2013

HIGHER SCHOOL CERTIFICATE
EXAMINATION

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 2–8

20 marks

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

(**Section II**) Pages 9–12

40 marks

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

(**Section III**) Pages 13–16

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   An organisation employs a project team to update a system.

Which of the following techniques could the team use to understand the needs of the organisation?

(A)   Testing the solution

(B)   Refining the prototype

(C)   Interviewing the participants

(D)   Scheduling the tasks to be completed

2   This context diagram represents an online retailer.
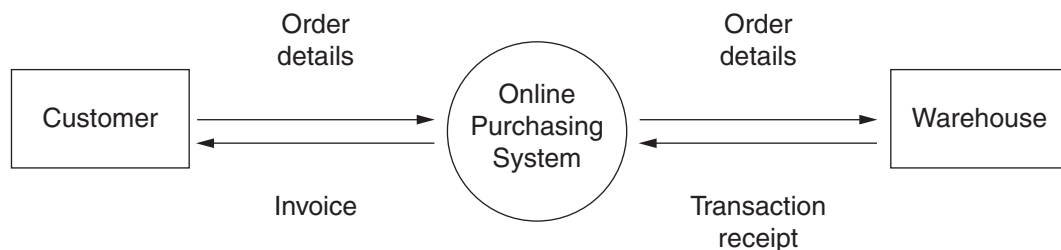
Which row in the table identifies a *process* and an *external entity* in the diagram?

	Process	*External entity*
(A)	Online purchasing system	Warehouse
(B)	Order details	Transaction receipt
(C)	Online purchasing system	Transaction receipt
(D)	Order details	Warehouse

3   A company is considering implementing a new system.

Which of the following should be included in the feasibility study?

   (A)   An operation manual

   (B)   Results from testing the new system

   (C)   A working model of the new system

   (D)   Risks associated with the new system

4   A worker uses a hand-held device to scan the barcodes of items in a warehouse.

Which information process best describes the activity of scanning?

   (A)   Collecting

   (B)   Displaying

   (C)   Storing

   (D)   Transmitting

5   The diagram shows a household network.
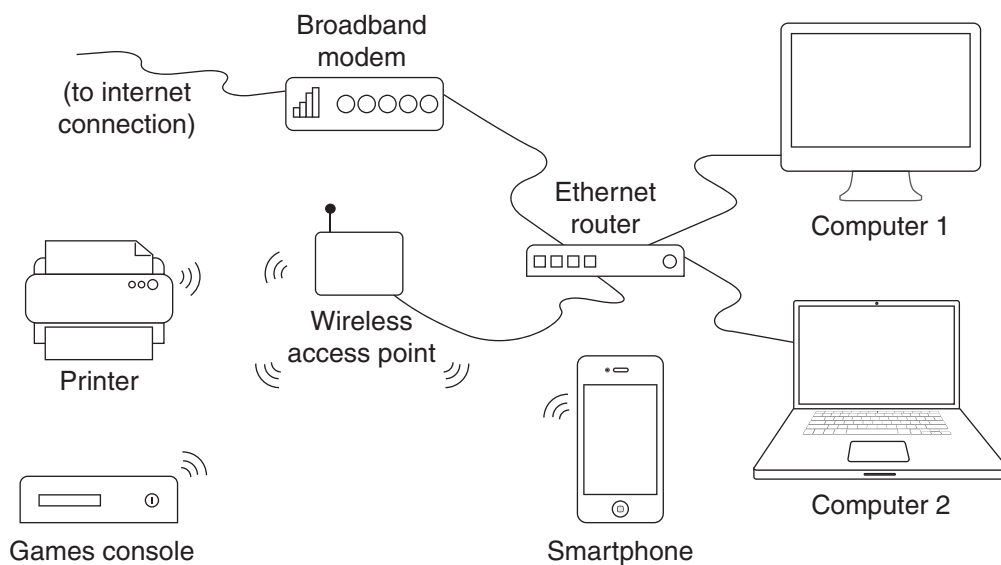
Which network topology is represented in this diagram?

   (A)   Bus

   (B)   Hybrid

   (C)   Star

   (D)   Wireless

6 Which of the following converts analog sound into digital data?

(A) OLAP

(B) RSS

(C) TCP

(D) VOIP

7 Which of the following would be LEAST effective in identifying problems in an existing system?

(A) Surveying users

(B) Interviewing participants

(C) Observing participants using the system

(D) Writing a troubleshooting guide for users

8 A new EFTPOS method of payment for purchases requires customers to simply place an enabled credit card close to a terminal at the checkout.

Which of these is used to transfer data from the credit card to the EFTPOS terminal?

(A) 3G

(B) Infrared

(C) NIC

(D) Radio

9 In a transmission system, when the message 'TOP MARKS' was sent as a secured message it appeared as 'XSTDQEVON'.

Which security measure was used?

(A) Checksum

(B) Encryption

(C) Modulation

(D) Synchronisation

Use this email to answer Questions 10–11.

To:	Patricia Jones, James Nguyen, Kevin Wang
Cc:	Kerrin Jacobson
Bcc:	Fred Stevenson
Subject:	Meeting Notes
From:	Brian Clarkson

Dear All,

Please find attached a copy of the meeting notes from our 10:00am meeting.

Regards

Roberto

Meeting Notes (24.6KB)

10 Who would receive this email without all the other recipients knowing?

  (A) Patricia Jones, James Nguyen and Kevin Wang

  (B) Kerrin Jacobson

  (C) Fred Stevenson

  (D) Brian Clarkson

11 What may raise concerns as to whether the email message is legitimate?

  (A) The attachment may contain a virus.

  (B) The message is being sent to three recipients.

  (C) There are obvious spelling mistakes in the message.

  (D) It is signed by a person who does not own the email account.

12 A prospective employer asks a job applicant for their 'social network' login details.

  The applicant should consider this request as

  (A) an invasion of privacy.

  (B) the employer's legal right.

  (C) a freedom of information request.

  (D) a breach of the applicant's ownership of data.

13   A database developer would create different *data views* for users to show

(A)   the metadata.

(B)   the data structures.

(C)   data relevant to their work.

(D)   data in response to their queries.

14   This is part of the PRODUCT table in a relational database.

PRODUCT

Product_ID	Product_Name	Price	Supplier_ID
SB1296	Cheese grater	4.55	SX43
SB1297	Salad spinner	11.25	SX43
SB1298	Knife block	45.00	SD18

Which of the following would be valid data types for the fields *Price* and *Supplier_ID*?

	Price	Supplier_ID
(A)	Boolean	Text
(B)	Text	Real
(C)	Real	Text
(D)	Currency	Real

15   This HTML code is found in the source of a web page.

```
<html>
<head>
<title>Cinema Releases of 2013</title>
<meta name="description" content="the best movies that were released in 2013">
<meta name="keywords" content="pictures, films, videos">
</head>
</html>
```
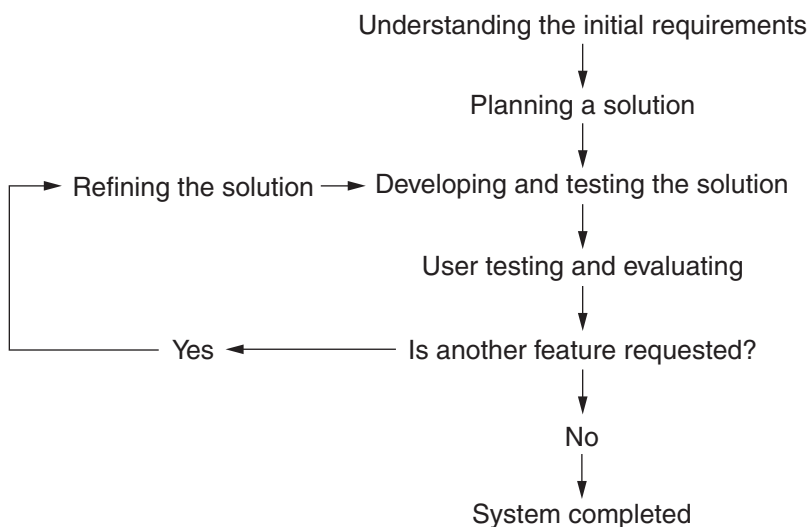
Which of the following words would NOT locate this web page when entered into a search engine?

(A)   2013

(B)   films

(C)   movies

(D)   title

16 A company is designing backup procedures for very important data. The main server is located in the head office and connected to a network of thin clients in remote offices.

Which of the following backup options is the most appropriate?

(A) Daily backup of the main server

(B) Daily backup of the thin clients

(C) Weekly backup of the thin clients

(D) Weekly backup of the main server

17 A business employs a project team to develop a new system. The development approach they use is represented in the diagram below.

Understanding the initial requirements

↓

Planning a solution

↓

Refining the solution → Developing and testing the solution

↓

User testing and evaluating

↓

Yes ← Is another feature requested?

↓

No

↓

System completed

Which development approach is used by the business?

(A) Agile

(B) Traditional

(C) Participant development

(D) Participant customisation

18 Which of the following is an example of live data testing?

(A) A programmer reviewing the code of a game prior to releasing it

(B) A business offering free goods to customers who order from an online store in its trial period

(C) A web designer requesting feedback about a website from the company for which it was developed

(D) A data entry operator investigating the maximum number of records that can be stored in a database

19 Janice entered the following SQL command to retrieve information about the products in her store.

> SELECT Products.ProductNumber
>
> FROM Products
>
> WHERE Products.Quantity < minimum stock
>
> ORDER BY Products.Quantity ASC

Which list would be produced as a result of this query?

(A) All products in alphabetical order

(B) Products due to be delivered in order of urgency

(C) Products sold in the last month in order of popularity

(D) Products that need to be reordered based on stock levels

20 A large insurance company wishes to integrate all data in its current information systems to create an enterprise-wide system within the next three months. Research into similar companies indicates that there are already successful systems available, although they do not fulfil all the specific needs of the company.

Which of the following would be the most appropriate solution for this company?

(A) Identify a developer who can apply agile methods to develop the new enterprise-wide system

(B) Use prototyping to show the modifications that the company requires of their new enterprise-wide system

(C) Use a traditional approach to develop the new enterprise-wide system in-house to meet the company's specific needs

(D) Identify an appropriate supplier, purchase an enterprise-wide system from them and have the system customised to meet the needs of the company

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 legal firm is planning to implement a file storage and sharing system. This system will allow employees in different locations to communicate and work together simultaneously. Depending on the position they hold, different staff members have access to different documents. Employees in this firm are inexperienced in the use of information technology and are not comfortable with the introduction of the new system.

(a)   Outline a method that could be used to provide different employees with different levels of access to the documents. **2**

(b)   Compare the use of printed user manuals with providing face-to-face training classes to prepare employees for the introduction of the new system. **3**

(c)   Describe technologies needed for employees in different locations to view, discuss and edit shared documents. **3**

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

An information system in context diagram is shown for an online coffee house.

```
┌─────────────────────────────────────────────────────────────────────────┐
│  ┌──────────────────────────┐          Environment                       │
│  │ Users                    │          Online Coffee House               │
│  │ Travelling public        │                                            │
│  └──────────────────────────┘                                            │
│              ↕                                                            │
│  ┌─────────────────────────────────────────────────────────────────────┐│
│  │ Information   ┌───────────────────────────────────────────────────┐  ││
│  │ system        │ Purpose                                           │  ││
│  │               │ The system will allow commuters to purchase coffee│  ││
│  │               │ using a mobile device. The coffee is ordered and  │  ││
│  │               │ paid for electronically and can be picked up at   │  ││
│  │               │ the coffee shop closest to their location.        │  ││
│  │               └───────────────────────────────────────────────────┘  ││
│  │                                        ↕                              ││
│  │  ┌──────────────────────────────────────────────────────────────┐    ││
│  │  │ Information processes                                         │    ││
│  │  │ Collecting, processing, analysing, displaying,               │    ││
│  │  │ transmitting/receiving, organising, storing/retrieving       │    ││
│  │  └──────────────────────────────────────────────────────────────┘    ││
│  │      ↕                   ↕                        ↓                   ││
│  │ ┌──────────────┐ ┌──────────────────┐ ┌──────────────────────────┐   ││
│  │ │ Participants │ │ Data/information │ │ Information technology    │   ││
│  │ │ Employees    │ │ Customer data    │ │ File server               │   ││
│  │ │              │ │ Order details    │ │ Communication equipment   │   ││
│  │ │              │ │ Geographical data│ │                           │   ││
│  │ └──────────────┘ └──────────────────┘ └──────────────────────────┘   ││
│  └─────────────────────────────────────────────────────────────────────┘│
│                          ── Boundary ──                                   │
└─────────────────────────────────────────────────────────────────────────┘
```

(a) Describe the information process of *collecting* in this coffee house information system. **3**

(b) Describe TWO different software applications used in this information system. **3**

(c) Explain what hardware is needed to ensure the uninterrupted availability of the system during periods of high demand. **3**

Question 23 (11 marks) Use the Question 23 writing booklet.

A website is to be created for a travel agency to answer customer enquiries.

(a) The following tasks and suggested time frames have been identified for the development of this website: **3**

- Requirements Gathering will begin immediately and continue for three weeks

- Cost-Benefit study will follow for two weeks

- Design will begin one week into the Requirements Gathering stage and end one week after the Cost-Benefit study

- Building and testing the website will follow the Design stage and continue for three weeks.

Create a Gantt chart showing the minimum time required to complete the above tasks.

(b) In the user manual of the proposed website, the following example is used to show how to locate tourist information for a customer who wishes to visit Ha Long Bay, Da Nang, Na Trang, Vinh Long and Vinh Thuan: **3**

∗Long∗ or ∗ang∗ or ∗Vinh∗

Explain how this search works.

(c) The homepage of this website needs to allow travel agents to collect customers' travel details for flight bookings, and to provide links to information about destinations, travel insurance and safety advice. **5**

Draw a labelled diagram that identifies the main features of this homepage.

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

A wholesale lighting company has three sales staff that travel to various businesses to sell their products. When a purchase occurs, the sales staff enter the sale into a central database via a wireless network. The company then prepares the order and ships it to the customer.

The table shows part of the data and how it is linked to other tables within the database.

Invoice table

Primary key fields	Foreign key fields			Other fields	
Invoice No	Order ID	Customer ID	Employee ID	Date ordered	Date required
10121345	73826	JAPE	A4	19/05/13	19/06/13
10121346	93825	KING	C6	26/05/13	16/06/13
10121347	93836	MOTO	A2	10/06/13	29/06/13
10121348	87465	KING	B9	12/06/13	01/07/13
10121349	43528	LOVE	C6	18/06/13	08/07/13

(a) Draw a labelled diagram to represent the communication technologies required for this system. In your diagram, include the communication media and hardware devices.   3

(b) Construct a schema representing the invoice table and the three related tables. Show primary keys, foreign keys and relationships.   4

(c) The company is considering outsourcing the hosting of its database. However, this will have financial and technical implications, and will affect the ownership and control of data.   5

Discuss the issues associated with this outsourcing proposal.

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.

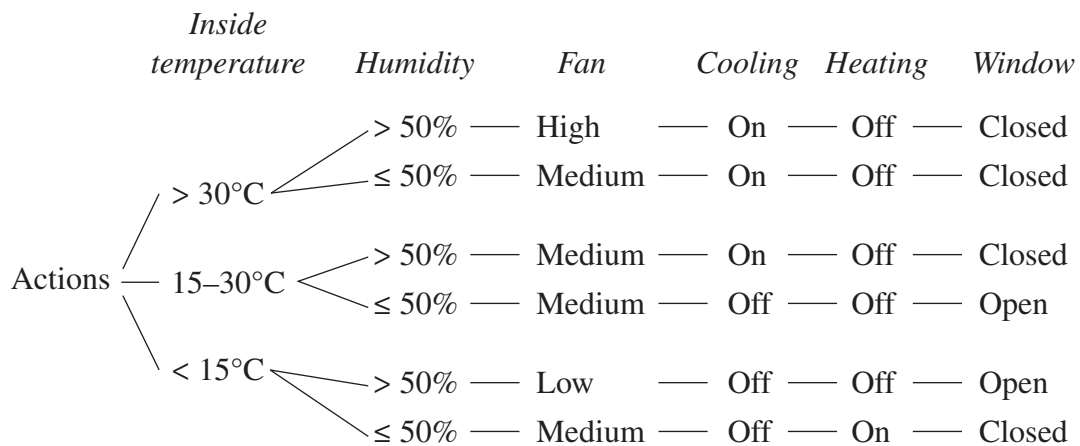**Question 25 — Transaction Processing Systems** (20 marks)
          Use a SEPARATE writing booklet.

(a)   (i)   Identify a strength and a weakness of an online ticketing system.   **2**

        (ii)   Using an example, explain the importance of data quality in a transaction processing system.   **3**

(b)   (i)   Describe how batch processing and real time processing are applied in an automatic teller machine transaction.   **3**

        (ii)   Explain why the alternative procedures for a transaction processing system need to be periodically tested.   **4**

(c)   A 'smart' house with a semi-automated kitchen includes a 'smart' refrigerator. The residents scan the food and drink items before placing them in the refrigerator. The item's barcode identifies product details which are recorded in the refrigerator's database. As each item is used, it is scanned again and the database is updated. A weekly order is automatically placed by the refrigerator to a supermarket based on quantities remaining, or a resident can choose to send an order to the supermarket. Purchases are debited from the resident's bank account.

        (i)   Describe the shifting of workload for both residents and supermarket staff as a result of the 'smart' refrigerator system.   **3**

        (ii)   Construct a data flow diagram that represents the ordering of food and drinks by the refrigerator.   **5**

Question 26 — Decision Support Systems (20 marks)
        Use a SEPARATE writing booklet.

(a)   (i)   What are the advantages of using graphs to represent data in spreadsheets?   **2**

       (ii)   Describe the effects on the participants when their decision making is automated.   **3**

(b)   (i)   Distinguish between *structured* and *unstructured* decision making, giving an example of each.   **3**

       (ii)   Discuss the role of the expert in the development of an expert system.   **4**

(c)   A 'smart' house has an expert system that controls the temperature and comfort levels within the house. This expert system monitors the internal areas of the building and informs the controller how to adjust the temperature in the house using fans, air conditioning and heating units. The controller can also open and close windows.

       (i)   Describe the effects on the residents of the house if the 'smart' house experiences a power failure.   **3**

       (ii)   This decision tree shows part of the expert system's logic.   **5**

|	*Inside temperature*	*Humidity*	*Fan*	*Cooling*	*Heating*	*Window*
Actions	> 30°C	> 50%	High	On	Off	Closed
		≤ 50%	Medium	On	Off	Closed
	15–30°C	> 50%	Medium	On	Off	Closed
		≤ 50%	Medium	Off	Off	Open
	< 15°C	> 50%	Low	Off	Off	Open
		≤ 50%	Medium	Off	On	Closed

       Using examples of facts and if-then rules, explain how a method of chaining could be applied in this system.

Question 27 — Automated Manufacturing Systems (20 marks)
Use a SEPARATE writing booklet.

(a)   (i)   Describe an application that uses a movement sensor.   **2**

        (ii)   What are the disadvantages for workers of an automated manufacturing system?   **3**

(b)   (i)   Distinguish between *discrete* and *continuous* processing, giving an example of each.   **3**

        (ii)   Using an example, describe how RFID (Radio Frequency IDentification) tags can assist in inventory tracking.   **4**

(c)   A 'smart' house has an automated drip watering system for indoor plants, similar to an agricultural irrigation system. A central controller accepts input from sensors in the pot plants and turns the water on when the sensors indicate a low moisture level. When the moisture reaches a suitable level for the plants, the drip system is turned off. Nutrients for the plants are added to the water automatically.

        (i)   What are the benefits for residents of the automated drip watering system over a manual system?   **3**

        (ii)   This diagram shows an incomplete block diagram of the system that maintains moisture levels in the 'smart' house's pot plants.   **5**
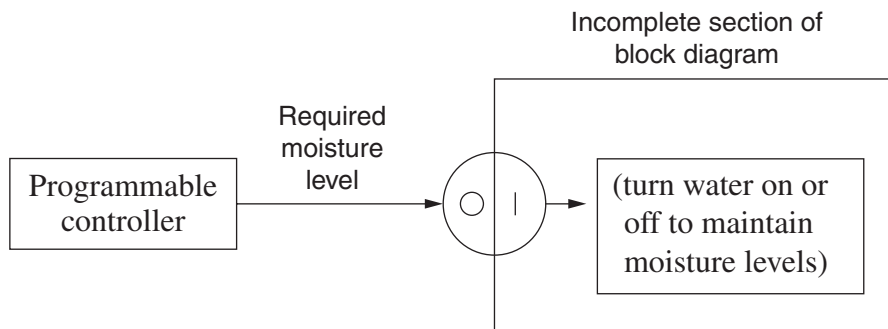
Using a refined block diagram, explain the technical problems that could occur with this continuous monitoring system.

Please turn over

Question 28 — Multimedia Systems (20 marks)

Use a SEPARATE writing booklet.

(a) (i) Identify different devices that are used to display multimedia. **2**

  (ii) How can a developer ensure that a multimedia project does not breach copyright? **3**

(b) (i) Describe the process of converting analog sound to digital data. **3**

  (ii) Explain the role of a multimedia system designer when developing a system. **4**

(c) A 'smart' house allows the residents to adjust settings of the many different services in the eight rooms of the house, including:

- lighting – on, off and dimming
- shutters and curtains – open or closed
- watering system for indoor plants
- air conditioning and heating
- smart refrigerator in the kitchen
- home entertainment system
- security system
- fire safety sprinklers.

The central controller is a wall-mounted touch-screen tablet that uses multimedia formats in the display. The display includes the use of text, sound, graphics, animation and live video feeds. Residents can also use their smart phones as an alternative remote-controller in other rooms.

  (i) How could the visually-based multimedia interface be adapted to cater for the needs of residents with sight impairment? **3**

  (ii) Design a storyboard showing screens of the central controller that control THREE aspects of the 'smart' house that make good use of the multimedia capabilities of the touch-screen tablet. Label the key features of each screen. **5**

End of paper