

**SC015**

Computer Science 1

Semester I

Session 2023/2024

2 hours

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(Isikan maklumat dengan lengkap)

**KEMENTERIAN PENDIDIKAN MALAYSIA**

KOLEJ MATRIKULASI NEGERI SEMBILAN  
NEGERI SEMBILAN MATRICULATION COLLEGE

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**PRA PEPERIKSAAN SEMESTER PROGRAM MATRIKULASI**  
*PRE MATRICULATION PROGRAMME SEMESTER EXAMINATION*

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**JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU.**  
*DO NOT OPEN THIS QUESTION PAPER UNTIL YOU ARE TOLD TO DO SO.*

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Untuk Kegunaan Pemeriksa For Examiner's Use		
No. Soalan Question No.	Markah Mark	
	Pemeriksa Examiner	KP / KKP
1	25	
2	18	
3	13	
4	12	
5	4	
6	8	
JUMLAH TOTAL	80	

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Kertas soalan ini mengandungi 11 halaman bercetak.

*This question paper consists of 11 printed pages.*

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- 1 (a) Autonomous vehicles refer to vehicles that are capable of navigating and operating without human intervention. This includes the ability to perceive the environment, make decisions, and control the vehicle's movements.

Operation	Activity/Element	Device
Input	<ul style="list-style-type: none"> <li>Reads the destination/location entered by the user</li> </ul>	Touch Screen
Process	<ul style="list-style-type: none"> <li>Identifies objects in the car's surroundings, such as other vehicles, pedestrians, and traffic signs to avoid collisions</li> <li>Determine to keep the car it in its lane and making lane changes when necessary.</li> </ul>	Processor of the vehicle
Output	<ul style="list-style-type: none"> <li>Displays the destination route</li> <li>Displays the distance in kilometer</li> <li>Displays the time of arrival</li> </ul>	Monitor screen of the vehicle
Storage	<ul style="list-style-type: none"> <li>Stores/Records the destination routes</li> </ul>	Cloud Storage

- i. Show the conversion of **1110 0101**<sub>2</sub> to decimal.

B-D *PVM								
Step1	1	1	1	0	0	1	0	1
Step2	<del>128</del> (2 <sup>7</sup> )	<del>64</del> (2 <sup>6</sup> )	<del>32</del> (2 <sup>5</sup> )	<del>16</del> (2 <sup>4</sup> )	<del>8</del> (2 <sup>3</sup> )	<del>4</del> (2 <sup>2</sup> )	<del>2</del> (2 <sup>1</sup> )	<del>1</del> (2 <sup>0</sup> )
Step3	128	+ 64	+ 32	+ 0	+ 0	+ 4	+ 0	+ 1

Answer: 229<sub>10</sub>

- ii. Find the missing number in the sequence given below. Show your answer in decimal number system. [2 marks]

$10010_2, 23_{10}, 100001_2, \underline{\hspace{2cm}}$

$\downarrow$   
~~18~~       $\downarrow$   
~~33~~

B-D  
\*PVM

Step1	1	0	0	1	0				
Step2	<del>16</del> (2 <sup>4</sup> )	<del>8</del> (2 <sup>3</sup> )	<del>4</del> (2 <sup>2</sup> )	<del>2</del> (2 <sup>1</sup> )	<del>1</del> (2 <sup>0</sup> )				
Step3	16	+	0	+	0	+	2	+	0

~~18~~

Step1	1	0	0	0	0	1					
	<del>x</del>	<del>x</del>	<del>x</del>	<del>x</del>	<del>x</del>	<del>x</del>					
Step2	32 (2 <sup>5</sup> )	16 (2 <sup>4</sup> )	8 (2 <sup>3</sup> )	4 (2 <sup>2</sup> )	2 (2 <sup>1</sup> )	1 (2 <sup>0</sup> )					
Step3	32	+	0	+	0	+	0	+	0	+	1

~~33~~

18, 23, 33, ? 48  
 $\swarrow +5$      $\swarrow +10$      $\swarrow +15$

$\frac{33}{15}$   
48

Ans: 48<sub>10</sub>

iii. Show the conversion of  $F1_{16}$  to decimal.

[3 marks]

H-D

\*PVM (4 steps)

Step1	F	1
Step2	15	1
Step3	16 (16')	1 (16')
Step4	240 +	1

Answer:  $241_{10}$

iv. Convert the decimal number  $159_{10}$  to a hexadecimal equivalent. Show the steps.

[2 marks]

D-H

\*Division; find remainder

$$\begin{array}{r} 16 \overline{) 159} \\ \underline{16 \phantom{0} 9} \phantom{0} \\ 0 \phantom{0} - 9 \end{array} \quad \begin{array}{l} 15 \rightarrow F \\ 9 \rightarrow 9 \end{array} \quad \uparrow$$

Answer:  $9F_{16}$

v. Show the conversion of  $EAF0_{16}$  to a binary number.

[2 marks]

H-B

\*PVM (4 steps ON/OFF)

Step1	E	A	F	0
Step2	14	10	15	0
Step3	8 4 2 1 (1)(1)(1)(0)	8 4 2 1 (1)(0)(1)(0)	8 4 2 1 (1)(1)(1)(1)	8 4 2 1 (0)(0)(0)(0)
Step4	1110	1010	1111	0000

Answer:  $1110 \ 1010 \ 1111 \ 0000_2$

- vi) Show the conversion  $10000_2$  to a hexadecimal equivalent. Show the steps.  
[2 marks]

BH  
\*PVM (4 Steps)

Step1	000 1	0000
Step2	8 4 2 1 7(1) 2(2)	8 4 2 1 6(1) 2(2) 2(3)
Step3	0+0+0+1	0+0+0+0

Answer: 10<sub>16</sub>

- (c) Information coding scheme is very important as without it, the machine could interpret the given bytes as a different character than intended.

- i. Differentiate between these two types of information coding scheme based on the criteria given: [2 marks]

Context Use	
Unicode	EBCDIC
<ul style="list-style-type: none"> <li>Implemented in several operating systems including Windows, Mac OS, and Linux</li> </ul>	<ul style="list-style-type: none"> <li>IBM mainframe, IBM midrange systems and IBM high-end servers operating systems.</li> </ul>

- ii. Calculate number of bits used in ASCII to represent the following phrase: [1 mark]

INTERNATIONAL INNOVATION

$$24 \text{ characters} \times 8 \text{ bits} \\ = \underline{\underline{192 \text{ bits}}}$$

- 2 (a) Azlan will go to the nursery (X) if Azlan does not have a fever (A) and free from flu (B). However, Azlan will be free from flu if Azlan takes medicine (C) and always wears a mask outdoor (D).

Derive Boolean expression based on the logic statement above. [8 marks]

**X = Azlan goes to nursery (Output)**

**A = Azlan has fever**

**B = Azlan is free from flu**

**C = Azlan takes medicine**

**D = Azlan always wear mask**

$$X = \bar{A} \cdot (C \cdot D)$$

or

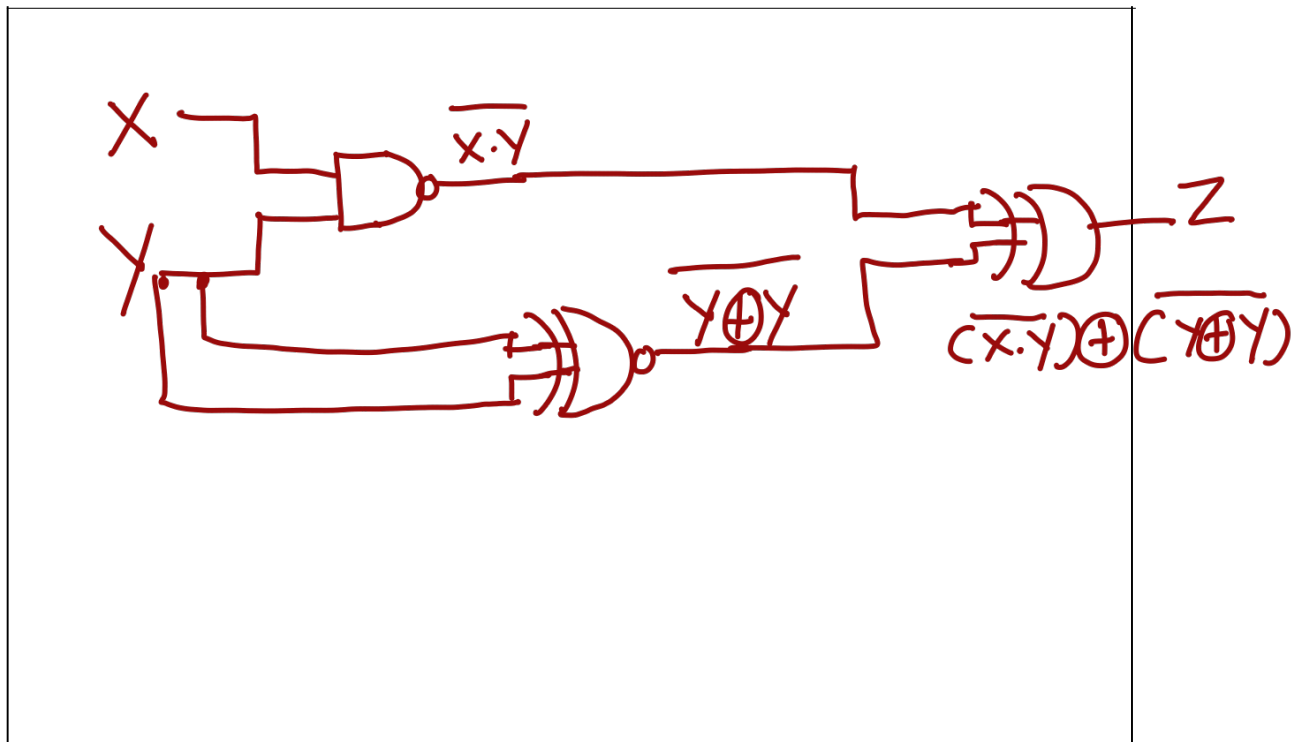
$$X = A' \cdot (C \cdot D)$$

- (b) Based on Boolean expression  $Z = (XY)' \oplus (Y \oplus Y)'$   
i. Construct a truth table.

[5 marks]

ii. Draw the logic circuit.

[5 marks]



- 3 (a) Mrs Shelly who works in IT department is asked to redesign the network located in the office on the 2<sup>nd</sup> floor. The office originally has only three (3) PCs and one (1) printer. Due to business expansion, the network needs to be redesigned so that all data, information and software can be stored in a central storage, making it easier to be managed and accessed. Other than that, three (3) PCs are added to the network together with a communication device X that connects the network to the Internet.

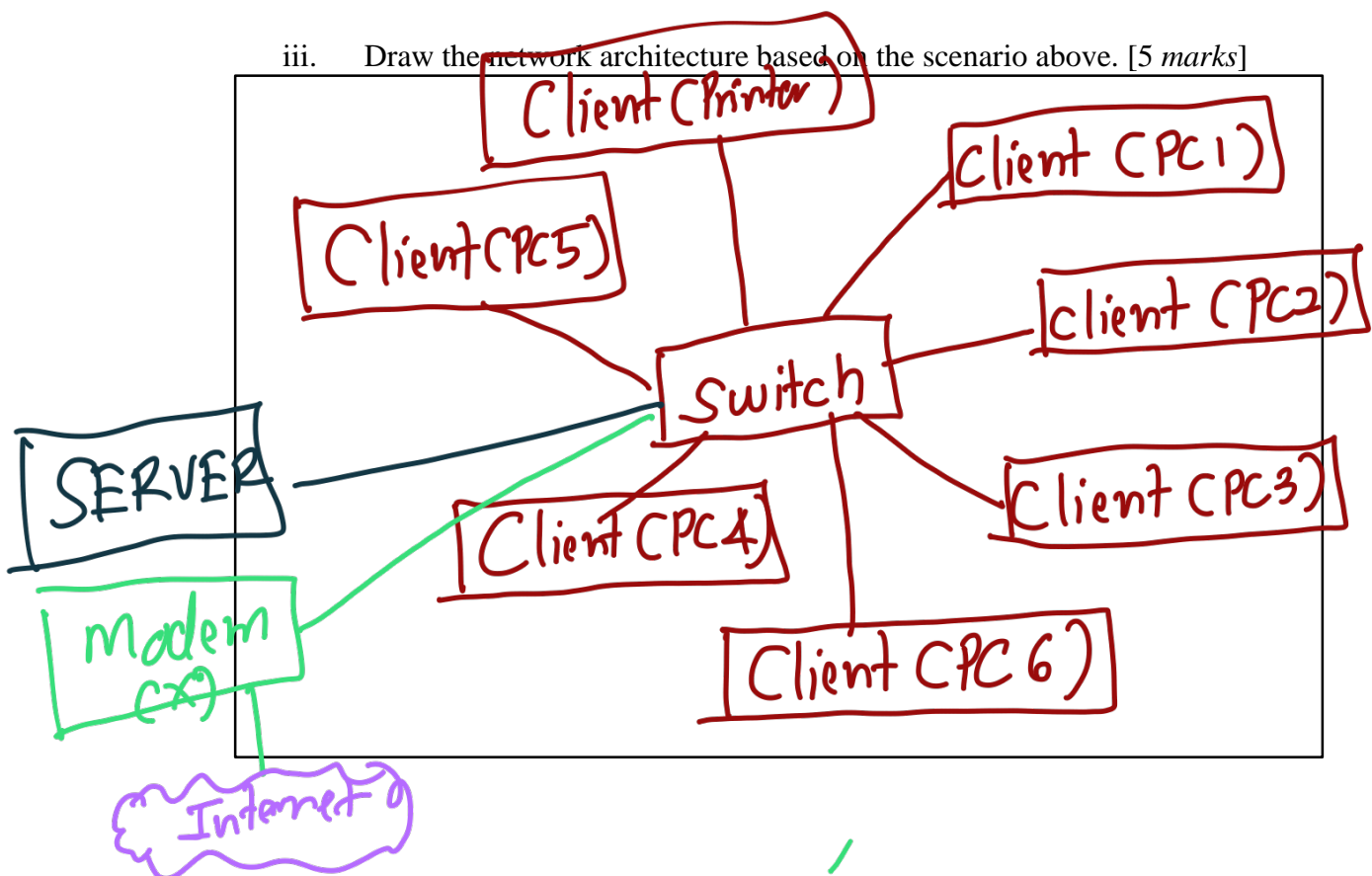
- i. Identify the network architecture based on the scenario above.

**Client-Server Network**

- ii. What would happen to the network if the central storage device is faulty?  
[1 mark]

**Failure of the central storage will affect all the computers in the network.**

- iii. Draw the network architecture based on the scenario above. [5 marks]





Complete the table below by identifying the classification of network and the ownership based on the statements given. [6 marks]

	Statements	Classification of Network	Network Ownership
i.	Sara needs to access the company central database located in company main branch in Pulau Pinang in order to retrieve some data required for the site visit that she is currently in Sabah.	Wide Area Network	Multiple Ownership / Shared Ownership / Distributed ownership
ii.	This network has high data transmit rate as the number of computers linked together is limited.	Local Area Network	Owned and operated by single person or organization
iii.	In Happy Bookstore, three computers (PC1, PC2, PC3) share one printer which is attached to PC3.	Local Area Network	Owned and operated by single person or organization

- 4 (a) Identify the type of network standard based on the scenarios:
- TS Berhad has created an application called OhMyShopping. This application makes it easier for customers to make purchases online and it can only be accessed by creating OhMyShopping account. [2 marks]

### Extranet

- Yusuf is now the human resource officer at Car Accessories House. Yusuf has been given the responsibility to update employee information, such as salaries, and to ensure that all employee information has been updated once a year. However, the Employee Information System can only be accessed by employees who have an account created by Yusuf. This is intended to allow employees to update information such as their home address, phone number, and latest e-mail address.

[2 marks]

### Intranet

(b) An IP address identifies any given device on a network. You might need it for online gaming or remote desktop computing. You can find the IPv4 and IPv6 addresses of your PC by using ipconfig as in **FIGURE 1**.

```
Wireless LAN adapter Wi-Fi:

Connection-specific DNS Suffix  . : kmns.matrik.edu.my
Link-local IPv6 Address . . . . . : fe80::b675:5dad:cd80:e965%4
IPv4 Address. . . . . : 10.14.90.213
Subnet Mask . . . . . : 255.255.254.0
Default Gateway . . . . . : 10.14.91.254
```

**FIGURE 1**

- i. Give two (2) reasons for using IPv6 addressing scheme. [2 marks]

**As the number of computers and devices being connected to the Internet are increasing day by day, more addresses are required which eventually will not be able to accommodated by IPv4 -- $2^{32}$ : Allows for about 4.2 billion IP addresses.**

**Therefore, IPv6 has been developed to rectify the problem since the lengthened address, can accommodate more IP addresses --  $2^{128}$  : Allows for about  $3.4 \times 10^{38}$  IP addresses.**

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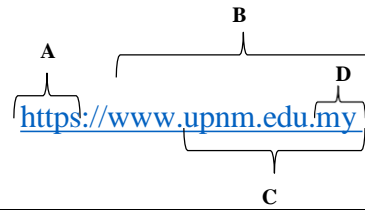
- ii. Explain the relationship between IP address and domain name. [2 marks]

**Domain name is a text version of IP address that correspond to a web server.**

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- (c) DNS stands for Domain Name System, the phonebook of the Internet that translates domain names to IP addresses. Explain the labelled sections in the following URL:



[4 marks]

<b>A</b>	<b>Protocol</b>
<b>B</b>	<b>Server Address</b>
<b>C</b>	<b>Domain Name</b>
<b>D</b>	<b>Country Code TopLevel Domain-Malaysia</b>

5 “The data stolen can be anything from bank account information, online passwords, passport numbers, driver's license numbers, social security numbers, medical records, online subscriptions, and so on.”

(a) Identify area of computer ethic related to the situation above. [1 mark]

### Information Privacy

(b) Give **one (1)** suggestion to all consumers to avoid this situation. [1 mark]

- **Use Multi Factor Authentication - user ID & Password**
- **Be wary of IoT devices – keep them all updated with the latest security software**
- **Back up data often – helps retain data if necessary**
- **Keep an eye out of odd requests – flashy click bait contents**

(c) **FIGURE 2** illustrates a snippet of an email from a candidate to a company where she applied for a job position.



**FIGURE 2**

Identify two (2) netiquette rules that **she followed** while using an e-mail based on Figure 2.

**Use meaningful subject lines in your email to reflect the content**

**Read the message before you send it to determine usage of proper grammar, spelling, and punctuation.**

[2 *marks*]

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6. The System Development Lifecycle (SDLC) is the cost-effective and time-efficient process that development teams use to design and build high-quality software. The goal of SDLC is to minimize project risks through planning so that software meets customer expectations during production and beyond.

- (a) Identify the phase in SDLC and its deliverables based on the given statement.

[8 marks]

Statement	Phase	Deliverable
(i) Developers will first outline the details for the overall application, alongside specific aspects, such as its user interfaces.	<b>Design</b>	<ul style="list-style-type: none"> <li>• Database Design</li> <li>• Input / Output Design</li> <li>• Flowchart</li> <li>• Prototype</li> </ul>
(ii) Handling residual bugs that have not been patched before launch or resolving new issues that come out due to user reports.	<b>Support &amp; Security</b>	Troubleshooting report
(iii) Help to secure the funding and resources they need to ensure their plan could be executed.	<b>Planning</b>	<ul style="list-style-type: none"> <li>• Approved Project</li> <li>• Cost Estimation</li> <li>• List of the Project Development Team Members</li> <li>• Gantt &amp; PERT Chart</li> </ul>
(iv) Testing is done to ensure quality and to validate the tests against the customer requirements to make sure the product satisfies the customers' needs.	<b>Implementation</b>	<ul style="list-style-type: none"> <li>• Actual Code</li> <li>• User Manual</li> <li>• Documentation</li> <li>• New Information System New / Modified Information System</li> </ul>
(v) Perform a functional assessment and finalize the client's or users' needs for the system in development	<b>Analysis</b>	<ul style="list-style-type: none"> <li>• Feasibility Report</li> </ul>