2015 HIGHER SCHOOL CERTIFICATE
EXAMINATION

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 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   At which of the following stages of system development is a requirements prototype used to model features of a proposed system?

(A)   Designing a solution

(B)   Understanding the problem

(C)   Implementing and testing a solution

(D)   Evaluating and maintaining the system

2   Sam has access to Lee's private contact details via social media.

Sam shared Lee's details with a cousin who does not have access to Lee's social media site.

How is Sam's action best described?

(A)   Unethical use of information

(B)   Infringement of copyright laws

(C)   Appropriate information use

(D)   Breach of government legislation

3   Which of the following sets of tasks is usually performed by a network administrator?

(A)   Adding users and creating webpages

(B)   Adding users and assigning users to printers

(C)   Updating a data dictionary and creating webpages

(D)   Updating a data dictionary and assigning users to printers

4 Consider this piece of HTML code.

 <img src="optic_fibre.jpg">

Which of the following best describes what the HTML code does?

(A) It runs a video.

(B) It inserts an image.

(C) It creates a video that is hyperlinked.

(D) It hyperlinks an image to a webpage.

5 Kate is producing a graduation video to be uploaded to the school website. The video needs to be ready in one month and she is not sure if she has the software on her laptop to produce the video.

Which combination of feasibility concerns applies to Kate's situation?

(A) Scheduling and technical

(B) Scheduling and economic

(C) Organisational and technical

(D) Organisational and economic

6 The network administrator has emailed this alert to staff.

Subject: **URGENT NOTICE**
To: Movile-staff

If you see this screen, do NOT provide your login details.

Movil Academy
User ID:

Password:

Warm regards,
Network Administrator

What issue is being addressed by the network administrator?

(A) Security

(B) Encryption

(C) Data collection

(D) Data redundancy

7 Which hardware component is necessary to physically connect a client to a server?

(A) Modem

(B) Repeater

(C) Wireless Access Point

(D) Network interface card

8 A project team has conducted a review for upgrading a library system.

Which document should the project team produce to detail the purpose of the upgrade, the analysis of the existing system and the time frame of the project?

(A) A Gantt chart

(B) A requirements report

(C) A feasibility study report

(D) A communication management plan

9 A person clicks on a movie name to show the session times on a cinema website.

Which combination of information processes is being carried out?

(A) Analysing, storing, receiving

(B) Collecting, storing, displaying

(C) Analysing, organising, receiving

(D) Collecting, organising, displaying

10 A project team has just completed the installation of the hardware and software for a new system.

Which of the following is most likely to be the next step?

(A) Clarify the purpose of the new system

(B) Produce a working model of the new system

(C) Develop an operation manual for participants

(D) Investigate alternative solutions for participants

11 What is the main function of a switch in a communication system?

(A) It links two identical networks.

(B) It links two different types of networks.

(C) It connects a network device to the internet.

(D) It enables network devices to talk to each other.

12 A company has decided to replace its current twisted pair cabling with optical fibre.

Which of the following could be a reason for this decision?

(A) Better error correction

(B) Larger storage capacity

(C) Faster data transmission

(D) More reliable wireless connectivity

13 Several employees were asked to obtain feedback from customers on a new product. To achieve this, they created an online survey form to capture data.

Which development approach was used?

(A) Customisation

(B) Participant

(C) Outsourcing

(D) Traditional

14 Which of the following actions is most likely to improve the reliability of employees' details stored in a company's database?

(A) Store the database off-site

(B) Run a virus check each day

(C) Review personal details each year

(D) Perform a full backup each week

15   What is the protocol SSL commonly used for?

(A)   To establish a connection between two computers on a network

(B)   To receive and send files between computers on a network

(C)   To establish an encrypted link between a web server and a browser

(D)   To receive and send email messages between a browser and a server

16   Which row of the following table correctly describes centralised and distributed databases?

	Centralised databases	*Distributed databases*
(A)	Only suitable for flat file databases	No need to synchronise data stored
(B)	Only suitable for flat file databases	Allows different locations faster access to relevant data
(C)	Allows different locations to access data from a single source	No need to synchronise data stored
(D)	Allows different locations to access data from a single source	Allows different locations faster access to relevant data

17   Which of the following is a transmission level protocol?

(A)   SMTP

(B)   Ethernet

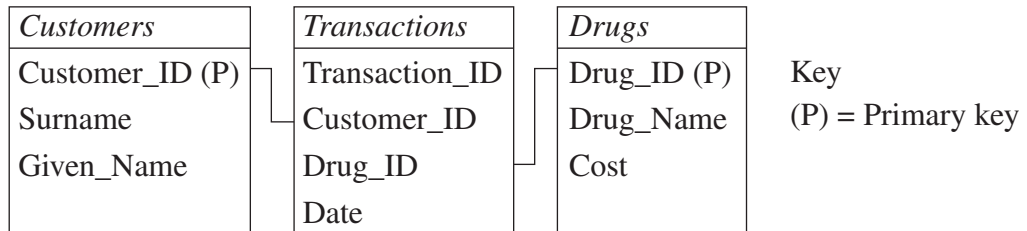(C)   Internet Protocol

(D)   Hyper Text Transfer Protocol

18 A sporting club manager wants to search the club's database for members who are under 16 as well as members who play soccer.

Which of the following is the correct SQL criteria to obtain this information?

(A) Age < 16 OR sport = 'soccer'

(B) Age < 16 AND sport = 'soccer'

(C) Age > 16 OR sport = 'soccer'

(D) Age > 16 AND sport = 'soccer'

19 A database is being designed for an online pharmacy. A customer can order more than one drug and a record is placed in the *Transactions* table for each drug ordered.

The diagram below describes some components already identified for the database.

Customers	*Transactions*	*Drugs*	
Customer_ID (P)	Transaction_ID	Drug_ID (P)	Key
Surname	Customer_ID	Drug_Name	(P) = Primary key
Given_Name	Drug_ID	Cost	
	Date		

What are the relationships between the *Customers* and *Transactions* tables and between the *Transactions* and *Drugs* tables?

	Customers – Transactions	*Transactions – Drugs*
(A)	many to one	many to one
(B)	many to one	one to many
(C)	one to many	many to one
(D)	one to many	one to many

20 The table below shows the results of the transmission of three data bytes.

First byte	*Second byte*	*Third byte*
01100111	10011001	11000101

Two of the data bytes were corrupted during transmission.

Which parity was used, and which two of the data bytes were corrupted during transmission?

	Parity	*Corrupted data bytes*
(A)	Odd	First and second
(B)	Odd	Second and third
(C)	Even	First and second
(D)	Even	Second and third

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.

A school library has set up a video-on-demand information system. Teachers and students can access the system using a valid email address and password.

At school, videos are accessed via the school's server using the local area network (LAN). At home, videos are supplied by an online provider via the internet over a wide area network (WAN).

(a) Draw a context diagram representing the video-on-demand information system. **3**

(b) Recommend a suitable network topology for the LAN in this information system and justify your choice. **3**

(c) Explain the advantages of using a LAN compared to using a WAN to access videos in this information system. **4**

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

A sporting club is planning to automate the entry process to its various venues. At present, when a member enters a venue, a staff member enters their membership card number into a computer system to see if the member has an expired membership card or if the member has been banned from the club. No entry will be allowed using an expired or banned membership card.

In the proposed system, an entry machine will be installed in each of the venues of the club and members will only have to insert their membership cards into the machines to enter. The machines will automatically check the expiry date of each membership card and whether the member has been marked as 'banned' in the database. If entry is refused, an explanation will be printed for the member.

(a)   Construct a decision table to describe the rules used to determine if a member is allowed to enter the club. **3**

(b)   Draw a dataflow diagram to represent the proposed entry system for ONE of the club's venues. **4**

(c)   Recommend a combination of conversion methods for the implementation of the proposed system into all of the sporting club's venues and justify your choice. **4**

Question 23 (8 marks) Use the Question 23 writing booklet.

A bank has introduced an information system that allows customers to withdraw money by making a request on their mobile phone. Using this system, the customer will be sent a temporary withdrawal code in a text message after making a withdrawal request. The withdrawal code can then be entered at an ATM for the money to be released.

Alternatively, the customer can provide the bank with the mobile phone number of an authorised person and the bank will send a text message with the temporary withdrawal code to this person. This system can be useful in situations where a customer has lost their card or may want to send money to their children or relatives.

(a) Using an example, distinguish between a user and a participant in this information system.   **3**

(b) Analyse the information system in terms of the information processes of: **5**
   • storing and retrieving
   • transmitting and receiving.

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

An online department store has introduced a loyalty system that offers its customers gifts when they have accumulated a number of points.

When a customer applies for a loyalty card, they enter personal details such as name, address, age and income level online. These details are kept by the department store.

Whenever a customer presents their card during a purchase, details such as brand names, quantities, discount received, amount spent, and date and time of purchase are collected and stored.

Data mining is performed on the stored data. The store uses this information to determine purchasing and promotional strategies. It also shares this information with its business partners so that they can send direct advertising emails to the customers.

(a)   Outline how cyclic redundancy check (CRC) can be used in this information system. **2**

(b)   Discuss the use of data mining in this information system. **4**

(c)   Describe how internet, intranet and extranet technologies would be used in this information system. **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 a transaction processing system?   **2**

(b)   Why are both off-site storage and on-site storage necessary when backing up a   **3**
transaction processing system?

(c)   Describe how online transaction processing (OLTP) has contributed to the   **3**
development of transaction processing systems.

(d)   Explain how data integrity and data quality can be maintained in a transaction   **4**
processing system.

(e)   A new transport system has been proposed to consolidate the management of
buses, trains and ferries.

The proposed system will have a centralised payment system. Each customer
will have a smart tag linked to a smart tag account which is charged each time a
customer uses the tag to get off a bus, a train or a ferry. The smart tag account is
also linked to the customer's bank account so that the balance of the smart tag
account can be automatically updated when it falls below a certain value.

Customers can view details of their transactions on the website of the payment
system. Statements detailing the cost, time, starting location and destination will
also be emailed to customers every month.

  (i)   Outline real-time and batch processing that would occur in the centralised   **3**
payment system.

  (ii) Discuss issues that could arise from implementing the centralised   **5**
payment system.

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

(a)   What is a decision support system? **2**

(b)   How are geographic information systems used to support decision making in a decision support system? **3**

(c)   Describe how spreadsheets can assist with the analysis of data in a decision support system. **3**

(d)   Using examples, distinguish between forward and backward chaining in an expert system. **4**

(e)   A new transport system has been proposed to consolidate the management of buses, trains and ferries.

The proposed system will have a centralised traffic management system that will use neural network technology to analyse traffic data in order to provide smoother journeys for customers who have to change buses or trains, or connect from one mode of transport to another. For example, if buses are running late, some train timetables may be adjusted to allow for the connection. Alerts on delays, traffic congestion and detours, and suggestions of alternative routes will also be generated for customers to access using mobile devices.

(i)   Outline the benefits of using neural network technology in the centralised traffic management system. **3**

(ii)   Explain problems that could arise from using neural network technology to implement the centralised traffic management system. **5**

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

(a)   What is an automated manufacturing system?   **2**

(b)   How can barcode readers be used in an automated manufacturing system?   **3**

(c)   Describe how a machine-centred system works in an automated warehouse.   **3**

(d)   Using examples, distinguish between underdamping and overdamping in an   **4**
      automated manufacturing system.

(e)   A new transport system has been proposed to consolidate the management of
      buses, trains and ferries.

      The proposed system will have a centralised control system that will use
      controllers, sensors and actuators to regulate the flow of traffic across the entire
      transport system. Manually controlled gates and timed signal lights will be
      replaced. For example, sensors will be activated when a car approaches a set of
      traffic lights, and the controller will direct the lights to allow the car to pass if
      there is no other traffic, or stop the car if there is traffic.

      (i)   Outline the types of sensors and actuators that could be used in the   **3**
             centralised control system.

      (ii)   Explain the potential benefits of implementing the centralised control   **5**
             system.

Please turn over

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

(a)　What is a multimedia system?　　**2**

(b)　What are the advantages of producing an online version of a magazine compared to its print version?　　**3**

(c)　Distinguish between hierarchical and non-linear storyboard layouts. You may support your answer with diagram(s).　　**3**

(d)　Describe how head-up displays and headsets are used in virtual reality applications.　　**4**

(e)　A new transport system has been proposed to consolidate the management of buses, trains and ferries.

The proposed system will have a centralised multimedia information system that will provide customers with access to maps, transport timetables and live visual and audio alerts about traffic and road conditions. Customers can access this information using mobile devices.

(i)　Outline the skills required of content providers and system designers in the design of the centralised multimedia information system.　　**3**

(ii)　Discuss technical issues that could arise from implementing the centralised multimedia information system.　　**5**

End of paper