

A/L ICT 2024 (Gr.12)

Marking Scheme

2nd Term

October – 2023 Examination



NFWC

Field Work Center (FWC)



*This document /scheme has been prepared for the use of marking examination paper.
Some changes and alternative answers would be made by the teachers.*

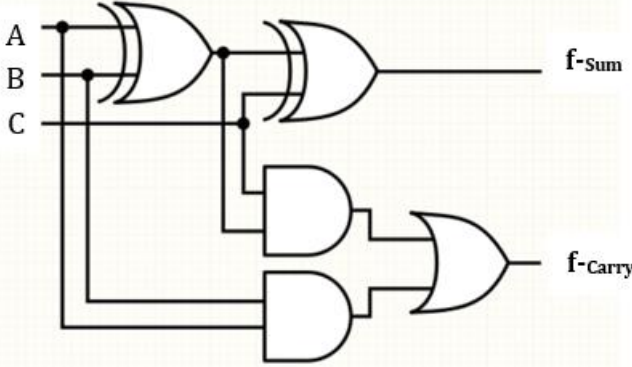
Amendments to be included.

Part – I

(1)	5	(11)	4	(21)	3
(2)	4	(12)	3	(22)	4
(3)	4	(13)	5	(23)	5
(4)	2	(14)	5	(24)	4
(5)	3	(15)	1	(25)	5
(6)	5	(16)	2	(26)	3
(7)	2	(17)	2	(27)	2
(8)	3	(18)	2	(28)	3
(9)	3	(19)	4	(29)	4
(10)	1	(20)	5	(30)	1

[1 x 30 = 30 Marks]**Part – II A**

Question No.		Marks																																													
(1)(a)	A : Central Processing Unit (CPU) B : Control Unit (CU) C : Arithmetic Logic Unit (ALU) D : Memory Unit	2 Marks [0.5 x 4]																																													
(1)(b)	<table><tr><th>A</th><th>B</th><th>C(C-IN)</th><th>f-Sum</th><th>f-Carry(C-OUT)</th></tr><tr><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr><tr><td>0</td><td>0</td><td>1</td><td>1</td><td>0</td></tr><tr><td>0</td><td>1</td><td>0</td><td>1</td><td>0</td></tr><tr><td>0</td><td>1</td><td>1</td><td>0</td><td>1</td></tr><tr><td>1</td><td>0</td><td>0</td><td>1</td><td>0</td></tr><tr><td>1</td><td>0</td><td>1</td><td>0</td><td>1</td></tr><tr><td>1</td><td>1</td><td>0</td><td>0</td><td>1</td></tr><tr><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td></tr></table>	A	B	C(C-IN)	f-Sum	f-Carry(C-OUT)	0	0	0	0	0	0	0	1	1	0	0	1	0	1	0	0	1	1	0	1	1	0	0	1	0	1	0	1	0	1	1	1	0	0	1	1	1	1	1	1	2 Marks
A	B	C(C-IN)	f-Sum	f-Carry(C-OUT)																																											
0	0	0	0	0																																											
0	0	1	1	0																																											
0	1	0	1	0																																											
0	1	1	0	1																																											
1	0	0	1	0																																											
1	0	1	0	1																																											
1	1	0	0	1																																											
1	1	1	1	1																																											
(1)(b)(i)	$f_{\text{Sum}} = \overline{A}\overline{B}C + \overline{A}B\overline{C} + A\overline{B}\overline{C} + ABC$ $f_{\text{Carry}} = \overline{A}BC + A\overline{B}C + AB\overline{C} + ABC$	2 Marks [1 x 2]																																													
(1)(b)(ii)	$f_{\text{Sum}} = \overline{A}\overline{B}C + \overline{A}B\overline{C} + A\overline{B}\overline{C} + ABC$ $= C. (\overline{A}\overline{B} + AB) + \overline{C}. (\overline{A}B + A\overline{B})$ $= C. (\overline{A} \oplus B) + \overline{C}. (A \oplus B)$ $= A \oplus B \oplus C$ $f_{\text{Carry}} = \overline{A}BC + A\overline{B}C + AB\overline{C} + ABC$ $= C. (\overline{A}B + A\overline{B}) + AB. (C + \overline{C})$ $= C. (A \oplus B) + AB$	2 Marks [1 x 2]																																													

(1)(b)(iii)		2 Marks
(2)(i)	$23_{10} \rightarrow 00010111$	1 Mark
(2)(ii)	$ \begin{array}{rcl} 9 & \rightarrow & 00001001 \\ 1's \text{ Com.}(-9) & \rightarrow & 11110110 \\ 2's \text{ Com.}(-9) & \rightarrow & + \quad \underline{1} \\ & & 11110111 \end{array} $	2 Marks
(2)(iii)	$ \begin{array}{rcl} 23_{10} + (-9_{10}) & \rightarrow & 00010111 \\ & + & \underline{11110111} \\ & & 00001110 \end{array} $ Discard 1 ←	2 Marks
(2)(iv)	$ \begin{array}{rcl} & & 00001110 \\ & \nearrow & \\ \text{MSB/Sign Bit} & & \\ 0 \rightarrow +Ve & + & 14 \end{array} $	2 Marks
(2)(v)	Sign Bit $\rightarrow 1 \rightarrow -Ve$ $ \begin{aligned} &= 1.111 \times 2^0 \\ &= 1.111 \\ &= 1 \times 2^0 + 1 \times 2^{-1} + 1 \times 2^{-2} + 1 \times 2^{-3} \\ &= 1 \times 1 + 1 \times 0.5 + 1 \times 0.25 + 1 \times 0.125 \\ &= 1 + 0.5 + 0.25 + 0.125 \\ &= 1.875 \\ &\mathbf{-1.875} \end{aligned} $	3 Marks [Sign Bit $\rightarrow 1$, Calculation $\rightarrow 1$, Final Answer $\rightarrow 1$]

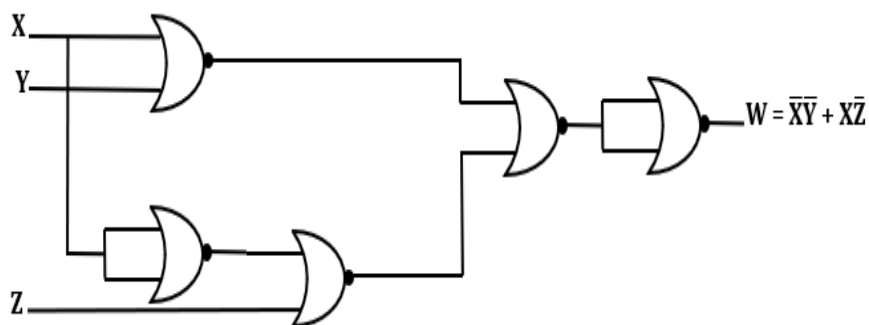
(3) (a)	<table><tr><td>1</td><td>Physical Layer</td></tr><tr><td>2</td><td>Data-Link Layer</td></tr><tr><td>3</td><td>Network Layer</td></tr><tr><td>4</td><td>Transport Layer</td></tr><tr><td>5</td><td>Session Layer</td></tr><tr><td>6</td><td>Presentation Layer</td></tr><tr><td>7</td><td>Application Layer</td></tr></table>	1	Physical Layer	2	Data-Link Layer	3	Network Layer	4	Transport Layer	5	Session Layer	6	Presentation Layer	7	Application Layer	2 Marks [No partial Marks]
1	Physical Layer															
2	Data-Link Layer															
3	Network Layer															
4	Transport Layer															
5	Session Layer															
6	Presentation Layer															
7	Application Layer															
(3) (b)	11101011 Even Parity Bit 1 mark for adding 1 as the parity bit (Ignore the position where the parity bit is added) 1 mark for receiver has to get the total number of bits even; if not error	2 Marks														
(3) (c)	A : 3 B : 2 C : 1 D : 5 E : 4	3 Marks [0.5x5 = 2.5, 0.5 for Completeness]														
(3) (d)	00110011 NRZ-L NRZ-I Manchester	3 Marks [1x3]														

(4)(a)(i)	No of pages = 2^{20}	1 Mark
(4)(a)(ii)	No of frames = 2^{14}	1 Mark
(4)(a)(iii)	No of page offset bits = 12	1 Mark
(4)(b)(i)	303	1 Mark
(4)(b)(ii)	16 KB	1 Mark
(4)(c)	A : Running B : Blocked C : Ready	3 Marks [1x3]
(4)(d)	○ That page would not have been accessed before. ○ That page would have got evicted / removed / expelled from physical memory. ○ That page is called in the program for the very first time. ○ That page was in physical memory before but has been taken off to make room for another page/ the page has been swapped out (priority queue).	2 Marks

Part – II B

Question No.																																																																																																					
(1)(i)	$W = \overline{X}\overline{Y}\overline{Z} + \overline{X}\overline{Y}Z + X\overline{Y}\overline{Z} + XY\overline{Z}$ <table><tr><th>X</th><th>Y</th><th>Z</th><th>$\overline{X}$</th><th>$\overline{Y}$</th><th>$\overline{Z}$</th><th>$\overline{X}\overline{Y}\overline{Z}$</th><th>$\overline{X}\overline{Y}Z$</th><th>$X\overline{Y}\overline{Z}$</th><th>$XY\overline{Z}$</th><th>W</th></tr><tr><td>0</td><td>0</td><td>0</td><td>1</td><td>1</td><td>1</td><td>1</td><td>0</td><td>0</td><td>0</td><td>1</td></tr><tr><td>0</td><td>0</td><td>1</td><td>1</td><td>1</td><td>0</td><td>0</td><td>1</td><td>0</td><td>0</td><td>1</td></tr><tr><td>0</td><td>1</td><td>0</td><td>1</td><td>0</td><td>1</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr><tr><td>0</td><td>1</td><td>1</td><td>1</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr><tr><td>1</td><td>0</td><td>0</td><td>0</td><td>1</td><td>1</td><td>0</td><td>0</td><td>1</td><td>0</td><td>1</td></tr><tr><td>1</td><td>0</td><td>1</td><td>0</td><td>1</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr><tr><td>1</td><td>1</td><td>0</td><td>0</td><td>0</td><td>1</td><td>0</td><td>0</td><td>0</td><td>1</td><td>1</td></tr><tr><td>1</td><td>1</td><td>1</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr></table>	X	Y	Z	$\overline{X}$	$\overline{Y}$	$\overline{Z}$	$\overline{X}\overline{Y}\overline{Z}$	$\overline{X}\overline{Y}Z$	$X\overline{Y}\overline{Z}$	$XY\overline{Z}$	W	0	0	0	1	1	1	1	0	0	0	1	0	0	1	1	1	0	0	1	0	0	1	0	1	0	1	0	1	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	1	0	0	0	1	1	0	0	1	0	1	1	0	1	0	1	0	0	0	0	0	0	1	1	0	0	0	1	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0	0	1 Mark 4 Marks [0.5 for each row]
X	Y	Z	$\overline{X}$	$\overline{Y}$	$\overline{Z}$	$\overline{X}\overline{Y}\overline{Z}$	$\overline{X}\overline{Y}Z$	$X\overline{Y}\overline{Z}$	$XY\overline{Z}$	W																																																																																											
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0	0	1	1	1	0	0	1	0	0	1																																																																																											
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1	1	1	0	0	0	0	0	0	0	0																																																																																											
(1)(ii)	<table><tr><th>YZ \ X</th><th>00</th><th>01</th><th>11</th><th>10</th></tr><tr><th>0</th><td>1</td><td>1</td><td>0</td><td>0</td></tr><tr><th>1</th><td>1</td><td>0</td><td>0</td><td>1</td></tr></table>	YZ \ X	00	01	11	10	0	1	1	0	0	1	1	0	0	1	2 Marks [Deduct 1 marks if “0” is not placed]																																																																																				
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0	1	1	0	0																																																																																																	
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YZ \ X	00	01	11	10																																																																																																	
0	1	1	0	0																																																																																																	
1	1	0	0	1																																																																																																	
(1)(iv)		2 Marks																																																																																																			

(1)(v)



3 Marks

(2) (i)

Star topology

- high performance / speed (as no data collisions can occur)
- easy management / maintenance / fault detection / easy expansion of network / easy addition of devices / easy removal of devices (can be done without disturbing entire network)
- reliability (if one cable or device fails then all the others will still continue to work)

2 Marks
[1,1]

(2) (ii)

192.168.30.128 - 192.168.30.255

2 Marks
[1, 1]

(2) (iii)

11111111.11111111.11111111.10000000
255.255.255.128

1 Mark

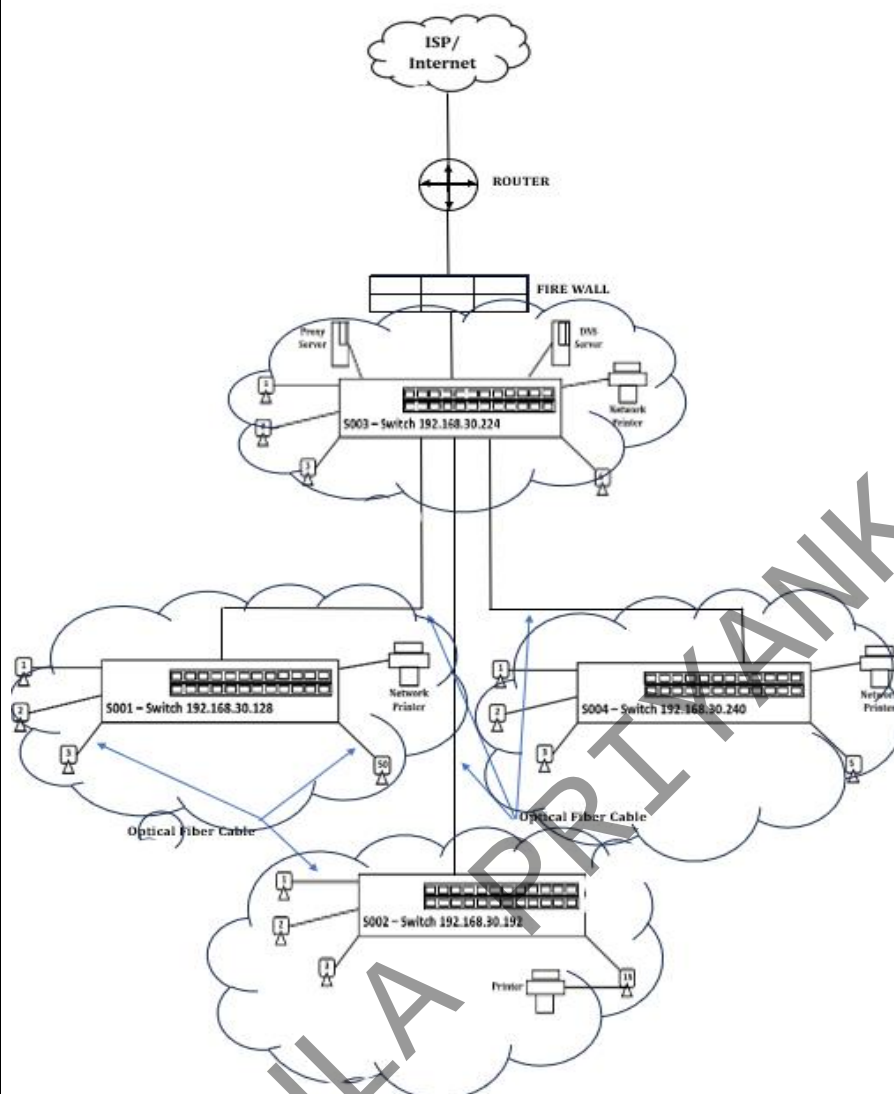
(2) (iv)

Subnet Number	Network Address	Subnet Mask	Usable IP Address Range	Broadcast Address
S001	192.168.30.128	255.255.255.192	192.168.30.129 - 192.168.30.190	192.168.30.191
S002	192.168.30.192	255.255.255.224	192.168.30.193 - 192.168.30.222	192.168.30.223
S003	192.168.30.224	255.255.255.240	192.168.30.225 - 192.168.30.238	192.168.30.239
S004	192.168.30.240	255.255.255.248	192.168.30.241 - 192.168.30.246	192.168.30.247

4 Marks
[1 for each row]

(2) (v)

5 Marks



1 mark for each:

A: Internet - Router - Firewall - IT switch link

B: Connecting HR, Finance and Marketing switches to the IT switch

C: Connecting Proxy and the DNS servers to the IT switch

D: Connecting the computers to the switches in each department

E: Connecting the three network printers to Finance, HR and Marketing switches and non-network printer to a computer in the IT Unit

(2) (vi)

1 Mark

Allocate the IP addresses through a DHCP server

Final Marks Distribution:

Part – I 1 x 30 = 30 Marks

Part – II A 10 x 4 = 40 Marks

Part – IIB

15 x 2 = 30 Marks

Total: 100 Marks
