20	E	II

Third Term Test - 2021 — **Grade 12**

Information and Communication Technology - II — **Time- 03 hours**

Part A – Structured Essay

- *Answer **all four questions on this paper itself***

1. Fill in the blanks with the most appropriate word from the list below. (1*10 marks)

(type check, Development Environmental Service, Plagiarism, L1 cache memory, Floppy disk, Register memory, Random access, Von Neumann ,IR Register , bus)

i. Type check (Development environment) is an example of a data validation test method.

ii. PaaS is a service model provided in cloud computing.

iii. Promoting a design or writing style created by someone else is plagiarism

iv. L1 cache memory is located in or near the processor.

v. Floppy disk can be considered as a magnetic storage device.

vi. The fastest memory device in terms of memory hierarchy is Register memory

vii. Random Access is used to access the data on the hard disk.

viii. The format used by the stored program concept was presented by Von Neumann

ix. ix. In any case, the instructions that are running in the processor are stored in IR Register

x. Bus helps to carry data, information, instructions, memory addresses..

2. A computer uses an 8-bit two's complement to represent its integers.

i. Write down how to calculate -10-17 in that computer, showing the steps. (3 marks)

+10 – 00001010

-10 – 11110101 - (1's complement)

+1

11110110 (2's)

+17 0001 0001

-17 1110 1110

+1

1110 1111

-10 11110100

-17 1110 1111

1 11100100

carry bit is discarded

-10-17 = 11100100

ii. Prove that the answer is -27. (1 mark)

invert

-10-17 = 1110 0100

0001 1011

16 8 2 1

get the sign - 27 = 0001 1011

+1

0001 1011

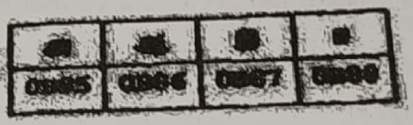
16 8 2 1 //

iii. Write down 2 advantages of using two's complements in a computer? (2 marks)

Two's complement only has one value for zero. Therefore, if any carry value remain after addition then there is no ony need to add that carry in the end results. So arithmetic operations are much easier than 1's complement

iv. iv. Different coding methods are used to represent data in a computer.

Table 2:



a. In what coding system is used to represent the characters in these tables? (1 mark)

UNICODE

b. b. Write down two advantages of the above coding method (2 marks)

① unicode assign a code to every character and symbol in every language in the world.

② portability. most operating systems, databases, programming languages web browsers currently support unicode.

disadvantages:- need more enought memory.

c. c. How many bits are used for the codes in that coding system? (1 mark)

unicode uses two encoding forms. 8-bit 16-bit

default encoding form = 16-bit

3. The digital computer we use is made up of a number of digital circuits.

i. i. What are the two main types of circuits we find in a computer?(2 marks)

combinational circuits

Sequential circuits.

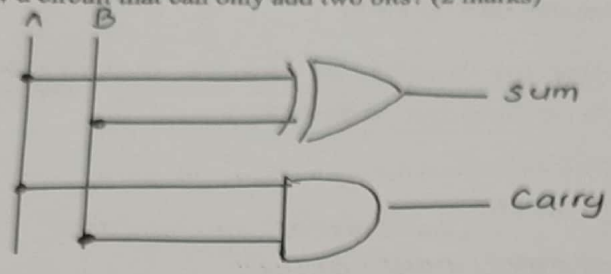
ii. ii. What is the name of the circuit used for basic arithmetic in a computer? (1 mark)

Adders - is a digital circuit that perfoms addition of numbers.

iii. iii. What type of circuits do these circuits belong to? (1 mark)

combinational logic circuit.

iv. Draw a circuit that can only add two bits? (2 marks)



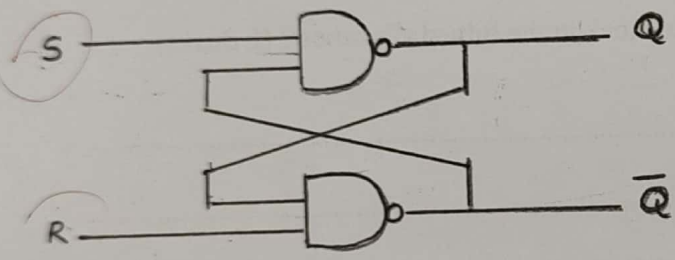
Sum = A ⊕ B

Carry = A.B

iv. What type of circuits do flip flops belong to? (1 mark)

Sequential Circuits

v. Draw the flip-flop circuit using the NAND gate. (2 marks)



vi. What are sequencing circuits used for? (1 mark)

Data entered into the computer should be kept in memory for a certain period of time. Sequential circuits are required to fullfill this need. Basically, flupflops is used to manufacture, these circuits memory cells are created by flupflops and it has the ability to store 0 or 1 binary.

- Help to design better Electronic circuits.

4.

I. Amal uses a single-processor computer. He opens his email account to send an emergency message while running Python programs.

Specify what the Process Control Block (PCB) of Python process contains in the following various domains when context switching (Python process → sending email process) occurs :

A. program counter? (1 mark)

memory address of the next instruction.

B. process state? (1 mark)

Blocked State

II. How is the data stored in the contigious allocation? (1 mark)

Saving data of the single file stored in several sectors in the adjacent areas is called contigious allocation.

III. Write down one of its disadvantages? (1 mark)

1.) Both External Fragmentation and Internal fragmentation may occur.

2.) Increasing file size is difficult because it depends on the availability of contigious memory at a particular instance.

IV. How data is stored in the linked allocation? (1 mark)

Saving files in a scattered manner in various places without being saved in several adjacent sectors of the harddisk is called linked A.

V. Write two points that can be contained in a file block in the linked allocation? (2 marks)

. Data

. end of the file

VI. Mention the advantage of using the page table? (1 mark)

Used to keep track of the relation between a page of a process to a frame in physical memory.

VII. The maximum physical memory capacity of a computer is 8GB and one frame is 4KB. Find the number of frames in that physical memory? (1 mark)

physical memory capacity = 8 GB

in KB = $2^3 \times 2^{10} \times 2^{10} = 2^{23}$

capacity of 1 Frame = 4 KB (2^2)

NO of frames in physical memory = $\frac{2^{23}}{2^2} = 2^{21}$ FRAMES. 2097152

VIII. What is the minimum width of the address bus on the computer if the above computer is byte addressable? (1 mark)

Capacity of the physical memory = 8 GB

in Bytes = $2^3 \times 2^{10} \times 2^{10} \times 2^{10} = 2^{33}$ bytes

∴ minimum width of the address bus = 33 bits.

Part B

① a)

A	B	C	Z
0	0	0	0
0	0	1	0
0	1	0	0
0	1	1	0
1	0	0	0
1	0	1	1
1	1	0	1
1	1	1	1

(4 marks)

b) $Z = A\bar{B}C + AB\bar{C} + ABC$ (3 marks)

c) $A\bar{B}C + AB\bar{C} + ABC$

$A\bar{B}C + ABC + AB\bar{C} + ABC$

$AC(\bar{B}+B) + AB(\bar{C}+C)$ විසිරවන නෑයේ

$AC(1) + AB(1)$ පුනරාවර්ත නෑයේ

$AC + AB$ සාධ්‍ය කරන නෑයේ

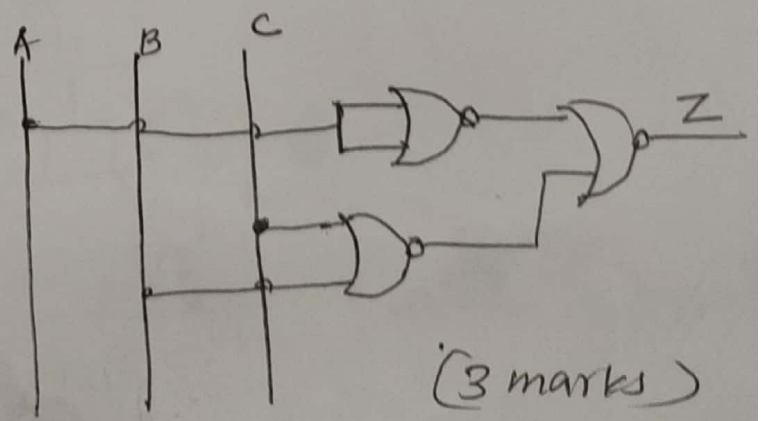
$A(C+B)$ // විසිරවන නෑයේ

(3 marks)

d) $\overline{\overline{A(C+B)}}$

$\overline{\bar{A} + \overline{(C+B)}}$

(2 marks)



(3 marks)

(2) i)

11111111 . 11111111 . 11111111 . 00000000

11111111 . 11111111 . 11111111 . 11000000

255 . 255 . 255 . 192

පාරෙක් නම	Subnet mask	Network IP	Broadcast IP	IP Range
HR	255.255.255.192	192.168.1.1	192.168.1.63	192.168.1.1 192.168.1.63
Admin	255.255.255.192	192.168.1.64	192.168.1.127	192.168.1.64 192.168.1.127
Finance	255.255.255.192	192.168.1.128	192.168.1.191	192.168.1.128 192.168.1.191
Supply	255.255.255.192	192.168.1.192	192.168.1.254	192.168.1.192 192.168.1.254

(1 × 4 = 4 marks)

(3)

a) මෙහෙයුම් පද්ධති - Opera, Mac, Windows XP, Linux mint, Hanthana Linux

යෙදුම් මෘදුකාංග - Adobe photoshop, Joomla, Opera.

උපයෝගිතා මෘදුකාංග - Disk Defragmentation, Avira Anti virus software

(3 marks)

b) රාමු - frame
Page - පිටු
Segment - කොටස්. (3 marks)

c)

	පෙර තිබිය යුතු තත්වය	සංක්‍රාන්තිය සඳහා කොන්දේසිය	ක්‍රියාවලි නියමකාරකය
ක්‍රියාත්මක	සූදානම්	ක්‍රියාවලිය ක්‍රියාත්මක කිරීම සඳහා	Short Term schedu
අවහිර කළ	ක්‍රියාත්මක	I/O wait	Short Term

(5 marks)

d) ප්‍රතිහරණය කළ හා රැඳී සිටින
* ප්‍රමුඛතාවය ඉහළ වූ ක්‍රියාවලියකට ප්‍රධාන මතකයේ ඉඩ ලබා දීම සඳහා

(2 marks)

e) ප්‍රතිහරණය කළ හා අවහිර කළ
* ප්‍රධාන මතකයේ Blocked queue හි ඉඩ ඉතිරි කිරීම සඳහා I/O සඳහා බොහෝ වේලාවක් රැඳී සිටින ක්‍රියාවලි ද්විතීයික මතකයට යොමු කොට RAM හි ඉඩ ලබා ගැනීම

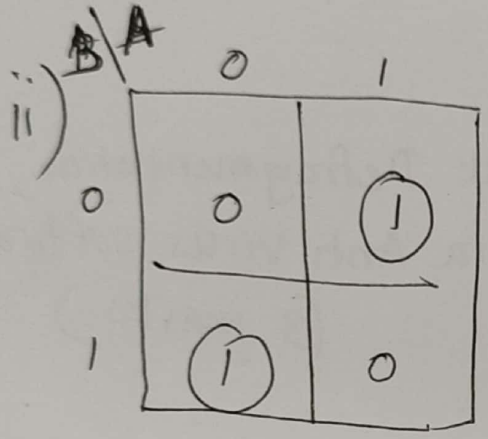
i)

(4)

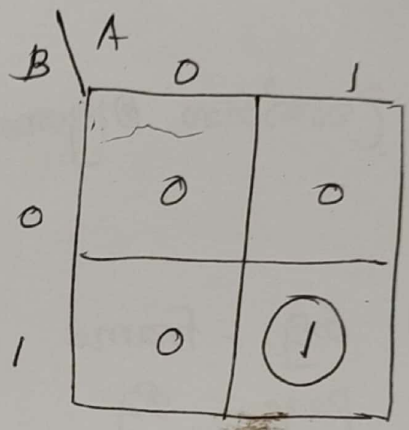
A	B	Sum	Carry
0	0	0	0
0	1	1	0
1	0	1	0
1	1	0	1

(2 marks)

ii)



Sum (1 mark)

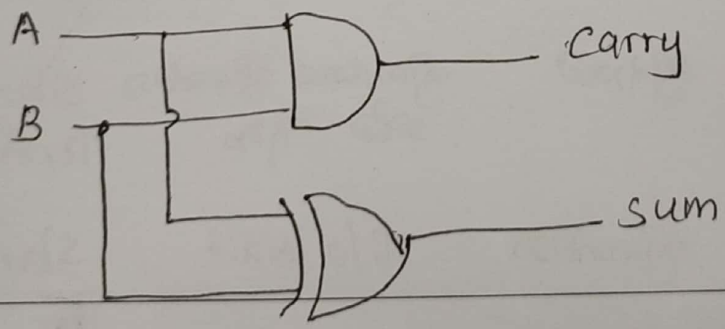


Carry (1 mark)

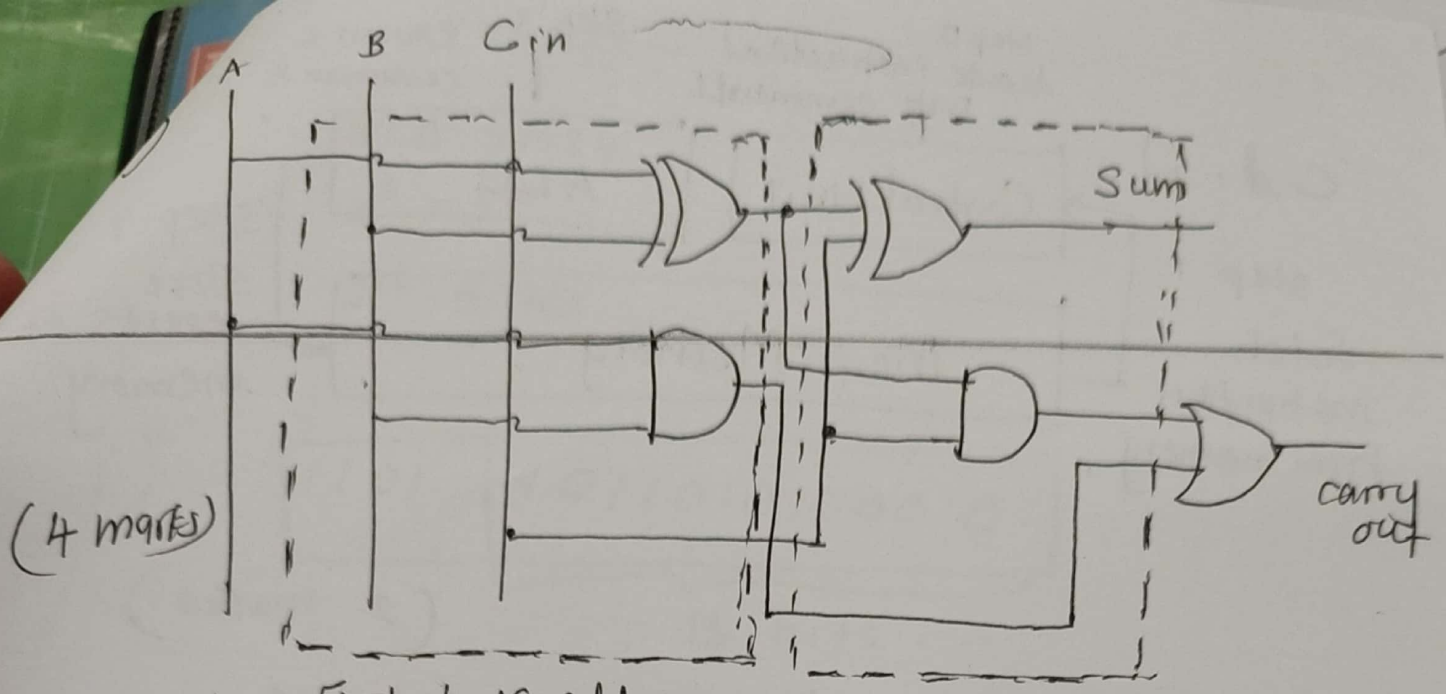
iii)

Sum = $A\bar{B} + \bar{A}B$ // (1 mark) Carry = AB // (1 mark)

iv)



(1 mark)



(4 marks)

vi)

A		1	1	0	1
B		0	1	1	1
Carry in	1	1	1	1	0
Sum	1	0	1	0	0
Carry out		1	1	1	1

(4 marks)

(5) a) නිවැරදි කිරීම් හඳුනාගැනීම නිවැරදි කොටසට අනාවරණය කිරීම. නිවැරදි කොටසට ලබා ගැනීම. සඳහා වලංගු දත්ත සැකසීමක් කළ යුතුය. (1 mark)

b) A – අනන්‍යතා පරීක්ෂාව Presence check

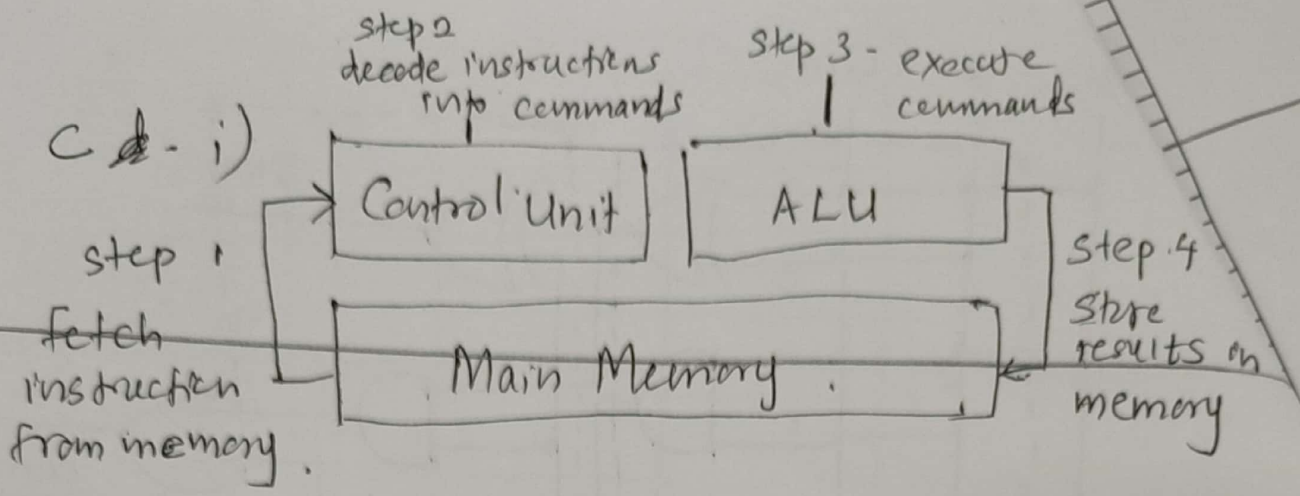
B – " "

C – වර්ග පරීක්ෂාව Type check

D – පරාස පරීක්ෂාව Range check.

(4 marks)

c) - i)



(2 marks)

MAR - Memory Address Registers (it holds

MDR - Memory Data Register

ii) IR - Instruction Register

PC - program counter (3 marks)

d) Registers → L1 cache → L2 cache → RAM → Flash memory → Hard disc → DVD

(2 marks)

e i) Work at home online (1 mark)

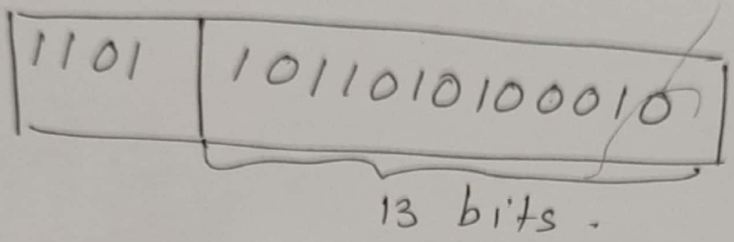
ii) Computer, Router, (2 marks)

⑥ 8KB X1024

$2^3 \times 2^{10}$

2^{13} Bytes

i)



ii) 2^{13} memory addresses //

iii) 8KB X16

$2^3 \times 2^4$

$2^7 = 128$ KB //

iv) $2^5 = 32$ pages //

v) $2^4 = 16$ frames //

vi) 0000 0000000000000 කිට

0000 1111111111111 දක්වා

vii) 0001 0000000000000 කිට

0001 1111111111111 දක්වා

viii) නැත. 0 රාමුවේ ලිපිනයෙහි තෘතීයක දැක්වීමේදී රාමු අංකය සඳහා 4 bits තෝරා ඇත. නමුත්, අනෙකාස මතකයේ 0 පිටුවේ ලිපිනයෙහි තෘතීයක දැක්වීමේදී පිටු අංකය සඳහා 5 bits තෝරා ඇත. එනම් 0 පිටුවේ මතක ලිපින සඳහා පිටු 18 ක් හා 0 රාමුවේ මතක ලිපිනයන් සඳහා පිටු 17ක් තෝරා ඇත. ∴ 0 පිටුවේ හා 0 රාමුවේ මතක ලිපිනයන් තෘතීයක සමාන නැත.