

Information Processes and Technology

General Instructions

- Reading time – 5 minutes
- Working time – 3 hours
- Write using black pen
- Draw diagrams using pencil

Total marks: 100

Section I – 20 marks (pages 2–8)

- Attempt Questions 1–20
- Allow about 40 minutes for this section

Section II – 40 marks (pages 9–12)

- Attempt Questions 21–24
- Allow about 1 hour and 10 minutes for this section

Section III – 40 marks (pages 13–16)

- Attempt TWO questions from Questions 25–28
- Allow about 1 hour and 10 minutes for this section

Section I

20 marks

Attempt Questions 1–20

Allow about 40 minutes for this section

Use the multiple-choice answer sheet for Questions 1–20.

- 1** Which of the following is used to document the conversion methods and training needs for a proposed information system?

 - A. Funding report
 - B. Requirements report
 - C. Implementation plan
 - D. Communication plan

- 2** Anna has taken a photograph of her brother using her mobile phone and wants to upload it to a social media site.

Which issue needs to be considered by Anna in this situation?

 - A. Accuracy
 - B. Copyright
 - C. Ownership
 - D. Privacy

- 3** What documentation would be used by technicians in the implementation stage?

 - A. Storyboard
 - B. User surveys
 - C. Operation manual
 - D. Feasibility study

- 4** Which of the following best illustrates the traditional system development approach?

 - A. Gantt chart
 - B. Waterfall model
 - C. Context diagram
 - D. Client–server model

5 In which row of the table are all the tasks typically performed by a network administrator?

A.	Add paper to printers	Install software	Create passwords
B.	Add/remove users	Create passwords	Install printer cartridges
C.	Give users access rights	Add/remove users	Install software
D.	Assign users to printers	Add paper to printers	Add/remove users

6 A business wants to add an e-commerce facility on its website. A developer is hired to create a working model of the proposed system.

Which development approach would best suit this situation?

- A. Prototyping
- B. Traditional
- C. Outsourcing
- D. Participant development

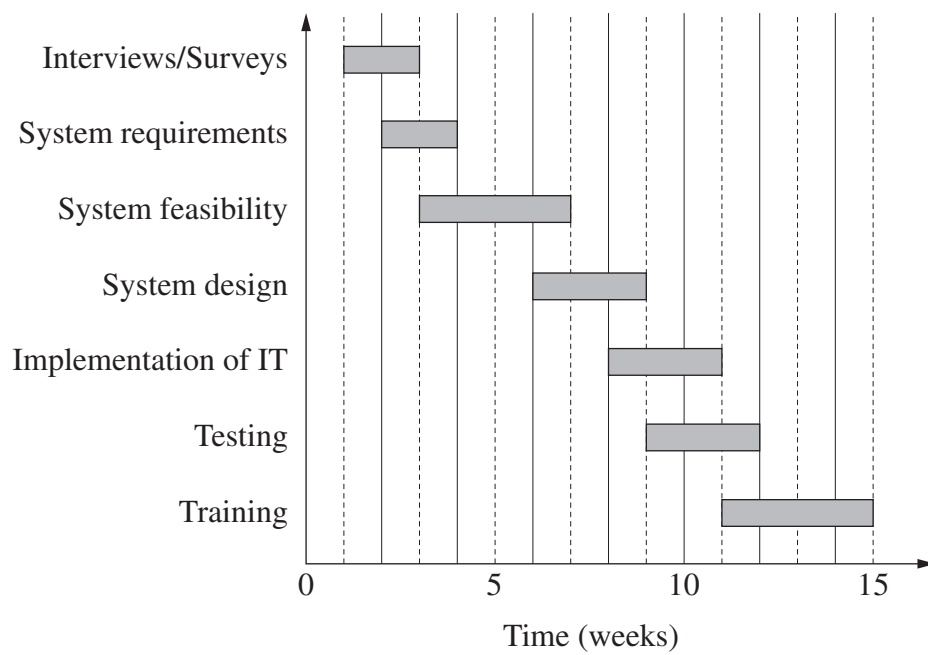
7 What is a purpose of a feasibility study in the development of a proposed system?

- A. To evaluate the final system
- B. To analyse data from the system
- C. To support the development of a training manual
- D. To identify the potential risks related to the proposed system

8 Which hardware component connects two networks which use the same protocol?

- A. Bridge
- B. Gateway
- C. Router
- D. Switch

- 9 A Gantt chart for a project in progress is shown.



What is the planned minimum duration, in weeks, of the project?

- A. 7
- B. 14
- C. 15
- D. 21

Use the following information to answer Questions 10 and 11.

A student creates a flat-file database to store details of her personal music collection. The data dictionary is shown.

<i>Field name</i>	<i>Field size (bytes)</i>
Track_Number	2
Title	50
Album	50
Artist	50
Time	8
Genre	10
Rating	5

10 How many records are stored in this database if the file size is approximately 175 megabytes?

- A. 1
- B. 1000
- C. 1 000 000
- D. 1 000 000 000

11 An additional field is to be added to the data dictionary shown above to indicate whether a song has lyrics containing inappropriate language.

Which data type would be most suitable?

- A. Boolean
- B. Currency
- C. Date
- D. Real

- 12** Online shoppers purchasing goods via a website enter their details.

Which of the following best protects the data from hackers during transmission?

- A. Firewall
- B. Checksum
- C. Encryption
- D. Cyclic redundancy check

- 13** A school is planning a web-based library catalogue for its students to search for and borrow resources while at home. The database for the catalogue needs to be stored in the school library so that it can be easily maintained and updated.

Which row of the table identifies the most suitable type of database and storage/retrieval method in this situation?

	<i>Database type</i>	<i>Storage/Retrieval method</i>
A.	Centralised	Offline
B.	Distributed	Offline
C.	Centralised	Online
D.	Distributed	Online

- 14** A data flow diagram shows

- A. the physical devices in an information system.
- B. the flow of documents between information systems.
- C. the sequence of processes within an information system.
- D. the relationship between processes within an information system.

- 15** The use of a requirements prototype is most beneficial to a system development team when
- A. there is limited budget and time.
 - B. the proposed system involves a high volume of data.
 - C. the traditional system development approach is used.
 - D. the clients are not sure what they want from the system.

- 16** This ASCII character and its parity bit were transmitted without error.

Character	Parity bit
01101100	1

Which of the following would result in an error if sent using the same parity?

- A. 00110010 1
 - B. 01010110 1
 - C. 00111000 0
 - D. 01011110 0
- 17** What is a database schema used for?
- A. To identify data accuracy within a database
 - B. To define the type of data within a database
 - C. To represent all possible conditions and actions
 - D. To visually display tables and their relationships
- 18** An employment agency has developed a website to allow job-seekers to create a login, make a profile and upload a resumé online.

Which of the following would be used for this site?

- A. Extranet
- B. Intranet
- C. Local Area Network
- D. Wide Area Network

- 19 An office worker replies to an email message from a client.

Which row of the table correctly identifies both the level within the Communication System Framework and the protocol that enable the worker's message to be sent?

	<i>Level</i>	<i>Protocol</i>
A.	Application	Ethernet
B.	Application	smtp
C.	Transmission	SSL
D.	Transmission	TCP/IP

- 20 Consider the following query written in a structured query language (SQL).

```
Line 1  SELECT      StudentID, StudentName, Marks
Line 2  FROM        STUDENT, RESULTS
Line 3  WHERE       STUDENT.StudentID = RESULTS.StudentID AND RESULTS.Marks > 49
Line 4  ORDER BY   Marks DESC
```

Which statements specify the query's search criteria and how the data is displayed?

- A. Line 1 and Line 2
- B. Line 1 and Line 4
- C. Line 3 and Line 2
- D. Line 3 and Line 4

Section II

40 marks

Attempt Questions 21–24

Allow about 1 hour and 10 minutes for this section

Answer each question in the appropriate writing booklet. Extra writing booklets are available.

If you include diagrams in your answer, ensure that they are clearly labelled.

Question 21 (8 marks) Use the Question 21 writing booklet.

A sporting association is investigating ways to improve how members access the results of games during the season. The existing system is paper-based, resulting in a time delay in the publication of results.

A proposal is made to develop a mobile application (app) which would enable members to log in and view the results of games. Association officials could securely log in to the app and input the results at the conclusion of games. The app would transmit the data to the association database and website and issue a notification to alert members of the availability of results.

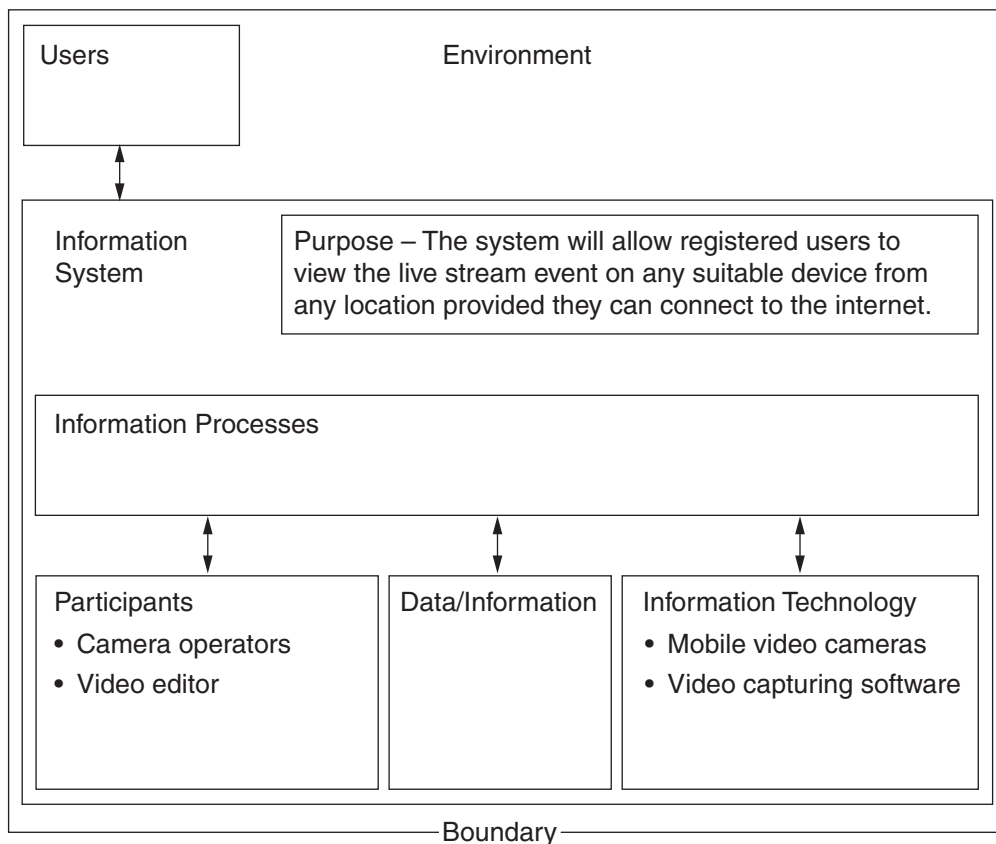
- | | | |
|-----|--|----------|
| (a) | Construct a context diagram for the proposed system. | 2 |
| (b) | Describe how information technology could be used in the proposed system. | 3 |
| (c) | Explain the advantages of using the proposed system compared to the existing paper-based system. | 3 |

Question 22 (10 marks) Use the Question 22 writing booklet.

The principal of a school would like to live stream school assemblies to enable registered users to view award ceremonies and speeches over an internet connection.

The network administrator has been asked to customise a piece of software that will enable the capturing of video from video cameras around the school hall and the transmission of the live stream to the school website. Access to the live stream will be password protected.

This incomplete information system diagram provides a visual representation of the proposed system.



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- | | |
|---|---|
| (a) Outline the Data/Information used in this system. | 2 |
| (b) Describe the information processes of <i>collecting</i> and <i>processing</i> related to this system. | 3 |
| (c) Analyse this system in terms of interpersonal relationships and virtual communities. | 5 |

Question 23 (10 marks) Use the Question 23 writing booklet.

- (a) Compare the features of a relational database with those of a flat-file database. **3**
- (b) Describe the benefits of normalising data. **3**
- (c) A hospital has implemented a patient transportation program where volunteer drivers provide transport for patients who are unable to make their own way home. **4**

In the early stage of the program, the manager constructed a flat-file database to assign patients to drivers.

Patient Name	Patient Address	Patient DOB	Patient Gender	Driver Name	Driver Licence	Driver Registration
John Nguyen	26 Even Ave, Oddville 2876	25/12/1952	M	Peter Morris	065216	PM-762
Tom Wynn	1/1–8 Fernbridge Dr, Oakville 2877	1/4/1940	M	Joanne Simpson	790707	JO-123
Delvene Johns	10 Rocksville Rd, Oakville 2877	8/9/1970	F	Leanne Smith	745247	XYZ-629
Irene Santosa	177 Overland St, Oddville 2876	6/12/1950	F	Leanne Smith	745247	XYZ-629
Jennifer Robson	76 Ventura Blvd, Roland Place 2177	11/3/1942	F	Peter Morris	065216	PM-762
Ron Littlejohn	2 Watson St, Roland Place 2177	1/2/1974	M	Joanne Simpson	790707	JO-123

Normalise the flat-file structure, showing all components in a schematic diagram.

Question 24 (12 marks) Use the Question 24 writing booklet.

A new wireless communication application (app) is now available for use on devices such as smart phones, smart watches and tablets. Once the app is downloaded, users can sign in with their bank account details and purchase goods by placing their device within 20 centimetres of the EFTPOS terminal.

1 'Wake' your device

2 Place it near a terminal

3 You're done!

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due to copyright issues.

- (a) Describe *handshaking* in this scenario. **3**
- (b) Name a wireless technology and discuss its suitability for transmitting and receiving data in this scenario. **4**
- (c) Explain security and legal issues arising from the use of wireless technology in this scenario. **5**

Section III

40 marks

Attempt TWO questions from Questions 25–28

Allow about 1 hour and 10 minutes for this section

Answer each question in a SEPARATE writing booklet. Extra writing booklets are available.

If you include diagrams in your answer, ensure that they are clearly labelled.

Question 25 — Transaction Processing Systems (20 marks)

Use a SEPARATE writing booklet.

- (a) What is the importance of a data warehouse in a transaction processing system? **2**
- (b) Using an example, explain how data mining from a transaction processing system could be an advantage to an organisation. **3**
- (c) Compare the use of a full backup to that of a partial backup in a transaction processing system. **3**
- (d) Explain how a credit card transaction involves both batch and real-time processing. **4**
- (e) A company has designed a web-based event management system. The system allows details of an event to be set up using an online data collection form. Once the form is completed, the system creates tickets and sends invitations to invited guests via email or SMS. Once an invitation is accepted, a ticket is generated. The ticket must be scanned for the guests to gain admission to the event and to be later issued with a certificate of participation.
 - (i) The company needs to develop manual procedures in case the online system is unavailable at the time of the event. **3**

Describe the procedures that should be considered.
 - (ii) Consider the features of the online data collection form in this scenario. **5**

Explain how these features contribute to the operation of this transaction processing system.

Question 26 — Decision Support Systems (20 marks)

Use a SEPARATE writing booklet.

- (a) What is the purpose of a *macro* in a spreadsheet? **2**
- (b) Using an example, describe the role of a knowledge engineer in the creation of an expert system. **3**
- (c) Describe the process of forward chaining used by inference engines in expert systems. **3**
- (d) Distinguish between structured and unstructured decision making. In your answer, include an example of each. **4**
- (e) A school is planning to develop a decision support system to assist students in the selection of their HSC subjects. Within the decision support system, the students are asked to complete an online form with information about:
- personal interests
 - career aspirations
 - initial subject preferences.
- (i) Describe the responsibilities of the school in relation to the use of data provided by the students. **3**
- (ii) Discuss the suitability of using spreadsheets and neural networks in this decision support system. **5**

Question 27 — Automated Manufacturing Systems (20 marks)

Use a SEPARATE writing booklet.

- (a) What is the purpose of damping in an automated manufacturing system? **2**
- (b) Describe the benefits of using an automated manufacturing system. **3**
- (c) Using an example, explain the difference between an actuator and a sensor. **3**
- (d) Compare continuous manufacturing systems with batch manufacturing systems. In your answer, include an example of each. **4**
- (e) An online shoe retailer has a warehouse that contains an automated manufacturing system for product retrieval. When an order is placed, a delivery robot receives a code (unique identifier) for each item ordered. The controller in the robot responds to the request and moves to locate and retrieve the item. Once retrieved, the item is delivered to the packaging area for distribution. The robot is then positioned to receive the next order.
 - (i) Describe how radio frequency identification (RFID) tags can assist in inventory tracking in this automated manufacturing system. **3**
 - (ii) Explain the operation of the robot in this scenario. Use a block diagram to support your answer. **5**

Please turn over

Question 28 — Multimedia Systems (20 marks)
Use a SEPARATE writing booklet.

- (a) Why is a speaker in a home entertainment system considered a display device? **2**
- (b) Describe the technological advances that have led to the adoption and widespread use of multimedia streaming services. **3**
- (c) Using an example, describe the process of analog to digital conversion. **3**
- (d) Smart phones are powerful, integrated multimedia devices. **4**

Explain the storage and retrieval demands that high quality multimedia content places on the hardware of a smart phone.

- (e) Teachers use a multimedia application (app) to take students on virtual field trips to significant places around the world.

Each virtual trip consists of virtual reality (VR) panoramas of 360° and images as well as interesting facts that a teacher can use during a lesson.

The teacher guides the virtual field trip through a tablet device connected to a wireless network. The students participate in the field trip by using a low-cost cardboard ‘viewer’ that holds in place a mobile phone connected to the same wireless network.

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- (i) Describe the information technology required to create the content in this multimedia app. **3**
- (ii) Explain how virtual reality can potentially be used outside the field of education. **5**

End of paper