

Computer science
Standard level
Paper 1

Specimen paper

Candidate session number

1 hour 15 minutes

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Instructions for candidates

- Write your session number in the boxes above.
- Do not open this examination paper until instructed to do so.
- A clean copy of the **computer science case study** is required for this examination paper.
- Read the case study carefully.
- Section A: answer all the questions.
- Section B: answer the question.
- Answers must be written within the answer boxes provided.
- The maximum mark for this examination paper is **[50 marks]**.



Section A

Answer **all** questions from this section. Answers must be written within the answer boxes provided.

1. A hospital has an IT team that repairs computer hardware and software.

- (a) (i) Identify the bus that transmits the program counter (PC) contents to the memory address register (MAR).

[1]

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- (ii) Outline the function of an accumulator.

[2]

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- (b) State the binary equivalent of the hexadecimal number AC.

[1]

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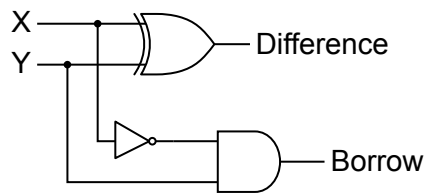
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(Question 1 continued)

- (c) Construct a truth table for the following circuit:

[2]



X	Y	Difference	Borrow

The IT team is considering replacing its laptops with ones that use flash memory instead of read-only memory (ROM) for permanent storage of the basic input/output system (BIOS).

- (d) Compare and contrast the use of a read-only memory (ROM) chip with flash memory for storing the basic input/output system (BIOS).

[3]

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- (e) Outline the function of queues in multilevel queue scheduling.

[2]

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2. A hospital has a local area network (LAN) with a router that uses a fiber-optic cable to connect directly to an internet service provider's equipment.

(a) List **three** advantages of using a fiber-optic cable instead of a twisted-pair cable. [3]

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(b) Describe the process of packet switching. [4]

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(Question 2 continued)

The hospital's local area network (LAN) is divided into multiple smaller subnetworks, also called subnets.

- (c) Explain how subnetting a local area network (LAN) can reduce network congestion. [4]

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3. A hospital stores patients' data in a relational database.

(a) Outline **one** benefit of using a relational database.

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(b) Identify **two** scalability issues in a relational database.

[2]

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The database view, VISITS, is an extract showing the dates patients visited the hospital for an appointment.

The VisitDate field represents the date of each patient's appointment.

PatID	PatientName	PatientDOB	DocID	Doctor	VisitDate	Treatment
1	Samuel Moody	2007/06/11	1	Jill Smith	2025/01/11	Bone scan
1	Samuel Moody	2007/06/11	2	Norayr Lomidze	2025/01/12	Physical therapy
2	Lin Kobayashi	1984/02/24	1	Jill Smith	2025/01/12	Physical therapy
3	Yeojoo Kim	1999/08/18	3	Phoebe Drakos	2025/01/13	Radiation therapy
3	Yeojoo Kim	1999/08/18	3	Phoebe Drakos	2025/01/14	Therapy part 1

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(Question 3 continued)

- (c) Construct an SQL SELECT query to list the names of patients whose treatment includes the word “therapy”.

A patient's name should only appear once.

[3]

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The database view, VISITS, can be represented by the following notation:

VISITS (PatID, PatientName, PatientDOB, DocID, Doctor,
VisitDate, Treatment)

- (d) Construct the database in third normal form (3NF) for the three entities in the VISITS view extract.

[5]

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4. A hospital uses a supervised learning algorithm for diagnosis.

- (a) Identify **two** factors that might determine the need for an increase in processing power for this supervised learning algorithm. [2]

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An article about algorithmic bias in machine learning appeared in a national newspaper. Some of the hospital's patients became concerned about the ethics of using supervised learning for diagnosis.

- (b) Outline **one** strategy the hospital could use to address patients' concerns. [2]

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Section B

Answer the following question, which refers to the case study. Answers must be written within the answer boxes provided.

5. Ransomware and rootkit are types of malware that result in system downtime and data losses.

(a) Outline **one other** potential consequence of a rootkit attack on a hospital. [2]

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(b) Outline **two** ways in which a firewall protects a network system from cybersecurity attacks. [4]

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- [6]

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This image shows a full page of blank handwriting practice paper. It features multiple rows of horizontal lines. Each row consists of three lines: two solid outer lines and a dashed middle line, providing a guide for letter height and placement. The paper is otherwise empty, with no text or markings other than the printed lines.

Please **do not** write on this page.

Answers written on this page
will not be marked.



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