

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 Pages 3–11

20 marks

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

Section II Pages 12–15

40 marks

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

Section III Pages 16–19

40 marks

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

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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 a function of a modem in a local area network?
- (A) Encryption of data
 - (B) Modulation of signals
 - (C) Detection of errors in data
 - (D) Synchronous exchange of signals
- 2** During an interview, a project manager verbally summarises the client's comments.
- Which communication skill is the project manager displaying?
- (A) Negotiation
 - (B) Team building
 - (C) Active listening
 - (D) Conflict resolution
- 3** Taylor wants to convert her existing paper-based recipe cards so they can be accessed electronically.
- Which would be the most appropriate type of database structure?
- (A) Flat-file
 - (B) Hypertext
 - (C) Schema
 - (D) Spreadsheet

Use the following scenario to answer Questions 4 and 5.

A retail store has installed facial recognition technology to track customers when they are in the store. The technology captures and records details such as physical features and time spent in-store without the customers' knowledge or consent.

- 4 Which ethical issue has the store violated?
- (A) Privacy
 - (B) Data quality
 - (C) Freedom of information
 - (D) Interpersonal relationships
- 5 Which combination of information processes is being used when the customer is in the store?
- (A) Collecting and storing
 - (B) Storing and displaying
 - (C) Storing and processing
 - (D) Collecting and displaying
- 6 The diagram shows an online form used to search an airline reservation system.

Search Airfares		
☒ Return ☐ One Way		
From Sydney	Departure Date Thu, 18 Feb 2017	
To 	Return Date Thu, 18 Feb 2017	
Adults 1	Children 0	Infants 0

Which set of fields contains a Boolean data type?

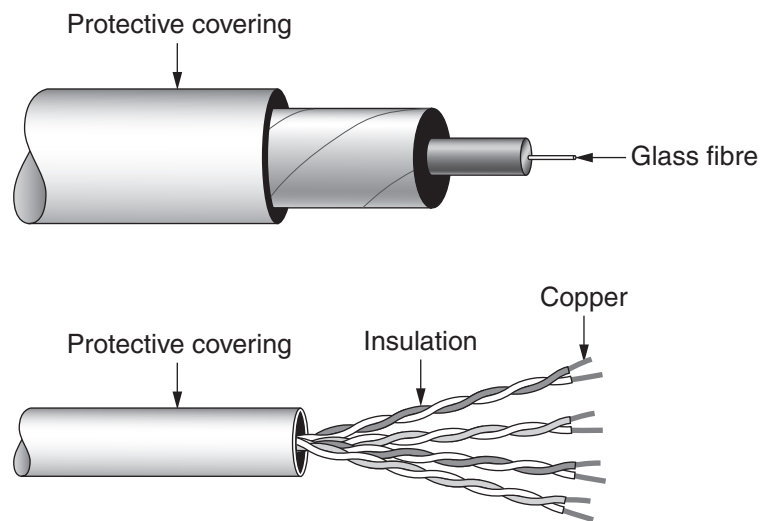
- (A) From and To
- (B) Return and One Way
- (C) Adults, Children and Infants
- (D) Departure Date and Return Date

- 7 In which stage of project management would the achievement of the project requirements be checked?
- (A) Planning
 - (B) Designing solutions
 - (C) Testing and evaluating
 - (D) Installation of information technologies

- 8 A business is updating its payroll system and is employing a specialist software development company to design a working model of the updated system.

Which combination of development approaches is being used in this situation?

- (A) Traditional and outsourcing
 - (B) Outsourcing and prototyping
 - (C) Traditional and participant development
 - (D) Prototyping and participant development
- 9 The diagrams show two types of transmission media.



Which transmission media types are shown?

- (A) Infrared, coaxial cable
- (B) Optic fibre, twisted pair
- (C) Optic fibre, coaxial cable
- (D) Coaxial cable, twisted pair

- 10** A high school has implemented a Bring Your Own Device (BYOD) policy. A student wishes to connect their personal laptop to the school's network.

Which hardware component is required to connect the student's laptop to the school network?

- (A) Graphics card
 - (B) Wireless access point
 - (C) Network interface card
 - (D) Network operating system
- 11** Which error checking method counts the number of bits in a transmission packet and includes this data with the packet so the receiver can check that the same number of bits has arrived?
- (A) Parity bit
 - (B) Check sum
 - (C) Block check character
 - (D) Cyclic redundancy check

- 12** The string `*S?` is used in a search query.

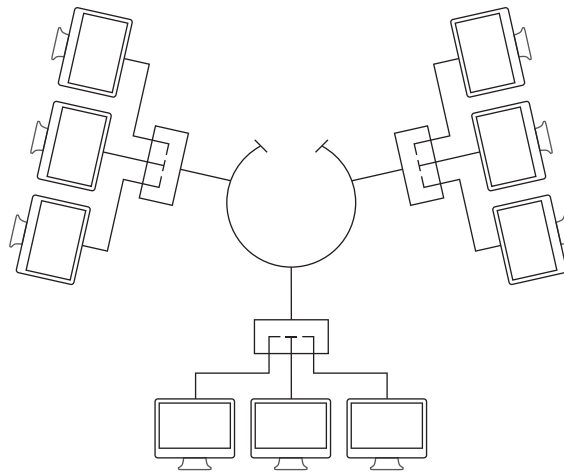
Which word will be found using this string?

- (A) ASCII
- (B) DISK
- (C) PASSED
- (D) USER

13 Which statement best describes a *bridge* in a communication system?

- (A) Hardware and software that determine where to send a data packet between two networks
- (B) Hardware and software that connect different networks by converting different protocols
- (C) Hardware and software that amplify signals to enable them to be transmitted over a longer distance
- (D) Hardware and software that connect similar networks that are using the same communications protocol

14 The diagram shows a hybrid network.

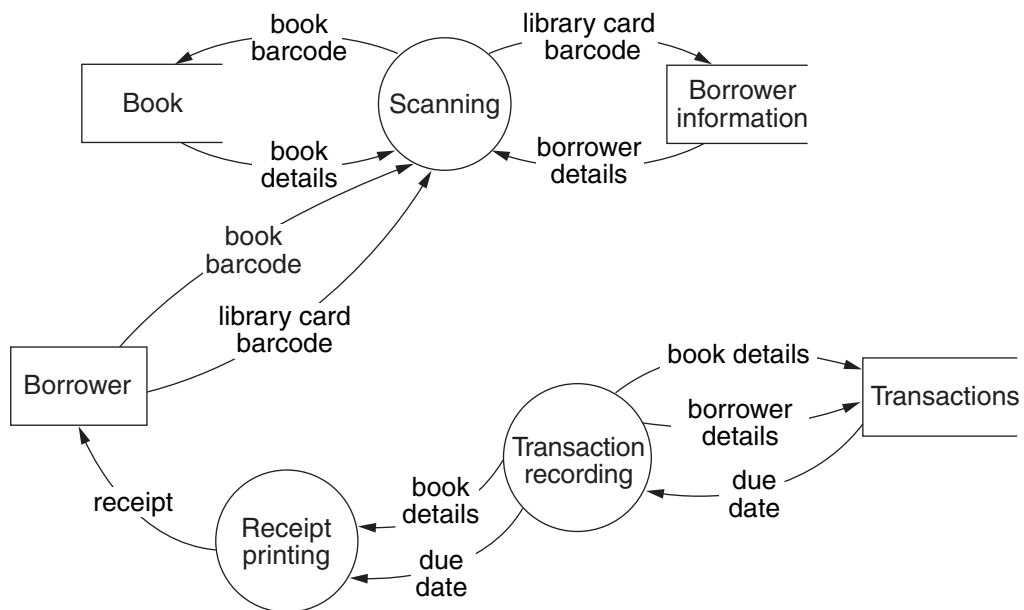


Which combination of topologies is represented?

- (A) Star and bus
- (B) Star and ring
- (C) Ring and bus
- (D) Ring and wireless

Use this information to answer Questions 15 and 16.

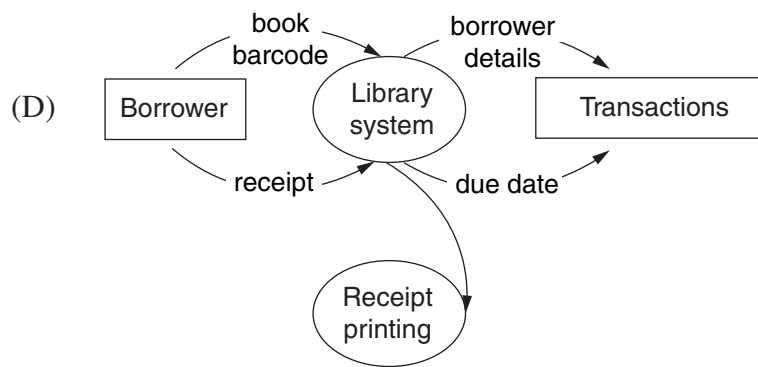
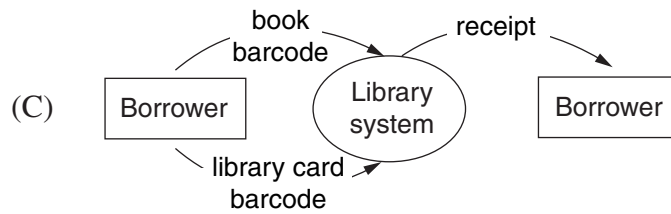
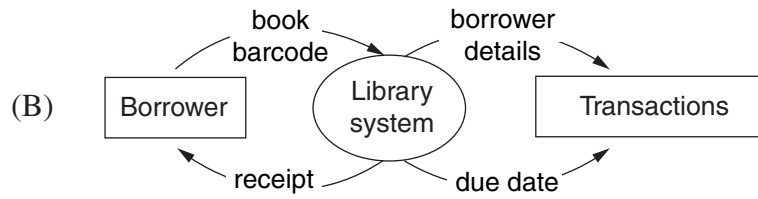
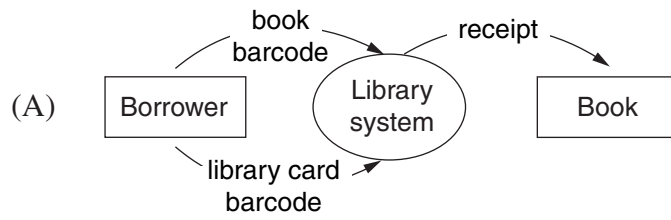
This data flow diagram is used in the design of a library system.



- 15 Which row in the table correctly identifies an external entity, a data store and a process in the data flow diagram?

	<i>External entity</i>	<i>Data store</i>	<i>Process</i>
(A)	Borrower	Borrower information	Borrowing
(B)	Book	Transactions	Scanning
(C)	Borrower	Transactions	Receipt printing
(D)	Book	Borrower	Transaction recording

16 Which of the following best represents the context diagram of the library system?



17 The main function of a hub in a network is to connect

- (A) computers on the network to share files.
- (B) computers on the network to the internet.
- (C) computers that are using different protocols.
- (D) computers that are using different operating systems.

18 Which row in the table correctly matches the particular protocol, with its level and purpose?

	<i>Protocol</i>	<i>Level</i>	<i>Purpose</i>
(A)	http	Transmission	Accesses web browsers
(B)	IP	Application	Establishes an encrypted link between a web server and browser
(C)	Ethernet	Transmission	Uses a token bit to transmit data to other devices on the same network
(D)	TCP	Communication control and addressing	Transmits data across internet ensuring messages are accurately delivered

19 A restaurant chain is converting to a self-service ordering system. It has introduced this new system alongside its existing system in one location, with a view to converting all the other outlets to the self-service ordering system in the future.

Which combination of conversion methods is being used?

- (A) Pilot and direct
- (B) Pilot and phased
- (C) Parallel and pilot
- (D) Parallel and direct

- 20** The diagram shows the operation of a search engine.



Which row in the table correctly identifies the processes labelled **1**, **2** and **3** in the diagram?

	1	2	3
(A)	Webpage crawling	Builds an index of keywords	Stores data for users to access
(B)	Internet crawling	Builds an index of sites	Displays results to the user
(C)	Internet crawling	Builds an index of keywords	Stores data for users to access
(D)	Webpage crawling	Builds an index of sites	Displays results to the user

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 (10 marks) Use the Question 21 writing booklet.

An organisation develops educational applications (apps). The development of these apps is undertaken in a collaborative environment with employees working in different global locations. Project managers at the organisation's head office maintain regular communication with the team members, using the internet for email, video conferences and online chats to monitor the progress of the development of the apps.

- | | | |
|-----|--|----------|
| (a) | Identify the information technologies required for communication between a project manager and team members. | 2 |
| (b) | Why would a project manager need a communication management plan to communicate with the team members? | 2 |
| (c) | Describe how Voice over Internet Protocol (VoIP) could be used for communication between a project manager and team members. | 3 |
| (d) | Explain the issues that could arise from team members working in different global locations. | 3 |

Question 22 (9 marks) Use the Question 22 writing booklet.

The management of a cinema wants to modify the cinema's website to offer free movie tickets to its customers. To claim these free tickets, customers need to register online at the cinema's website in the first three hours after the release of a new movie is announced.

- (a) Outline the potential risks that may arise from modifying the cinema's website to offer free movie tickets. **3**
- (b) Explain why the agile development method would be appropriate for this modification. **3**
- (c) Recommend a type of test data that could be used to evaluate the system performance of the modified website. Justify your choice. **3**

Question 23 (9 marks) Use the Question 23 writing booklet.

A government is introducing a 50% discount on the licence renewal fee for drivers with a good driving record. To qualify for the discount, a driver must:

- have an unrestricted licence
- have had a licence continuously for at least five years
- have no driving offences that attract demerit points (eg speeding or drink driving) recorded on their current driving licence.

The discount applies for licence renewal for one, three or five years.

- (a) Draw a decision tree showing the rules used to determine if a driver is eligible to receive the 50% renewal discount. **3**

- (b) The driver's licence renewal data is stored in a relational database. **3**

Construct a schematic diagram to demonstrate the organisation of data in this database. Show the relevant fields, primary keys, foreign keys and relationships.

- (c) Drivers born between 1972 and 1995 can apply for a 10-year licence. **3**

Construct an SQL that would display the drivers who are eligible for a 10-year licence renewal.

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

A car insurance company is planning to implement a new information system that would automatically adjust the amount payable by the customer. The system uses real-time data from the car's GPS (Global Positioning Satellite) system (*time of day, type of road surface, speed, distance travelled*) to generate a bill at the end of the month. The data is available to policy holders when they log in to the insurance company's secure website.

Awaiting copyright

- (a) Describe how the client-server architecture operates in this system. **3**
- (b) Explain why the different transmission media are used in the system. **4**
- (c) Analyse the information system in terms of the information processes of analysing and processing. **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) Why is data validation important in a transaction processing system? **2**
- (b) Using an example, describe how a radio frequency identification (RFID) tag operates. **3**
- (c) A bank has introduced a new application that allows customers to pay for any transaction from their nominated account using a smartphone. **3**
- Describe how both real-time processing and batch processing occur when using this application.
- (d) An organisation was in the process of backing up its critical system data when a power failure occurred, corrupting the system data. **4**
- Explain how backup procedures can be used by the organisation to recover the system data.
- (e) A transport company has implemented a virtual shopping application (app) which allows customers to shop with their smartphones as they wait at train stations and bus stops. Using the app, customers scan a picture of different products displayed on a wall at the train station or bus stop, pay online and have these products delivered to their home.
- (i) Describe the data that the company needs to collect from the virtual shopping app in order to process the sales. **3**
- (ii) Design suitable data entry screens to capture the required data, such as product information and payment details. Clearly indicate the screen elements that are being used to collect the data. Justify your choices. **5**

Question 26 — Decision Support Systems (20 marks)

Use a SEPARATE writing booklet.

- (a) How do management information systems support decision-making? **2**
- (b) Distinguish between *absolute referencing* and *relative referencing* in a spreadsheet, giving an example of each. **3**
- (c) A company uses a spreadsheet to keep track of sales and returns of products, complaints calls from different stores, their website and customer service centres. **3**
- Describe how different types of charts generated from the spreadsheet could assist the company in making decisions.
- (d) Explain, using an example, the role of the knowledge base and that of the inference engine in the development of an expert system. **4**
- (e) A government's weather emergency service department is using a Cyclone Response Management System (CRMS) to track the speed, direction and intensity of cyclones. The CRMS uses prediction modelling software which collects live, web-based data on wind speed and direction, moisture levels, air and water temperature and air pressure. The data is then stored in a database and overlaid onto a web-based map application, displaying the results as a video. The CRMS modelling software can be used to track where and when cyclones might occur. Situation reports are generated to support decision-making, such as when to alert communities to prepare for extensive damage or advise residents to take shelter.
- (i) Explain how data mining can be used in this system. **3**
- (ii) Discuss measures to reduce negative impacts on participants in this decision support system when their decision-making is automated. **5**

Question 27 — Automated Manufacturing Systems (20 marks)

Use a SEPARATE writing booklet.

- (a) How is CAD/CAM used in an automated manufacturing system? **2**
- (b) Explain why an automated mail-sorting operation may be considered a human-centred system. **3**
- (c) A company produces personalised cases for mobile phones featuring custom designs, artwork or photographs uploaded by customers. These are printed on the selected case and the customer is given an option to order multiple copies of the same design. **3**

Explain whether the system used for processing these cases is continuous, discrete, batch or a combination.

- (d) A business uses an automated manufacturing system to produce embroidered images on items of clothing. **4**

What are the advantages of using this type of system for repetitive tasks?

- (e) A parcel delivery robot with two motor-driven wheels uses an optical or light sensor and a proximity or motion sensor to follow its designated path along the floor and avoid moving obstacles in an automated warehouse.
 - (i) Draw a block diagram showing the interactions between the information technology items in this system. **3**
 - (ii) Explain how the sensors and actuators in the parcel delivery robot operate. **5**

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

- (a) Why is a storyboard used in designing a multimedia system? **2**
- (b) Distinguish between *morphing* and *distorting*, giving an example of each. **3**
- (c) Leisure and entertainment multimedia systems integrate multimedia elements such as video clips, animations, integrated audio and 3D graphics, allowing for increased realism and excitement. **3**

Describe how leisure and entertainment multimedia systems can be used in an educational setting.

- (d) Explain how the merging of radio, television, communications and the internet has changed the way users access multimedia systems. **4**
- (e) A virtual care clinic has a kiosk that allows doctors and patients to connect with each other in an online environment.

Patients have the option to select their family doctor or have a doctor assigned. Patients enter data about their symptoms, any medications they are taking and what allergies they may have into an online form. Patients can upload images and files of their symptoms and connect with a doctor via video conference to seek medical advice. The doctor can write prescriptions, referrals to specialists, and schedule appointments using the kiosk. These files can be transmitted to the patient's account.

- (i) What skills would developers need to produce the design and layout of the virtual care clinic kiosk? **3**
- (ii) Explain how advances in hardware technologies have influenced the development of this kiosk. **5**

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