

SC015
Computer Science 1
Semester I
Session 2023/2024
2 hours

SC015
Sains Komputer 1
Semester I
Sesi 2023/2024
2 jam

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(Isikan maklumat dengan lengkap)



KEMENTERIAN PENDIDIKAN MALAYSIA

KOLEJ MATRIKULASI NEGERI SEMBILAN
NEGERI SEMBILAN MATRICULATION COLLEGE

PRA PEPERIKSAAN SEMESTER PROGRAM MATRIKULASI
PRE MATRICULATION PROGRAMME SEMESTER EXAMINATION

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SC015

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	

- 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.

Identify the activities or elements and devices for input, process, output and storage involved in the autonomous vehicle above. [8 marks]

Operation	Activity/Element	Device
Input	<ul style="list-style-type: none"> Read destination entered by user / driver 	Touch screen Sensors such as cameras, lidar, radar and GPS
Process	<ul style="list-style-type: none"> Determine destination entered by user / driver 	vehicle's on board computer/processor
Output	<ul style="list-style-type: none"> Display destination route 	monitor screen
Storage	<ul style="list-style-type: none"> Store the details route maps 	Vehicle on-board computer storage/cloud storage

- (b) Numbering system is a systematic method for representing numbers using a particular set of symbols.

i. Show the conversion of **1110 0101₂** to decimal. [3 marks]

1	1	1	0	0	1	0	1
1×2^7	1×2^6	1×2^5	0×2^4	0×2^3	0×2^2	0×2^1	1×2^0
128	64	32	0	0	4	0	1

$$= 128 + 64 + 32 + 0 + 0 + 4 + 0 + 1$$

$$= 229_{10}$$

$$\mathbf{1110\ 0101_2 = 229_{10}}$$

Workflow: 2 marks
 Final answer: 1 mark

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

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

$10010_2, 23_{10}, 100001_2, 48_{10}$ Final mark: 1 mark
 $\downarrow \qquad \qquad \downarrow$
 $18_{10} \qquad \qquad 33_{10}$
 0.5 mark 0.5 mark

- iii. Show the conversion of $F1_{16}$ to decimal. [3 marks]

$F(15)$	1
15×16^1	1×16^0
240	1

$= 240 + 1$
 $= 241_{10}$
 $F1_{16} = 241_{10}$
 Workflow: 2 marks
 Final answer: 1 mark

- iv. Convert the decimal number **159**₁₀ to a hexadecimal equivalent. Show the steps.
[2 marks]

16	159	
16	9	15
	0	9

↑

=9F₁₆

Workflow: 1 mark
Final answer: 1 mark

- v. Show the conversion of **EAF0**₁₆ to a binary number. [2 marks]

E (14)	A (10)			
2 ³ 2 ² 2 ¹ 2 ⁰	2 ³ 2 ² 2 ¹ 2 ⁰			
<u>8</u> <u>4</u> <u>2</u> 1	<u>8</u> 4 <u>2</u> 1			
1 1 1 0	1 0 1 0			

EAF0₁₆ = 1110 1010 1111 0000₂

Workflow: 1 mark (0.5 mark for each row)
Final answer: 1 mark

- vi) Show the conversion **10000₂** to a hexadecimal equivalent. Show the steps.
[2 marks]

1	0	0	0	0
2^4	2^3	2^2	2^1	2^0
1x1	8 x0	4x0	2x0	1x0
1	0 + 0 + 0 + 0			

10000₂ = 10₁₆

Workflow: 1 mark (0.5 mark for each row) |
Final answer: 1 mark

(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
Several OS (Mac OS, Window)	Primarily used on IBM mainframe computers and some high-end servers

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

INTERNATIONAL INNOVATION

24 characters x 8 bits = 192 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
 A = Azlan has fever
 B = Azlan is free from flu
 C = Azlan takes medicine
 D = Azlan always wear mask

$$X = A' \cdot B$$

$$B = C \cdot D$$

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

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

[5 marks]

$$Z = (XY)' \text{ XOR } (Y \text{ XOR } Y)'$$

X	Y	XY	(XY)'	(Y ⊕ Y)'	Z = (XY)' XOR (Y XOR Y)'
0	0	0	1	1	0
0	1	0	1	1	0
1	0	0	1	1	0
1	1	1	0	1	1

J0.5

J.05

J1

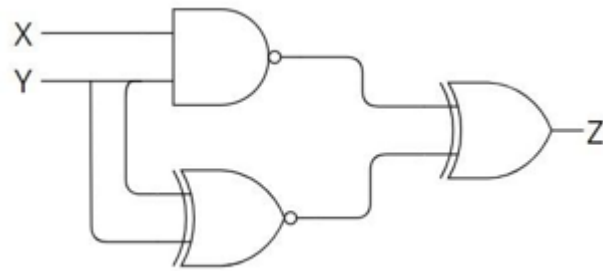
J1

J1

J1

ii. Draw the logic circuit.

[5 marks]



NAND:

J1.5

XNOR:

J1.5

XOR: J1

Label input and output: J1

- 3 (a) Mrs Shelly who works in IT department is asked to redesign the network located in the office on the 2nd 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.

[1 mark]

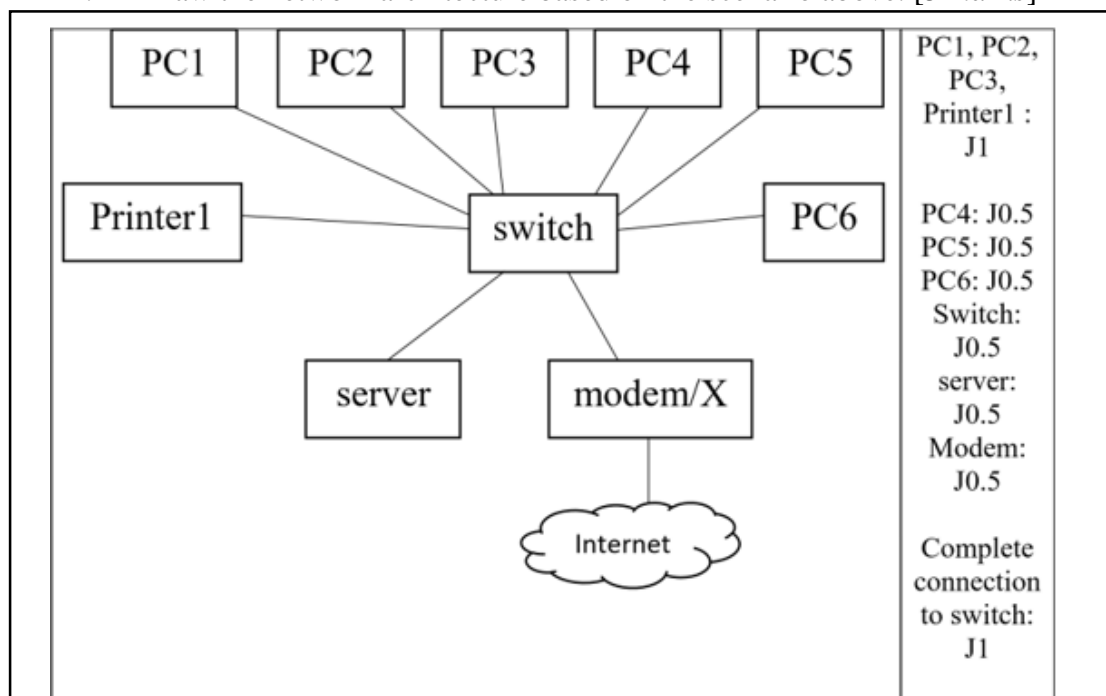
Client-server

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

[1 mark]

The whole network will be down/will stop functioning

- 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 (WAN)	No single ownership/exists under collective ownership over long distance/ multiple ownership
ii.	This network has high data transmit rate as the number of computers linked together is limited	Local area network (LAN)	Is owned and operated by individual organisation
iii.	In Happy Bookstore, three computers (PC1, PC2, PC3) share one printer which is attached to PC3.	Local area network (LAN)	Is owned and operated by individual organisation

- 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]

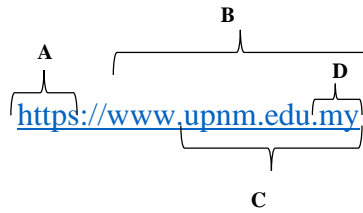
- The vast number of devices connecting to the internet today.
- To facilitate huge/more IP addresses
- Allows 2^{128} possible unique address
- Better security and support for real time
- To make the connection of non-personal-computer devices such as smartphones/IPTV

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

A domain name is a text-based name that corresponds to the IP address of a server.

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

- (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]

A	Represents the protocol
B	Represents server address
C	is the domain name
D	Is the country code top level domain (ccTLD) or TLD which represents Malaysia

- 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

OR any acceptable answer

- (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.

[2 marks]

- Use meaningful subject lines
- Use proper grammar, spelling and punctuation
- Be clear and concise
- Keep message brief ,short and meaningful

OR any acceptable answer

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.	Design	<ul style="list-style-type: none"> Functional Requirement Specification of the modified system List of required HW & SW Prototype Flowchart
(ii) Handling residual bugs that have not been patched before launch or resolving new issues that come out due to user reports.	Support & Security	Troubleshooting report
(iii) Help to secure the funding and resources they need to ensure their plan could be executed.	Planning	<ul style="list-style-type: none"> Cost estimation Project team developed Set schedule/milestone Gantt/PERT chart <ul style="list-style-type: none"> List of project requests
(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.	Implementation	<ul style="list-style-type: none"> Code Documentation Training procedures New/modified system

(v) Perform a functional assessment and finalize the client's or users' needs for the system in development	Analysis	<ul style="list-style-type: none"> • Analysis of existing system • Analysis of intended system/recommended solution • Preliminary investigation result • Approved feasibility study report • Result from survey/questionnaire
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