

- 1 (a) Identify the operation code and the shape of the information processing cycle based on the activities given in the scenario.

"This week, Ali has to write a report about three security threats and measures. He uses the chatGPT chatbot to find related ideas and information about the topic. Generally, this is the main activity to generate responses to Ali's question.

| Operation Code | Activities |
|----------------|---|
| B | Input is pre-processed to clean and format the text including removing extra spaces, and converting text to lowercase |
| C | Receives the user's question or input in the form of text or speech |
| D | chatGPT analyses the context of the conversation to understand the user's intention from previous messages to provide meaningful responses |
| E | Data related to the current session are temporarily stored to help maintain context and provide coherent responses within the current session |
| F | The final response is delivered to the user through appropriate channels, such as a chat interface, voice assistant, or any other medium |

[8 marks]

| Operation | Operation Code | Operation Shape |
|----------------|------------------|---------------------------------------|
| Input | C (1m) | draw the shape (parallelogram) |
| Process | B, D (1m) | draw the shape (rectangle) |
| Storage | E (1m) | draw the shape (cylinder) |
| Output | F (1m) | draw the shape (parallelogram) |

- (b) Convert 1010012 into a decimal number. Show your calculation.

[3 marks]

$10110012 = (1 \times 2^5 + 0 \times 2^4 + 1 \times 2^3 + 0 \times 2^2 + 0 \times 2^1 + 1 \times 2^0)$
 $= 32 + 0 + 8 + 0 + 0 + 1$
 $= 41$

$$1011001_2 = 41_{10}$$

(c) Convert 4986_{10} into a binary number. Show your calculation.

[3 marks]

| | |
|---|----------|
| 2 | 4986 |
| 2 | 2493 – 0 |
| 2 | 1246 – 1 |
| 2 | 623 – 0 |
| 2 | 311 – 1 |
| 2 | 155 – 1 |
| 2 | 77 – 1 |
| 2 | 38 – 1 |
| 2 | 19 – 0 |
| 2 | 9 – 1 |
| 2 | 4 – 1 |
| 2 | 2 – 0 |
| 2 | 1 – 0 |
| 2 | 0 – 1 |

$4986_{10} = 1\ 0011\ 0111\ 1010_2$

(d) Convert $1010F20F30_{16}$ to a binary number. Show your calculation.
 [4 marks]

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0 | 1 | 0 | F(15) | 2 | 0 | F(15) | 3 | 0 |
| 2 ³ 2 ² 2 ¹ 2 ⁰ | 2 ³ 2 ² 2 ¹ 2 ⁰ | 2 ³ 2 ² 2 ¹ 2 ⁰ | 2 ³ 2 ² 2 ¹ 2 ⁰ | 2 ³ 2 ² 2 ¹ 2 ⁰ | 2 ³ 2 ² 2 ¹ 2 ⁰ | 2 ³ 2 ² 2 ¹ 2 ⁰ | 2 ³ 2 ² 2 ¹ 2 ⁰ | 2 ³ 2 ² 2 ¹ 2 ⁰ | 2 ³ 2 ² 2 ¹ 2 ⁰ |
| 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 21 20 | |
| 8 4 2 1 | 8 4 2 1 | 8 4 2 1 | 8 4 2 1 | 8 4 2 1 | 8 4 2 1 | 8 4 2 1 | 8 4 2 1 | 8 4 2 1 | 8 4 2 1 |
| 0 0 0 1 | 0 0 0 0 | 0 0 0 1 | 0 0 0 0 | 1 1 1 1 | 0 0 1 0 | 0 0 0 0 | 1 1 1 1 | 0 0 1 1 | 0 0 0 0 |
| 1 0000 0001 0000 1111 0010 0000 1111 0011 0000 | | | | | | | | | |

$1010F20F30_{16} = 1\ 0000\ 0001\ 0000\ 1111\ 0010\ 0000\ 1111\ 0011\ 0000_2$

(e) Convert 1010_{10} to hexadecimal number. Show your calculation.

[4 marks]

| | |
|----|--------|
| 16 | 1010 |
| 16 | 63 – 2 |
| 16 | 3 – 15 |
| | 0 - 3 |
| | |

$1010_{10} = 3F2_{16}$

- (f) EBCDIC, Extended ASCII, and Unicode are common coding schemes that use binary data representation in the computer. Every phrase and instruction will be stored as a bit in the memory/storage.

- (i) Calculate the number of bits for the phrase 20/5*24 in EBCDIC. Show your calculation.

[2 marks]

| |
|---|
| Total character = 7 EBCDIC uses 8 bits per character Total bit = 7 x 8 = 56 bit |
|---|


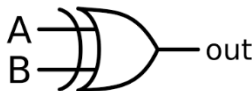
- (ii) How many bytes of 4-digit hexadecimal in Unicode? (Given 4-digit Hexadecimal = 1 character Unicode)

[1 mark]

2 Bytes

- 2 Logic gates serve as the elemental building blocks that underpin the digital logic and binary operations crucial for information processing, enabling a wide range of logical and arithmetic functions

(a) Based on the given Boolean expression, name the gates and construct the truth tables
 [8 marks]

| | Combinational Gates | Name | Truth Table | | | | | | | | | | | | | | | |
|------|---|--------------|--|---|---|--------------|---|---|---|---|---|---|---|---|---|---|---|---|
| (i) |  | NOR Gate | <table><tr><th>A</th><th>B</th><th>Q</th></tr><tr><td>0</td><td>0</td><td>1</td></tr><tr><td>0</td><td>1</td><td>0</td></tr><tr><td>1</td><td>0</td><td>0</td></tr><tr><td>1</td><td>1</td><td>0</td></tr></table> | A | B | Q | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 0 |
| A | B | Q | | | | | | | | | | | | | | | | |
| 0 | 0 | 1 | | | | | | | | | | | | | | | | |
| 0 | 1 | 0 | | | | | | | | | | | | | | | | |
| 1 | 0 | 0 | | | | | | | | | | | | | | | | |
| 1 | 1 | 0 | | | | | | | | | | | | | | | | |
| (ii) |  | XOR Gate | <table><tr><th>A</th><th>B</th><th>$A \oplus B$</th></tr><tr><td>0</td><td>0</td><td>0</td></tr><tr><td>0</td><td>1</td><td>1</td></tr><tr><td>1</td><td>0</td><td>1</td></tr><tr><td>1</td><td>1</td><td>0</td></tr></table> | A | B | $A \oplus B$ | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 0 |
| A | B | $A \oplus B$ | | | | | | | | | | | | | | | | |
| 0 | 0 | 0 | | | | | | | | | | | | | | | | |
| 0 | 1 | 1 | | | | | | | | | | | | | | | | |
| 1 | 0 | 1 | | | | | | | | | | | | | | | | |
| 1 | 1 | 0 | | | | | | | | | | | | | | | | |

(b) Based on the Boolean expression, $Y = A \cdot B + C \cdot A'$, answer the following questions.

(i) Construct a truth table.


[5 marks]

| A | B | C | A' | A.B | C.A' | $Y = A.B + C.A'$ |
|---|---|---|----|-----|------|------------------|
| 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| 0 | 0 | 1 | 1 | 0 | 1 | 1 |
| 0 | 1 | 0 | 1 | 0 | 0 | 0 |
| 0 | 1 | 1 | 1 | 0 | 1 | 1 |
| 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 0 | 1 | 0 | 0 | 0 | 0 |
| 1 | 1 | 0 | 0 | 1 | 0 | 1 |
| 1 | 1 | 1 | 0 | 1 | 0 | 1 |

Column A - 0.5m
 Column B - 0.5m
 Column C - 0.5m
 Column A' - 0.5m
 Column A.B - 1m
 Column C.A' - 1m
 Column Y - 1m

(ii) Draw the logic circuit.

[5 marks]



- 3 (a) An **X Berhad** is looking to implement a local email system for its employees. The organization needs a solution that provides centralized email storage and management, strong security features, and the ability to handle a large volume of emails efficiently.

(i) Suggest the suitable network architecture for the **X Berhad** e-mail system.

[1 mark]

Client server

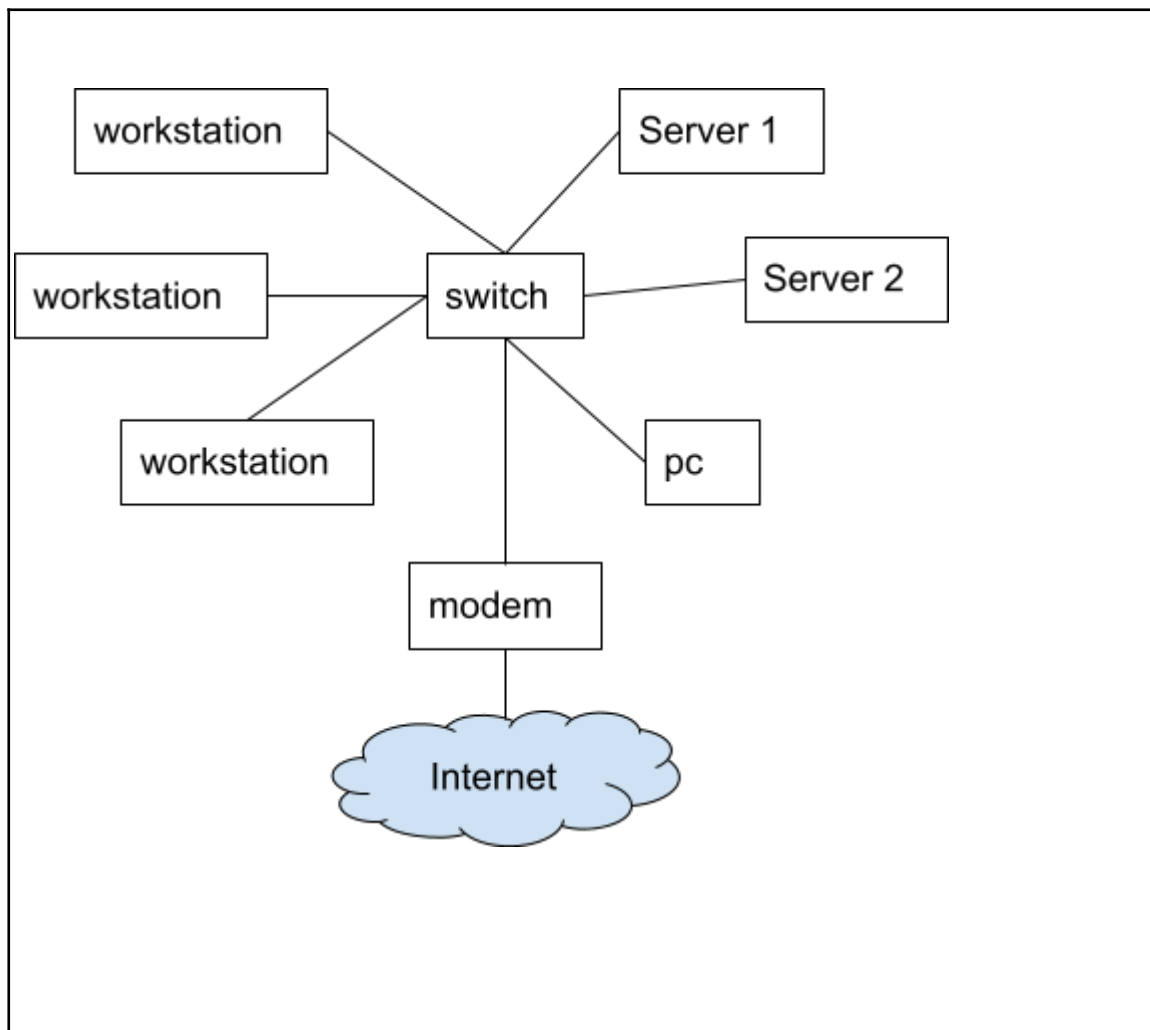
(ii) Describe the reason for your suggestion in **question (a)(i)**

[1 mark]

Client-server can provide centralized control management and storage for each email service including higher security.

(iii) The **X Berhad** also provides its staff with an Internet network. One server (Server 1) serves as a gateway between the internal network and the Internet. Another server (server 2) is dedicated to handling the local email system for **X Berhad**. Draw the network architecture for **X Berhad** with 3 workstations, 1 personal computer, servers, and any suitable communication device.

[5 marks]



- (b) Identify the appropriate network classification, area of coverage, and ownership based on the following scenarios.

[6 marks]

| Scenario | Network Classification | Network Area of coverage | Network Ownership |
|--|------------------------|-------------------------------------|--|
| You are working in company A with 50 employees. Communication between employees mostly via the internal comm board system which can be accessed within the same building. The system has been developed to offer internal communication, reliable chat, and | Local Area Network | Limited / smaller geographical area | Individual/single organization ownership |

| | | | |
|---|-------------------|--------------------------|---------------------------------|
| discussion room between the employees, and can attach any type of media. | | | |
| Company B has thousands of employees, to streamline communication and collaboration across its global presence, the company requires a robust email system to ensure seamless communication among employees from different offices and locations spread across the continent | Wide Area Network | Larger geographical area | Distributed/ multiple ownership |

- 4 (a) Identify the network based on the scenario.

ACME Corporation allows its key supplier, Smith Metalworks, to access a secure online system. Through this system, Smith Metalworks updates raw material availability, receives purchase orders, and shares delivery schedules. They also access important documents like quality standards and product specifications. This system promotes efficient communication and collaboration in supply chain management for ACME.

[2 marks]

Extranet

At XYZ Corporation, Lisa, the finance manager, is responsible for managing budgets, approving expenses, and generating financial reports. She uses a network accessible only to employees for these tasks. This network also allows employees to submit expense claims and access financial documents, serving as a hub for financial management and communication at the company.

[2 marks]

Intranet

- (b)

- (i) Give two (2) characteristics of IPv4 that distinguish it from IPv6.

[2 marks]

| IPv4 |
|---|
| Has 32 bit IP Address |
| IPv4 is a numeric addressing method/ decimal method |
| IPv4 binary bits are separated by dot (.) |
| Provide small/limited space for address |
| Less security / old version |
| IPv4 consist 4 groups number |
| Provide 2^{32} IP address |
| Use decimal number of IP address |
| Each group range between 0 - 255 for IP address |

Select any two.

- (ii) Provide an example of an IPv6 address.

[1 mark]

2001:00b8:85a3:0000:0000:8a2e:0370:7334

(any relevant answer)

- (iii) What is the primary reason for the shift from IPv4 to IPv6?

IPv4's limited address space was insufficient to accommodate the growing number of devices, making IPv6 the solution due to its larger address pool.

[1 mark]

- (c) Answer the following questions based on the URL given:

https://www.nasa.gov.us

[2 marks]

- (i) What do the domain name and gTLD indicate about the website's content and origin?

domain name: www.nasa.gov.us

gTLD : gov (government organization)

us: the origin country is US

[2 marks]

- (ii) In the given URL, what is the purpose of the "**www**" subdomain, and what does the "**https**" protocol signify?

www : web server/ world wide web/ sub domain

HTTPS (Hypertext Transfer Protocol Secure). This means that data exchanged between your web browser and the website is encrypted for security

[2 marks]

- 5 (a) Based on the following scenarios, identify the area of computer ethics involved.
[2 marks]

| Scenario | Areas of Computer Ethics |
|---|--|
| Amir, an independent musician, has recently released an original song on various digital music platforms. The song has gained popularity, and Alex is starting to receive recognition for their work. However, Alex soon discovers that their song has been uploaded to a popular video-sharing platform by an anonymous user without their permission. | Intellectual Property right (Copyright) |
| Puan Ainun, a concerned parent, is researching online to find information about the nutritional requirements of her child, who has food allergies and dietary restrictions. While searching for information on a popular health and nutrition website, she comes across a blog post that claims to offer expert advice on managing food allergies in children | Information Accuracy |

- (b) What is the purpose of using smiley and abbreviations in your sentences while posting a message on your social media?

[2 marks]

| | Purpose |
|--------------|--|
| Smiley | <ul style="list-style-type: none"> • A smiley is used to express emotion that might be hard to convey through writing • adds a visual element to the message, making it • easier for the recipient to understand the intended emotion behind the text |
| Abbreviation | <ul style="list-style-type: none"> • Abbreviations allow for shorter and more efficient communication by condensing longer words or phrases into shorter forms • By <i>using abbreviations, individuals can convey their message more quickly and with fewer characters, saving time and effort in typing or writing</i> |

- 6 XYZ Healthcare Center is currently using an on-premises electronic health records (EHR) system to manage patient records and appointments. The center's management has decided to migrate the EHR system to a cloud-based platform to improve accessibility, scalability, and data security.

Based on the given scenario, list **one (1) activity** and **one (1) deliverable** for each of the following phases of the System Development Life Cycle (SDLC).

[8 marks]

| Phase of SDLC | Activity | Deliverable |
|---------------|--|---|
| Planning | 1. Review and approve the project request 2. Prioritize the project request 3. Allocate resources 4. Form a project development team (choose any one [1 m]) | 1. Cost estimate 2. Project team 3. Set milestone/ schedule 4. Produce Gant/Pert Chart 5. List of project request (choose any one [1 m]) |
| Analysis | 1. Conduct a preliminary investigation 2. Perform detailed analysis 3. Perform feasibility study (choose any one [1 m]) | 1. Analysis of existing system 2. Analysis of intended system/ Recommended solution 3. Preliminary investigation results 4. Approved feasibility study 5. Result from survey/ |

| | | |
|-----------------------|--|--|
| | | questionnaire /gathering/ technique (choose any one [1 m]) |
| Design | 1. Acquiring hardware and software 2. Perform detail design (choose any one [1 m]) | 1. Functional requirement 2. Specification of the modified system 3. List required hardware and software 4. Prototype 5. Flowchart 6. ERD/DFD 7. Database design 8. Input/output design (choose any one [1 m]) |
| Implementation | 1. Develop program 2. Install and test the system 3. Train users 4. Convert to the new system (choose any one [1 m]) | 1. Writing code 2. Documentation 3. Training procedures 4. New/ modified system (choose any one [1 m]) |

END OF QUESTION