REDSPOT Fresh Minds New Thoughts

About O LEVEL

COMPUTER SCIENCE 2210

(YEARLY)

About Thinking Process

When solving problems, we first analyse the questions and then gather relevant information until we are able to determine the answers. But for presentation reason, we need to organise, rearrange and then present ONLY the required workings and solutions.

Thinking process reveals the extra but relevant information which is not required as part of the solutions.

period	2012 to 2022
contents	June & November Exams, Worked Solutions
form	Yearly
compiled for	O Levels
special features	Thinking Process

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JUNE 2022 PAPER 1

Theory

Answer **all** questions.

No marks will be awarded for using brand names of software packages or hardware.

Question 1

(a) Denary values are converted to binary values to be processed by a computer.

Draw **one** line from each denary value to the correctly converted 8-bit binary value.

Denary	8-bit binary
	00100001
41	10100110
	00101001
174	10000110
	10101110
86	01010110

[3]

Working space

.....

.....

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.....

(b) Binary values can also be converted to denary values.

Give the correct denary value for the 12-bit binary value 000101010111

Show all your working.

.....

.....

.....

.....

.....

Denary value ..... [2]

Question 2

Hexadecimal is used for Hypertext Markup Language (HTML) colour codes.

An HTML colour code is:

#2F15D6

Each pair of digits is stored as binary in an 8-bit register.

(a) Give the 8-bit binary value that would be stored for each pair of hexadecimal digits.

2F								
15								
D6								

[6]

Working space

.....

.....

.....

.....

.....

(b) HTML colour codes and Media Access Control (MAC) addresses are two examples of where hexadecimal is used in Computer Science.

Give **two** other examples of where hexadecimal can be used in Computer Science.

Example 1 .....

Example 2 ..... [2]

(c) Websites can be created using HTML structure and presentation.
State what is meant by HTML structure and presentation.
Give an example of each in your answer.

Structure .....

.....

.....

Presentation .....

.....

.....

..... [4]

(d) Explain why presentation is often separated from structure when creating a web page.

.....

.....

.....

..... [2]

Question 3

Joelle is a student who uses the Internet.

(a) The table contains **five** terms or definitions that relate to the Internet.
Complete the table by writing each missing term or definition. [5]

Term	Definition
browser	....
.....	this is the company that provides a user with a connection to the Internet
.....	this is a protocol that is used to send data for web pages across the Internet
Uniform Resource Locator (URL)	....
cookie	....

(b) Joelle uses a firewall to keep her data safe when she uses the Internet.

Tick (✓) to show which statement about firewalls is true.

	Tick (✓)
Firewalls can only be hardware-based	☐
Firewalls can only be software-based	☐
Firewalls can be hardware-based or software-based	☐

[1]

(c) Joelle's parent also uses the firewall to limit the websites that Joelle can access.

Explain how the firewall is used to limit the websites that Joelle can access.

.....

.....

.....

.....

.....

.....

.....

..... [4]

Question 4

Jason is a programmer who writes computer programs in a high-level language.

(a) Describe what is meant by a high-level language.

.....

.....

.....

.....

.....

..... [3]

(b) Jason wants to distribute a computer program he has written. He is considering distributing it to users as freeware or free software.

(i) Explain **one** drawback to a user if the program is distributed as freeware.

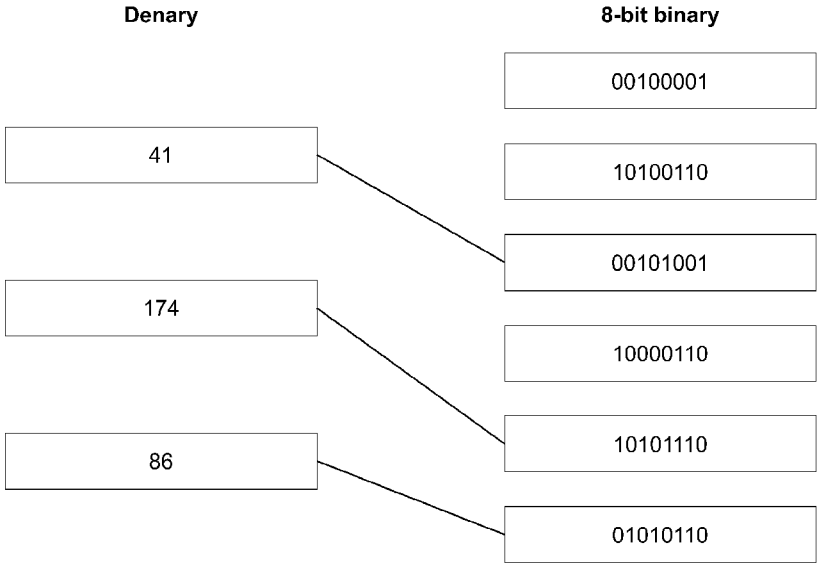
.....

.....

SOLUTIONS - JUNE 2022 PAPER 1

Q1 - Solution

(a)



Working

$41 = 2^5 + 2^3 + 2^0$. The equivalent binary number would have a 1 on the 5^{th}, 3^{rd} and 0^{th} index. Therefore, the binary number would be 00101001.

$174 = 2^7 + 2^5 + 2^3 + 2^2 + 2^1$. The equivalent binary number would have a 1 on the 7^{th}, 5^{th}, 3^{rd}, 2^{nd}, and 1^{st} index. Therefore, the binary number would be 10101110.

$86 = 2^6 + 2^4 + 2^2 + 2^1$. The equivalent binary number would have a 1 on the 6^{th}, 4^{th}, 2^{nd}, and 1^{st} index. Therefore, the binary number would be 01010110.

(b) 000101010111

$= 2^8 + 2^6 + 2^4 + 2^2 + 2^1 + 2^0$

$= 256 + 64 + 16 + 4 + 2 + 1 = 343$.

Q2 - Solution

(a)

2F	**0**	**0**	**1**	**0**	**1**	**1**	**1**	**1**
15	**0**	**0**	**0**	**1**	**0**	**1**	**0**	**1**
D6	**1**	**1**	**0**	**1**	**0**	**1**	**1**	**0**

Working

2 in Hex = 2 in Denary = 0010 in Binary. F in Hex = 15 in Denary = 1111 in Binary. Therefore, the 8-bit binary value would be 00101111.

1 in Hex = 1 in Denary = 0001 in Binary. 5 in Hex = 5 in Denary = 0101 in Binary. Therefore, the 8-bit binary value would be 00010101.

D in Hex = 13 in Denary = 1101 in Binary. 6 in Hex = 6 in Denary = 0110 in Binary. Therefore, the 8-bit binary value would be 11010110.

(b) **Example 1:** To denote locations in memory.
Example 2: To refer to error messages and codes.

(c) **Structure:** Structure refers to the layout of the webpage.
e.g. The placement of images on a webpage.

Presentation: Presentation refers to the formatting of the webpage"
e.g. The font colour and size applied to text placed on a webpage.

(d) Separating the presentation from the structure allows for the formatting of the web page to be changed without altering the structure of the web page. This also allows the user to make use of CSS to standardize formatting i.e. CSS only needs to be created once and can then be applied across multiple web pages to save time that is otherwise spent on website formatting.

COMMENT on **ANSWER**

❝(b) Hexadecimal values are used in the encoding of URLs and can also be used to represent IP addresses.❞

Q3 - Solution

(a)

Term	Definition
browser	**A software that allows users to view web pages.**
Internet Service provider // ISP	This is the company that provides a user with a connection to the Internet.
HTTP // HTTPS	This is a protocol that is used to send data for web pages across the Internet.
Uniform Resource Locator (URL)	**It is a text-based version of a web address.**
cookie	**It is a text file stored by the user's web browser that contains data about a user's browsing habits and preferences.**

(b) Firewalls can only be hardware-based ☐

Firewalls can only be software-based ☐

Firewalls can be hardware-based or software-based ☑

(c) Joelle's parents use the firewall to set criteria on the websites that Joelle is allowed to visit e.g., a whitelist or blacklist of websites. The firewall then monitors both incoming and outgoing traffic from Joelle's computer, thereby checking what has been requested and what has been received by Joelle. If the firewall detects data being sent / received from a website that is not allowed, the firewall will block it.

COMMENT on **ANSWER**

❝(b) (i) Users cannot also fix any bugs / defects on their own and must acquire the permission of the program's owner to modify the program. Furthermore, the software is still covered by copyright.

(ii) Users can also study the source code for educational purposes. Furthermore, they can redistribute the free software but this must be done under the same terms as the original software.❞

Q4 - Solution

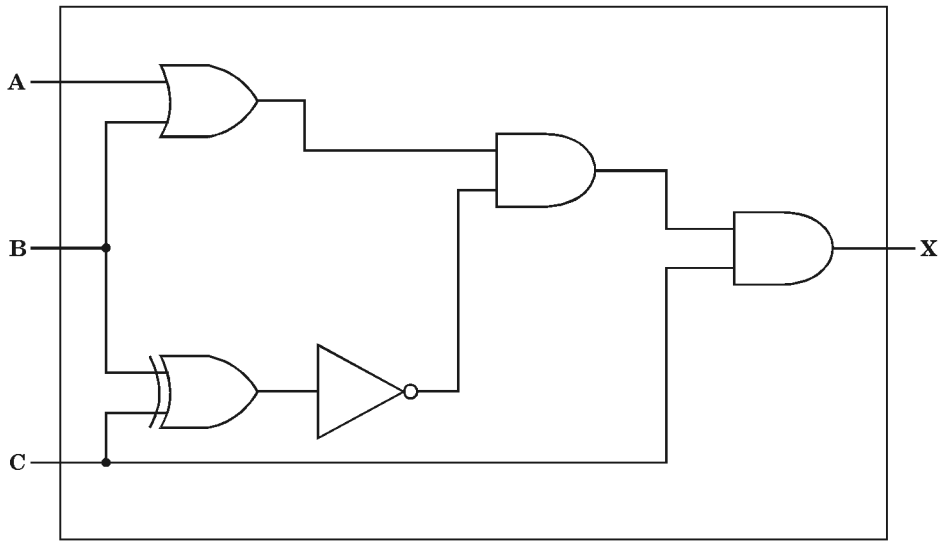
(a) A high-level language is a programming language that uses English-like statements to write out instructions in a manner that is easier to understand than low-level languages. High-level languages are portable and require a translator for them to be converted into machine code that can then be processed by a computer.

(b) (i) Users are not allowed access to the computer program's source code. Therefore, users cannot customize the computer program to their own needs.

(ii) Users can access the source code and modify the program to their needs. Users can also redistribute the free software. However, this must be done under the same terms as the original software.

Q5 - Solution

(a)



(b)

A	B	C	Working space	X
0	0	0	X = ((0 OR 0) AND (NOT (0 XOR 0)) AND 0) = 0 AND (1 AND 0) = 0	**0**
0	0	1	X = ((0 OR 0) AND (NOT (0 XOR 1)) AND 1) = 0 AND (0 AND 1) = 0	**0**
0	1	0	X = ((0 OR 1) AND (NOT (1 XOR 0)) AND 0) = 0 AND (0 AND 0) = 0	**0**
0	1	1	X = ((0 OR 1) AND (NOT (1 XOR 1)) AND 1) = 1 AND (1 AND 1) = 1	**1**
1	0	0	X = ((1 OR 0) AND (NOT (0 XOR 0)) AND 0) = 1 AND (1 AND 0) = 0	**0**
1	0	1	X = ((1 OR 0) AND (NOT (0 XOR 1)) AND 1) = 1 AND (0 AND 1) = 0	**0**
1	1	0	X = ((1 OR 1) AND (NOT (1 XOR 0)) AND 0) = 1 AND (0 AND 0) = 0	**0**
1	1	1	X = ((1 OR 1) AND (NOT (1 XOR 1)) AND 1) = 1 AND (1 AND 1) = 1	**1**

COMMENT on **ANSWER**

❝**(b)** X = ((A OR B) AND (NOT (B XOR C)) AND C)

X = (A OR B) AND (NOT ((B AND NOT(C)) OR (C AND NOT(B)) AND C)

X = (A OR B) AND (((NOT(B) OR C) AND (NOT(C) OR B)) AND C)

X = (A OR B) AND ((NOT(B) AND NOT(C)) OR 0 OR 0 OR (B AND C)) AND C)

X = (A OR B) AND (0 OR (B AND C))

X = (A OR B) AND (B AND C)

X = (A AND B AND C) OR (B AND C)

X = (B AND C) AND (A OR 1)

X = (B AND C) AND (1)

X = (B AND C) ❞

Q6 - Solution

(a) Any two from,

Online security attack 1: Malware

Description: Emails are sent to users that encourage them to click on a link or an attachment within an email that triggers the download of malware onto the user's computer.

Online security attack 2: Pharming

Description: Emails are sent to users that encourage the users to click on malicious links. Clicking on such a link then triggers the download of malicious code that takes the user to a fake website in an attempt to steal their confidential and/or personal information.

Online security attack 3: Denial of service.

Description: A very large number of emails are sent to a server at the same time, thereby causing the server to crash.

Online security attack 4: Phishing.

Description: Phishing refers to fraudulent practice of using bogus links / attachments, usually embedded within spam mails, to redirect users to a fake website to steal sensitive personal information and data

(b) Any two from,

Multifactor Authentication, Antivirus, Encryption, Password, Proxy-server

(c)

Example	Method of prevention
Power surges that cause spikes in voltage and damage electrical hardware may cause data to become corrupt.	A UPS can be used to regulate and provide an uninterrupted flow of electricity to electrical hardware.
Software failure due to previously unrecognized bugs and defects in the software's code may cause accidental deletion of data.	Keep all software up-to-date and enable automatic updates of software.
A building fire may destroy a device and cause data to become irrecoverable.	Use a fire prevention system and keep devices in fireproof boxes when not in use.
Alternatively	
Data is accidentally deleted	Add a verification method, such as an appropriate prompt, to verify if users want to delete the data. Furthermore, set appropriate access levels to limit the deletion of data to authorised individuals only. Both of these would reduce the chances of data being unintentionally deleted."
Water can be spilled on the device	Don't keep water near the device. Keep device in a waterproof box when not in use.