SOUTH EASTERN UNIVERSITY OF SRI LANKA

-071

FIRST EXAMINATION IN BACHELOR OF INFORMATION AND COMMUNICATION TECHNOLOGY - 2019/2020

SEMESTER – I, AUGUST - 2022

CIS11032- Logic Designing and Computer Organization

Answer all Questions **Time: 02 hours.**

Question 01:

a) What is a computer? And discuss the components of the computer by relating the human body parts. **(20 Marks)**

b) Explain how the audio data can be stored on a computer. **(20 Marks)**

c) What is **radix/base** in number system and why it is used? **(10 Marks)**

d) Differentiate between the positional and non-positional number systems by mentioning some examples. **(20 Marks)**

e) Convert the following decimal fraction into binary, octal and hexadecimal.

i. 12.03

ii. 9.325 **(30 Marks)**

[Total 100 marks]

Question 02:

a) Convert the following numbers into decimal number.

i. $1BCD4.54_{16}$

ii. 1663_8

iii. 1110011.001_2 **(15 Marks)**

b) Transform the following octal and hexadecimal numbers into binary number and convert the given binary number into octal and hexadecimal numbers.

i. 371.2_8

ii. $3DCA.31A_{16}$

iii. 1001011110.110_2 **(15 Marks)**

c) List out and briefly describe the three ways in which signed binary numbers can be expressed. **(15 Marks)**

d) Add 17_{10} **to** -8_{10} using **one's complement** arithmetic and verify your answer. **(10 Marks)**

e) Calculate the **two's complement** of -174_{10} **(10 Marks)**

f) Find the decimal equivalent of the 8-bit 2's complement value 11001110_2. **(15 Marks)**

g) Explain the following gates using a suitable diagram.

i. AND gate

ii. OR gate **(20 Marks)**

[Total 100 marks]

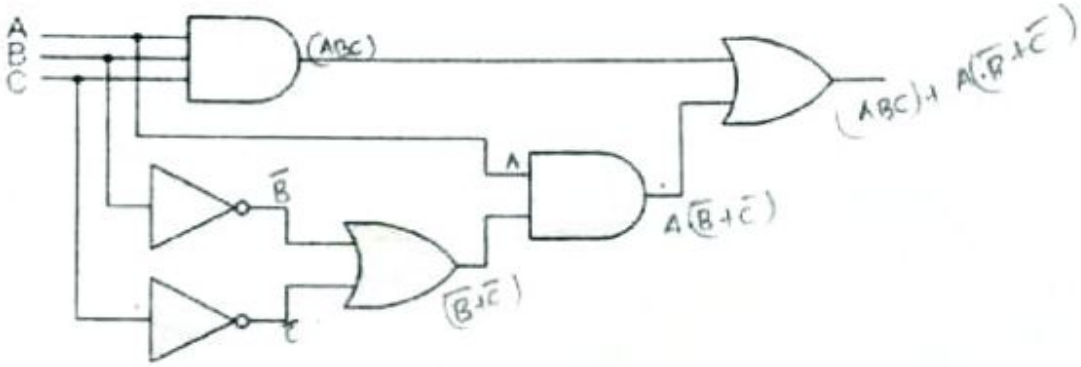
Question 03:

a) What is **truth table** and construct truth table for the following Boolean expression.

i. $(X\overline{YZ}) + (\overline{X} + Y)$

ii. $(A + \overline{B})(AB + \overline{C})$ **(25 Marks)**

b) Convert the following logic gate circuit into a **Boolean Expression** and **truth table**.



(20 Marks)

c) Derive a Boolean expressions from the given truth table.

A	B	C	R
0	0	0	0
0	0	1	1
0	1	0	0
0	1	1	1
1	0	0	0
1	0	1	0
1	1	0	1
1	1	1	1

(15 Marks)

d) Minimize the following Boolean function using **Karnaugh maps.**

i. $B, C, D) = \Sigma m(3, 4, 5, 7, 9, 13, 14, 15)$

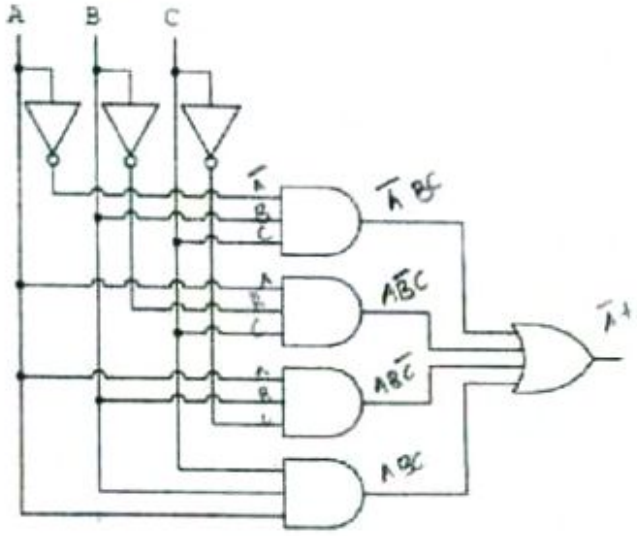
ii. $F(A, B, C, D) = \Sigma m(0, 1, 2, 5, 7, 8, 10, 12, 15) + \Sigma d(3, 14)$

(40 Marks)

[Total 100 marks]

Question 04:

a) Simplify the output of the following logic gate circuit by converting it into Boolean expression and truth table.



(25 Marks)

b) Discuss the components of the central processing unit (CPU). **(20 Marks)**

c) Describe how an ALU works. **(15 Marks)**

d) Simplify the following expressions using Boolean algebra.

i. $A\bar{B} + A(B + C) + B(B + C)$

ii. $[A\bar{B}(C + BD) + \bar{A}\bar{B}]C$

iii. $\bar{A}BC + A\bar{B}\bar{C} + \bar{A}\bar{B}\bar{C} + A\bar{B}C + ABC$

iv. $\overline{(A + \bar{B})(AB)} + \overline{(A + B)(\bar{A}\bar{B})}$

(40 Marks)

[Total 100 marks]

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