F(A, B, C, D) = \prod(1,3,5,8,10, 11,12,15) \quad [4]$$

8. Redraw the following circuit using:

- a. **Only NAND Gates** and
- b. **Only NOR Gates.**



[8]

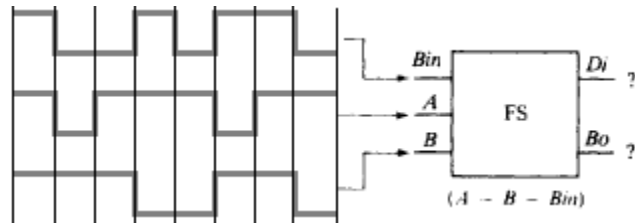
Total (50 Marks)

SECTION B

Answer any two (2) questions

1. a. Draw the truth table and circuit diagram for a full subtractor using two half subtractors. [7]

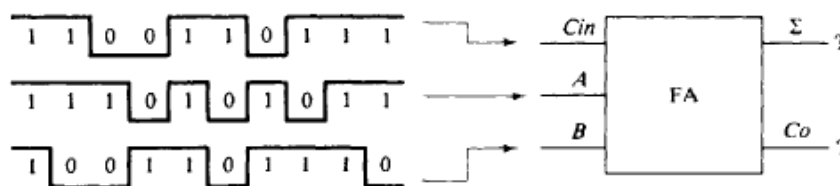
b. Determine the D_i and B_o outputs for the diagram shown below.



[4]

c. Draw a diagram of a 4-bit parallel subtractor using only full subtractors. [4]

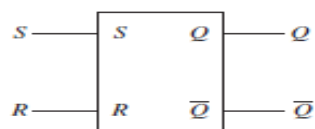
d. Draw the sum and Carry out outputs for the diagram shown below



[5]

2. a. Draw the circuit diagram, truth table and logic symbol for an SR latch with enable. [7]

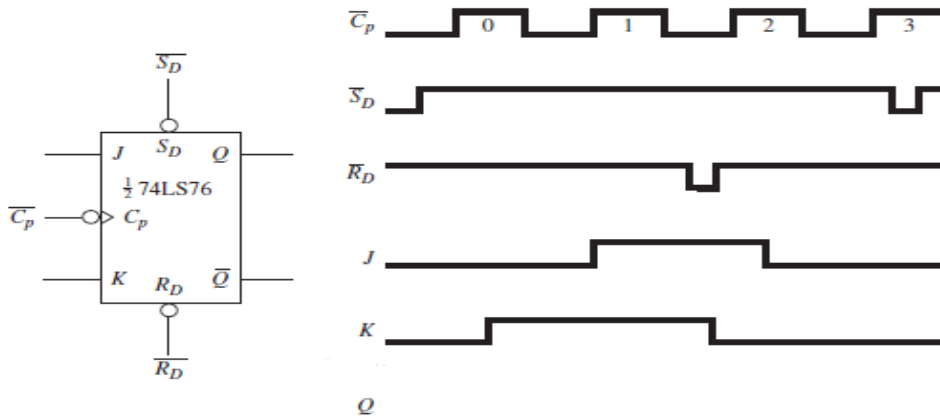
b. Draw the truth table and determine the Q output for the flip-flop in the diagram below.



[7]

c. What is the difference between an asynchronous and a synchronous sequential logic circuit? [2]

d. Draw the Q output for the diagram shown below.



[4]

3. a. Name the four classifications of shift registers and draw the 4-bit variations of any two types. [8]

b. Draw the circuit diagram for a ring counter. [2]

c. Draw the timing diagram for CLK, Q₀, Q₁ and Q₂ for a 3-bit binary up counter for 10 clock pulses. [5]

d. Design a MOD 11 ripple up counter. [5]

Total (40 Marks)

END OF EXAMINATION!!