

# Information Processes and Technology

## General Instructions

- Reading time – 5 minutes
- Working time – 3 hours
- Write using black or blue pen  
Black pen is preferred
- Draw diagrams using pencil

## Total marks – 100

**Section I** Pages 2–9

### 20 marks

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

**Section II** Pages 10–13

### 40 marks

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

**Section III** Pages 14–18

### 40 marks

- 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 contains a project team's descriptions of progress and issues encountered during system development?

  - (A) A journal
  - (B) A schedule of tasks
  - (C) A funding management plan
  - (D) A communication management plan
  
- 2** Which of the following is NOT a network administration task?

  - (A) Mapping users
  - (B) Installing software
  - (C) Assigning protocols
  - (D) Refining prototypes
  
- 3** Which of the following technologies provides the fastest wireless transmission over short distances between mobile devices?

  - (A) Infrared
  - (B) Bluetooth
  - (C) Optic fibre
  - (D) Twisted pair

Use the following extract from a data dictionary to answer Questions 4–5.

<i>Field name</i>	<i>Field size</i>	<i>Example</i>
Student_ID	10	00105/VB
Student_DOB	10	10/08/2007
Fees_Paid	1	N

- 4 Which row in the following table correctly identifies the suitable data types for Student\_ID, Student\_DOB and Fees\_Paid?

	<i>Student_ID</i>	<i>Student_DOB</i>	<i>Fees_Paid</i>
(A)	Text	Date	Boolean
(B)	Numeric	Date	Text
(C)	Numeric	Numeric	Text
(D)	Text	Numeric	Boolean

- 5 Which calculation could be used to determine the storage space in kilobytes for 1000 records of this database?

- (A) (Number of characters in a record)  $\times$  1024  $\div$  1000
- (B) (Number of characters in a record)  $\times$  8  $\div$  1024
- (C) (Number of characters in a record)  $\times$  1000  $\div$  8
- (D) (Number of characters in a record)  $\times$  1000  $\div$  1024

- 6 Two members of a development team disagree about the information technology requirements of a project.

Which initial strategy should the project manager use to identify the issues of the disagreement?

- (A) Team building
- (B) Conducting a survey with team members
- (C) Observing the two team members
- (D) Interviewing the two team members

- 7 Which of the following error detection techniques is the most effective in checking the accuracy of data transmitted?
- (A) Parity bit
  - (B) Checksum
  - (C) Block character check
  - (D) Cyclic redundancy check
- 8 What is the main purpose of assigning employees different levels of network access?
- (A) To ensure that the network is correctly set up
  - (B) To make the network inaccessible from a remote location
  - (C) To ensure employees only have access to data relevant to their role
  - (D) To prevent people outside the organisation from accessing the network
- 9 A business operates a secure private network that allows access for its employees and limited access for its customers via a secure login.

What types of networks allow access for the employees and the customers respectively?

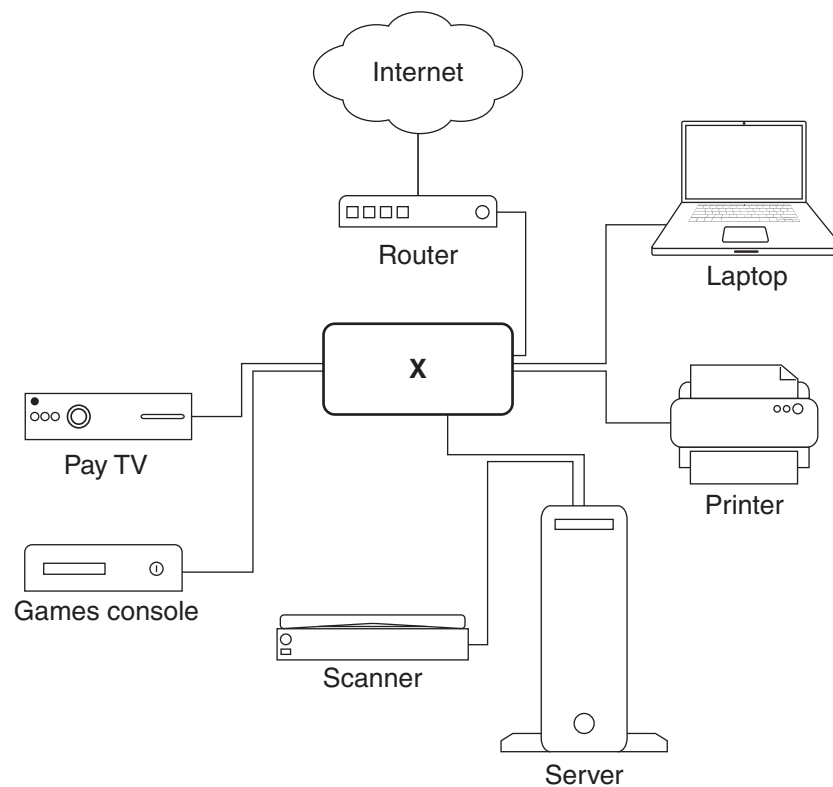
	<i>Employees</i>	<i>Customers</i>
(A)	Internet	Extranet
(B)	Intranet	Extranet
(C)	Internet	Local area network
(D)	Intranet	Local area network

- 10 A company is replacing all of its physical stores with an online store. During the trial period, customers are able to purchase products online or from any of the company's existing stores. When the company is confident that the online system is functioning correctly, it will set a date to close all of the physical stores.

Which method of conversion is being used?

- (A) Direct
- (B) Parallel
- (C) Phased
- (D) Pilot

11 The diagram shows a home communication system.



Which hardware component is **X** most likely to be?

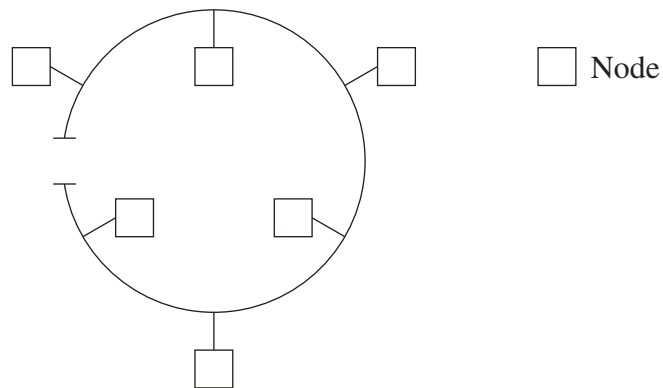
- (A) Modem
- (B) Switch
- (C) Repeater
- (D) Wireless Access Point

12 A company will use a participant development approach to modify its website.

Which statement best describes this approach?

- (A) Purchasing a custom-built website
- (B) Hiring programmers to develop the website
- (C) Using the existing information technology and skills of the staff
- (D) Meeting with external contractors to modify, refine and test the website

13 This diagram shows a network.



Which topology is represented?

- (A) Bus
  - (B) Hybrid
  - (C) Ring
  - (D) Star
- 14 What is the purpose of system evaluation?
- (A) To customise a system to make it operational
  - (B) To clarify the relevant information processes within a system
  - (C) To review the effect that a system has on its users and participants
  - (D) To determine whether an organisation can meet the costs associated with the changes to its existing system

15 Which data modelling tool shows the relationship between data entry screens?

- (A) Storyboard
- (B) Decision tree
- (C) Schematic diagram
- (D) Data flow diagram

16 Which row of the table correctly matches the communication level with a suitable protocol?

	<i>Communication level</i>	<i>Protocol</i>
(A)	Transmission	TCP
(B)	Application	TCP
(C)	Application	SSL
(D)	Transmission	SSL

17 This decision table is used for troubleshooting printer problems.

<i>Conditions</i>	<i>Rules</i>							
Printer does not print	✓	✓	✓	✓	✗	✗	✗	✗
Status light is flashing	✓	✓	✗	✗	✓	✓	✗	✗
Printer is unrecognised	✓	✗	✓	✗	✓	✗	✓	✗
<i>Actions</i>								
Check printer cable	✓	✗	✓	✗	✗	✗	✗	✗
Check paper jam	✗	✓	✗	✓	✗	✗	✗	✗

Which of the following situations will require checking the printer cable?

- (A) The printer prints and the status light is flashing.
- (B) The printer does not print and the status light is not flashing.
- (C) The printer does not print but is recognised by the computer.
- (D) The printer prints but is not recognised by the computer.

**18** A Gantt chart for an upgrade of a business network indicates that:

- Research will take two weeks, followed by designing the solution which will take three weeks.
- Installation of cables will start immediately after this and last for two weeks.
- Installation of software and hardware will last for five weeks and will start when research has concluded.
- On completion of all of the above tasks, the network upgrade will undergo an evaluation for a one-week period.

What is the minimum number of weeks required for the network upgrade?

- (A) 7
- (B) 8
- (C) 9
- (D) 10

**19** The following 7-bit ASCII character and parity bit were transmitted.

0110101 1

In which of the following examples would the receiver request that the message be re-sent?

	ASCII character	Parity bit
(A)	0110101	1
(B)	1011010	1
(C)	0011011	0
(D)	0011010	0



20 This flat-file database stores the details of devices that can be borrowed from a library.

<i>Item</i>	<i>Item number</i>	<i>Borrower's first name</i>	<i>Borrower's surname</i>	<i>Faculty</i>	<i>Date borrowed</i>	<i>Date returned</i>
Laser printer #1	001	John	Jones	Science	31 Jan 14	02 Feb 14
Video camera	008	John	Jones	Science	07 Feb 14	12 Feb 14
Video camera	008	Mary	Green	Maths	14 Feb 14	
Multimedia projector	005	John	Jones	Science	21 Feb 14	06 Jun 14
Digital camera	003	Jack	Smith	English	04 Apr 14	08 Apr 14
⋮	⋮	⋮	⋮	⋮	⋮	⋮
Multimedia projector	005	Mary	Green	Maths	15 Sep 14	22 Sep 14

The database manager has decided that the flat-file database should be normalised.

Which of the following best represents the relationship between the *Borrower* table and the *Item* table?

**P** – Primary key      **F** – Foreign key

- (A)
- |                          |
|--------------------------|
| <i>Borrower</i>          |
| Borrower ID ( <b>F</b> ) |
| Surname                  |
| First name               |
| Faculty                  |
- |                          |
|--------------------------|
| <i>Item</i>              |
| Item number ( <b>P</b> ) |
| Borrower ID ( <b>F</b> ) |
| Item                     |
- (B)
- |                          |
|--------------------------|
| <i>Borrower</i>          |
| Borrower ID ( <b>P</b> ) |
| Surname                  |
| First name               |
| Faculty                  |
- |                          |
|--------------------------|
| <i>Item</i>              |
| Item number ( <b>F</b> ) |
| Borrower ID ( <b>P</b> ) |
| Item                     |
- (C)
- |                          |
|--------------------------|
| <i>Borrower</i>          |
| Borrower ID ( <b>P</b> ) |
| Surname                  |
| First name               |
| Faculty                  |
- |                          |
|--------------------------|
| <i>Item</i>              |
| Item number ( <b>P</b> ) |
| Borrower ID ( <b>F</b> ) |
| Item                     |
- (D)
- |                      |
|----------------------|
| <i>Borrower</i>      |
| Borrower ID          |
| Surname ( <b>P</b> ) |
| First name           |
| Faculty              |
- |                          |
|--------------------------|
| <i>Item</i>              |
| Item number ( <b>P</b> ) |
| Borrower ID ( <b>F</b> ) |
| Item                     |

## 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 school is planning to modify its current attendance system to incorporate digital imaging technologies.

The proposed system will take a digital image of each student as they enter the school, and compare this image with the student's image in the attendance database. If the images match, the student is recorded as present. A daily attendance report will also be generated by administration staff.

- (a) Identify the information technologies required for this proposed system. **2**
  
- (b) Describe a method for testing this proposed system. **3**
  
- (c) Explain why data accuracy is important in this proposed system. **3**

**Question 22** (11 marks) Use the Question 22 writing booklet.

A government is considering implementing a national health record system which can replace paper-based records held by healthcare professionals. Individuals can choose to register and have their details stored in the system.

Healthcare professionals will be able to access the system to add or retrieve important health information such as past treatments or current medications.

- (a) Identify the participants of this system. **2**
  
- (b) Draw a context diagram to represent this system. **3**
  
- (c) Describe ethical issues that relate to the implementation of this system. **3**
  
- (d) Justify the use of a distributed database rather than a centralised database for this system. **3**

**Please turn over**

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

A sporting club uses an information system to capture and maintain the medical and performance details of its players.

Data is stored in a secure online database. Medical information, such as fitness levels and past injuries, is entered manually by staff. Performance data and injuries are collected real-time during games using a tiny device worn by each player. The data is transmitted wirelessly from the tiny devices to the online database.

The information system is accessible by coaches and medical staff at any time.

- (a) What are the advantages of having an online database in this system? **3**
- (b) Describe how a structured query could be used to extract different types of information from the online database. **3**
- (c) Discuss strategies that could be used to prevent loss and corruption of data when data from multiple players are transmitted simultaneously during a game. **4**

**Question 24** (11 marks) Use the Question 24 writing booklet.

A fire service has a central office and several fire stations across the state. The central office uses a communication system to assist its fire stations and to inform the community about emergency situations.

Using the communication system, the central office sends out instructions to the firefighters at the fire stations to attend to emergencies, and the firefighters respond with updates of the emergency situations. The central office also informs the community about fire locations and conditions using a variety of communication methods including their website, RSS feeds, social media, text messages and mobile phone apps.

- (a) Explain why both bridges and gateways are required in this communication system. **3**
  
- (b) Assess the suitability of the communication methods used to inform the community in this system. **3**
  
- (c) Recommend and justify suitable wired and wireless transmission media for the communication between the central office, fire stations and firefighters. **5**

**Please turn over**

## 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) (i) Give TWO examples of bias problems that could arise in data collection. **2**
- (ii) Why is data integrity important in a transaction processing system? **3**
- (b) (i) Using an example, distinguish between batch and real-time processing. **3**
- (ii) How can mirroring and rollback procedures be used in a transaction processing system? **4**
- (c) At a pet resort, each pet is fitted with a radio frequency identification (RFID) tag and the owner's details are entered into a database.

A pet's RFID tag is scanned when it uses services, such as pet washing or a visit to the vet. These transaction details are recorded in a database.

When owners collect their pets, they are given a printout of all transactions listing the services and their cost.

- (i) Describe how data mining can be used in this scenario. **3**
- (ii) Discuss an alternative use of this type of transaction processing system. **5**

**Question 26 — Decision Support Systems (20 marks)**

Use a SEPARATE writing booklet.

- (a) (i) Identify advantages of linking multiple sheets in a spreadsheet. 2
- (ii) Describe benefits of group decision support systems. 3
- (b) (i) Describe an advantage and a disadvantage of using a macro in a spreadsheet. 3
- (ii) This diagram shows part of an accommodation payment system. Different accommodation packages are available and a 10% discount is applicable for bookings of more than five days. 4

Design formulae for cells D7, E5 and F3.

	A	B	C	D	E	F
1	Accommodation Payment					
2	<b>ID</b>	<b>No. of Days</b>	<b>Accommodation Package</b>	<b>Daily Rate</b>	<b>Discount Rate</b>	<b>Accommodation Cost</b>
3	Kim Pine	2	Silver	\$46.00	0	
4	Ti Huon	6	Suite	\$75.00	10%	\$405.00
5	Frieda Pharos	7	Standard	\$24.00		\$151.20
6	Angela Webester	3	Bronze	\$35.00	0	\$105.00
7	Lech Gowitzer	9	Silver		10%	\$372.60
8	Jane Wayne	4	Luxury	\$55.00	0	\$220.00
9						
10						
11		<b>Accommodation Packages</b>	<b>Daily Rate</b>			
12		Bronze	\$35.00			
13		Luxury	\$55.00			
14		Silver	\$46.00			
15		Standard	\$24.00			
16		Suite	\$75.00			
17						

Question 26 continues on page 16

Question 26 (continued)

- (c) This diagram shows the screens of a decision support system that recommends car insurance to customers.

Each customer is asked a series of questions and the system determines the best insurance for the customer based on the responses to the questions.

**Step 1: Vehicle Details**

1. Registration due date:  ▼  ▼  ▼
2. Vehicle type:  ▼
3. Vehicle year:  (eg 1998)
4. Vehicle garaged at:  (postcode)
5. Vehicle use:  ▼

**Step 2: Registered Owner and Driver Details**

6. Owner age:  ▼
7. Demerit points:  ▼
8. Youngest driver age:  ▼
9. Driver with at-fault accident in last 2 years:  ▼
10. Driver with driving conviction in last 5 years:  ▼

- (i) Classify this decision support system as structured, semistructured or unstructured, and justify your choice. **3**
- (ii) Discuss an alternative use of this type of decision support system. **5**

**End of Question 26**

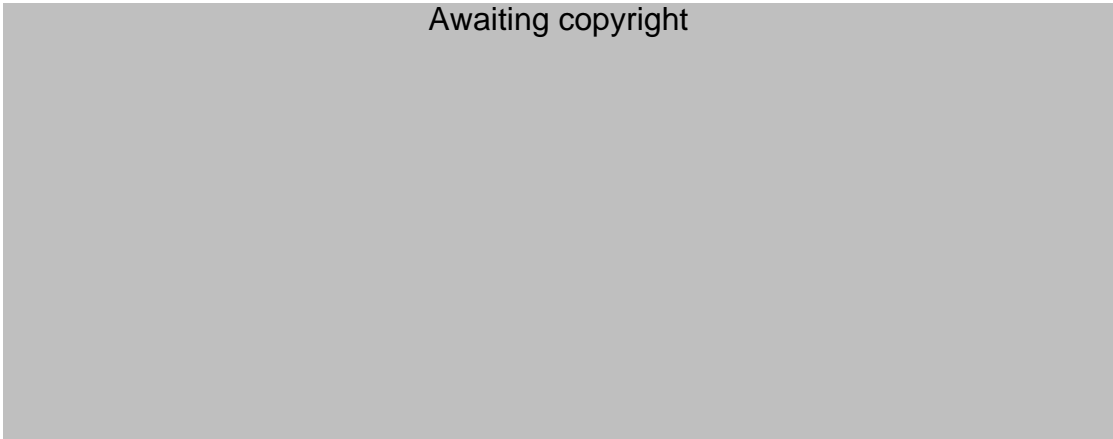


**Question 27 — Automated Manufacturing Systems (20 marks)**

Use a SEPARATE writing booklet.

- (a) (i) Identify advantages of automation in a mail sorting system. **2**
- (ii) Describe techniques for reducing noise in relation to signals in an automated manufacturing system. **3**
- (b) (i) Describe how a sensor in an automated manufacturing system converts analog data to digital data. **3**
- (ii) Contrast, using examples, discrete and continuous processing in an automated manufacturing system. **4**
- (c) Three-dimensional (3D) printing is an automated process that can be used in the manufacture and construction of low-cost housing. The diagrams below show a portable mobile printing rig that can be easily assembled on a building site. It can produce all of the walls and main support structures required in the building. The system has a specially designed concrete pump nozzle attached to a robotic arm that moves along a railway-style track placed around the foundation of the house. A computing numerical control (CNC) system directs the mobile printing rig to produce the house.

Awaiting copyright



- (i) Describe the relationship between computer aided design (CAD) and computer aided manufacture (CAM) in this automated manufacturing system. **3**
- (ii) Discuss an alternative use for this type of automated manufacturing system. **5**

**Question 28 — Multimedia Systems (20 marks)**

Use a SEPARATE writing booklet.

- (a) (i) Identify an advantage and a disadvantage of compressing video in multimedia. **2**
- (ii) Describe how online games can be used in education and training. **3**
- (b) (i) Distinguish between authoring software and HTML editors for creating multimedia. **3**
- (ii) Explain how the bit-depth and the representation of colour data place demands on hardware in a multimedia system. **4**
- (c) A car manufacturer provides an infotainment and navigation in-car system in its vehicles. This multimedia system allows users to access services such as:
- phone calls using speech recognition
  - connection to the internet, social media and digital radio
  - navigation using visual and audio messages.
- (i) Identify suitable file formats for storing images and audio data in this multimedia system and justify your choices. **3**
- (ii) Discuss an alternative use of this type of multimedia system. **5**

**End of paper**

BLANK PAGE

BLANK PAGE