COMP2012 (Fall 2022) Discrete Mathematics

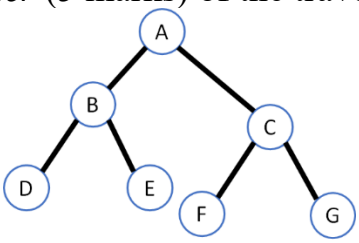
Quiz 3. 15:00pm-16:00pm, 30th November 2022

Name: ZHOU Siyu Student ID: _____ Marks: _____ / 100

- This is an **individual** quiz.
- Please submit the **soft copy** of your answer to Blackboard (as a doc/docx/pdf file).

Question 1 [40 marks]

1(a) Traverse the following Binary Search Tree (BST). List the *in-order* (5 marks), *pre-order* (5 marks) and *post-order* (5 marks) of the traversal.



In-order: D, B, E, A, F, C, G
Pre-order: A, B, D, E, C, F, G
Post-order: D, E, B, F, G, C, A

1(b) Use the postfix expression below to form a binary tree (15 marks), then write the prefix form (5 marks) and the infix form (5 marks) of this tree.

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ED-CBA+**
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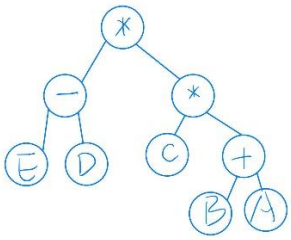
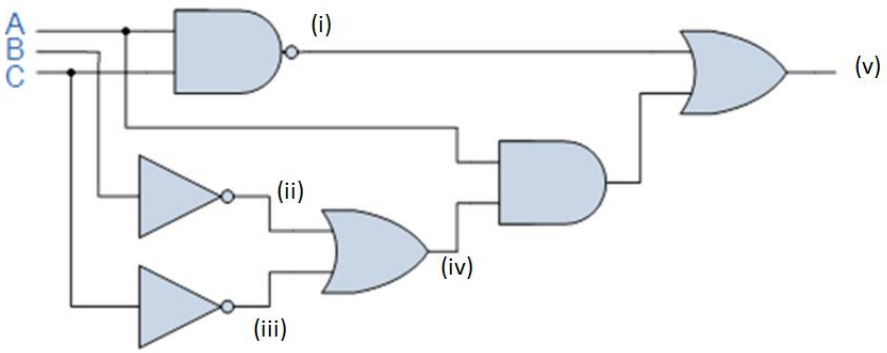


Prefix: *-ED*C+BA
Infix: (E-D) *(C*(B+A))

Question 2 [60 marks]

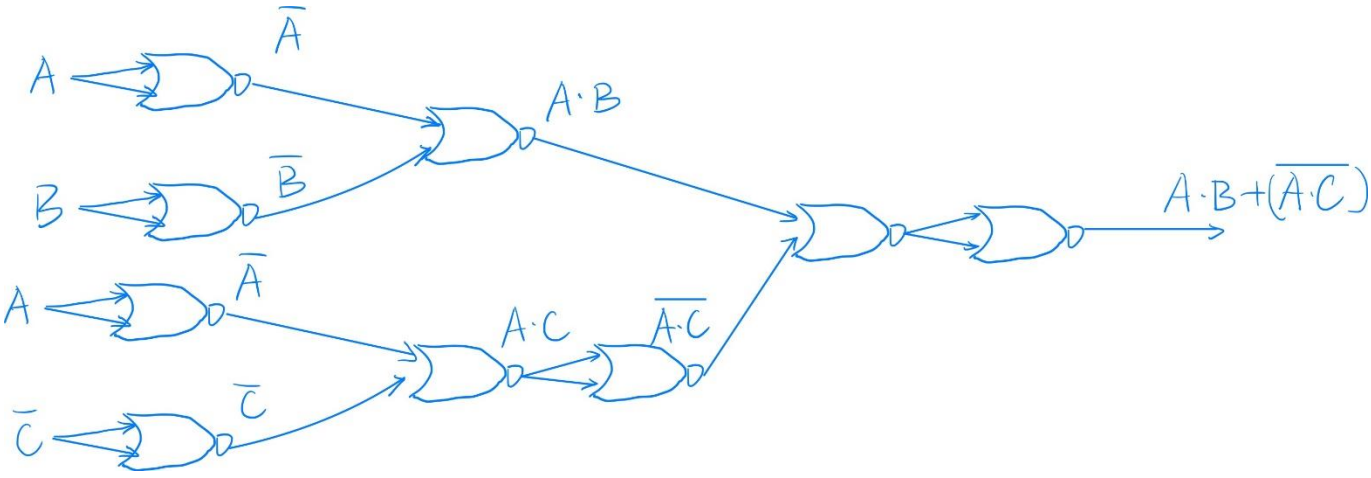
This question is about Boolean algebra and circuits.

2(a) Write down the logic expression at the points (i) to (v) for the following circuit. (15 marks).



(i) A NAND C
(ii) NOT B
(iii) NOT C
(iv) (NOT B) OR (NOT C)
(v) (A NAND C) OR (A AND (NOT B) OR (NOT C)))

2(b) Express $F(A, B, C) = A \cdot B + (\overline{A \cdot C})$ by using a combinational circuit with NOR gates only (20 marks)



2(c) Simplify the following expression using K-map (25 marks)

$F(A, B, C) = A\bar{B}C + \bar{A}BC + AB + \overline{A}\overline{B}C$

$$AB = ABC + AB\bar{C}$$

K-map:

	BC	$B\bar{C}$	$\bar{B}\bar{C}$	$\bar{B}C$
A	1	1		1
$\bar{A}$	1			1

Then

$$F(A,B,C) = C + AB\bar{C}$$