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NATIONAL SENIOR CERTIFICATE

GRADE 12

SEPTEMBER 2024

INFORMATION TECHNOLOGY P2

MARKS: 150

TIME: 3 hours

This question paper consists of 13 pages.



INSTRUCTIONS AND INFORMATION

1. This paper consists of SIX sections:

SECTION A: Short questions	(15)
SECTION B: System Technologies	(25)
SECTION C: Communication and Network Technologies	(24)
SECTION D: Data and Information Management	(26)
SECTION E: Solution Development	(25)
SECTION F: Integrated Scenario	(35)

2. Read ALL the questions carefully.
3. Answer ALL the questions.
4. The mark allocation generally gives an indication of the number of facts/reasons required.
5. Number the answers correctly according to the numbering system used in this question paper.
6. Answer QUESTION 4.5.1 and 5.3.6 on the attached ANSWER SHEET.
7. Write neatly and legibly.

SECTION A: SHORT QUESTIONS**QUESTION 1**

- 1.1 Give ONE word/term for each of the following descriptions. Write only the word/term next to the question numbers (1.1.1 to 1.1.10).
- 1.1.1 An identity theft scam where the user is automatically redirected to another fake website even if the correct URL was entered. (1)
- 1.1.2 A category of software specifically designed to perform various tasks and functions for end-users. (1)
- 1.1.3 A part of a file name which uniquely identifies the type of file. (1)
- 1.1.4 It refers to the total amount of data that can be transferred from one point to another in a given period of time. (1)
- 1.1.5 A standard language used for querying and manipulating data in a database. (1)
- 1.1.6 A peer-to-peer protocol used for downloading and uploading large files over the internet. (1)
- 1.1.7 A strategy used to obtain a high-ranking placement in the search engine results page of a search engine. (1)
- 1.1.8 A technique where certain internet services are given preference while others are given less priority, so that performance is maintained for more critical services. (1)
- 1.1.9 A common protocol used by e-mail clients to retrieve e-mails from a mail server. (1)
- 1.1.10 A database design technique that reduces data redundancy and eliminates issues caused by anomalies. (1)

- 1.2 Various options are provided as possible answers to the following questions. Choose the answer and write down only the letter (A–D) next to the question numbers (1.2.1 to 1.2.5), for example 1.2.6 D.

1.2.1 CSV is an acronym for ...

- A Comma Separated Volume
- B Comma Separated Values
- C Common Separated Values
- D Comma Saturated Values (1)

1.2.2 The instance of a class in OOP is called a/an ...

- A attribute.
- B method.
- C object.
- D data type. (1)

1.2.3 Consider the array declaration below:

```
var myArray: array[0..6] of Integer;
```

The correct code to access the third element of the above array, is:

- A myArray[3]
- B Array[3]
- C myArray[2]
- D myArray{2} (1)

1.2.4 Which technology enables SaaS providers to serve multiple customers from a single instance of their software?

- A Virtualisation
- B Blockchain
- C Machine Learning
- D Augmented Reality (1)

1.2.5 Given the following statement:

```
iValue := CEIL(15/4) + 22 DIV 4 MOD 3;
```

The value of iValue will be ...

- A 26
- B 6
- C 5
- D 4 (1)

TOTAL SECTION A: 15

SECTION B: SYSTEMS TECHNOLOGIES**QUESTION 2**

- 2.1 A Central Processing Unit (CPU) plays a significant role in the performance of a PC.
- 2.1.1 Name the socket which connects the CPU to the motherboard. (1)
- 2.1.2 Define *multiprocessing*. (2)
- 2.1.3 List the FOUR steps of the machine cycle. (4)
- 2.2 Indicate whether the following statements are TRUE or FALSE.
Write only TRUE or FALSE next to the question numbers (2.2.1 to 2.2.4) in the ANSWER BOOK.
- 2.2.1 Convergence is a trend whereby separate technologies and functions from multiple devices are combined into a single multi-purpose device. (1)
- 2.2.2 A core is a single complete working RAM circuit. (1)
- 2.2.3 An interpreter is software that translates programming instructions into executable files. (1)
- 2.2.4 The BIOS is stored on a non-volatile ROM chip on the computer's motherboard. (1)
- 2.3 Caching offers advantages to users, network systems and businesses.
- 2.3.1 Briefly explain what *caching* is. (2)
- 2.3.2 Name and explain THREE types/forms of caching. (6)
- 2.4 Businesses are becoming more reliant on cloud-based resources.
- 2.4.1 Briefly explain what *cloud computing* is. (1)
- 2.4.2 Give TWO advantages of cloud computing. (2)
- 2.5 A good backup strategy is important and can protect you from data loss.
Provide THREE guidelines to consider when creating a backup strategy. (3)

TOTAL SECTION B: 25

SECTION C: COMMUNICATION AND NETWORK TECHNOLOGIES**QUESTION 3**

- 3.1 The internet and its technologies are changing rapidly; and has changed the way people live and conduct business.
- 3.1.1 Distinguish between the terms *Internet* and *World Wide Web*. (2)
- 3.1.2 Explain what is meant by the *semantic web*. (2)
- 3.2 A school's gaming club has decided to setup a temporary peer-to-peer LAN which will be connected to the school's client-server network.
- 3.2.1 Tabulate TWO differences between a client-server network and a peer-to-peer LAN. (4)
- 3.2.2 The most commonly used communication media used in a wired local area network is a UTP cable.
- List and explain THREE weaknesses of UTP cables. (3)
- 3.2.3 State TWO functions of a network switch. (2)
- 3.2.4 Differentiate between a *server* and a *workstation*. (2)
- 3.2.5 The gaming club would like to setup a WiFi network.
- Give the name of an additional network device which they will need to purchase to change the LAN to a WLAN. (1)
- 3.3 State THREE disadvantages of having a wireless computer network. (3)
- 3.4 Explain the purpose of a router. (2)
- 3.5 Distinguish between a *HAN* and a *PAN*. (2)
- 3.6 What do we call a form of fraud, where a large group of low-paid workers are hired to click on paid advertising links to artificially inflate the traffic to the site? (1)

TOTAL SECTION C: 24

SECTION D: DATA AND INFORMATION MANAGEMENT**QUESTION 4**

4.1 Good database design is important for reliable and accurate data.

4.1.1 Briefly explain what a *database anomaly* is. (1)

4.1.2 List THREE types of anomalies commonly found in bad database design. (3)

4.2 Identify THREE problems with the design of the following database table.

Field Name	Data Type	Description
FirstName	Short Text	Name of owner
Surname	Short Text	Surname of owner
Address	Short Text	Street address, Suburb and Postal code
Vehicle Registration No 1	Short Text	First vehicle registration number
Vehicle Registration No 2	Short Text	Second vehicle registration number
Vehicle Registration No 3	Short Text	Third vehicle registration number

(3)

4.3 The use of RFID technology is becoming increasingly popular in data management.

4.3.1 Give TWO examples of how RFID can be used in businesses. (2)

4.3.2 State THREE advantages of RFID technology compared to barcode technology. (3)

4.4 Social media companies use data mining for a variety of reasons.

4.4.1 Define *data mining*. (3)

4.4.2 Explain how data mining can be used on social media sites, for example Facebook. (2)

4.4.3 Discuss TWO risks involved with social media data mining. (2)

- 4.5 Intelligent devices are becoming increasingly popular. A database is used to store details about intelligent devices and contains two tables, *tblGadgets* and *tblManufacturers*.

tblGadgets						
DeviceID	DeviceName	Category	OperatingSystem	Price	NumInStock	ProducerID
D001	Always Summer	Smart heating	Android	R300.00	107	M105
D002	Boom XL	Smart speaker	iOS	R1,500.00	80	M104
D003	Boom XXL	Smart speaker	iOS	R2,000.00	50	M104
D004	Bulb 6	Smart lighting	Android	R500.00	100	M101
D005	Core Sound	Smart speaker	iOS	R999.00	425	M106
D006	Crystal TV	Smart TV	HarmonyOS	R13,999.00	389	M103
D007	Flash 4	Smart lighting	iOS	R200.00	313	M104
D008	Freeze 3	Smart refrigerator	Android	R12,000.00	2	M101
D009	Ice Box	Smart refrigerator	Android	R14,999.00	14	M105

tblManufacturers				
ManufacturerID	ManufacturerName	ContactNumber	OnlineSupport	
M100	Berry tech	0122035878	<input checked="" type="checkbox"/>	
M101	Gem smart	0169725478	<input type="checkbox"/>	
M102	Gemini	0512025306	<input type="checkbox"/>	
M103	Jupiter Inc	0311257412	<input checked="" type="checkbox"/>	
M104	Mobile Comp	0412258756	<input type="checkbox"/>	
M105	Smart computing	0169632587	<input checked="" type="checkbox"/>	
M106	Tech wiz	0412224568	<input checked="" type="checkbox"/>	

- 4.5.1 Answer this question on the ANSWER SHEET provided on page 13.

You are asked to design a relational database. The table designs below are incomplete.

tblManufacturers	
	ManufacturerID
	ManufacturerName
	ContactNumber
	OnlineSupport

tblGadgets	
	DeviceID
	DeviceName
	Category
	OperatingSystem
	Price
	NumInStock
	ProducerID

- Identify a primary key (PK) in each table. Write PK next to the applicable field names. (2)
- Identify a foreign key (FK). Write FK next to the applicable field name. (1)
- Show how you would link the 2 tables and indicate the type of relationship that exists. (2)

- 4.5.2 Identify the data type of the following fields:

- Price (1)
- OnlineSupport (1)

TOTAL SECTION D: 26

SECTION E: SOLUTION DEVELOPMENT**QUESTION 5**

5.1 Incorporating defensive programming practices can help avoid logical errors in programs.

5.1.1 Explain what is meant by the term *logical error*. (2)

5.1.2 Explain what is meant by *defensive programming*. (1)

5.2 Explain why the binary search algorithm cannot be used in the following array in its current state:

arrNumbers							
1	2	3	4	5	6	7	8
13	56	78	23	48	89	76	98

(1)

5.3 Study the Delphi code below and answer QUESTIONS 5.3.1 to 5.3.6.

```
begin
    iStartValue := LowerBound.Value;
    iEndValue := UpperBound.Value;
    {1} iSum := 0;
    {2} for iLoop := iStartValue to iEndValue do
    {3}   iSum := iSum + iLoop;
    {4} lblSum.Caption := 'The sum is ' + IntToStr(iSum);
    {5} lblCount.Caption := 'The loop is executed '+____+ 'times. ';
end;
```

5.3.1 Identify the Delphi component type that is used to obtain input in the above code segment. (1)

5.3.2 Write an alternative line of Delphi code that will have the same effect as the code in line 3. (2)

5.3.3 Write down the line number from the code segment that implements the following:

(a) Initialisation (1)

(b) Typecasting (1)

5.3.4 Complete the missing code in line 5 that must display how many times the loop was executed. (2)

5.3.5 Rewrite line 2 as a conditional loop. (4)

5.3.6 Answer this question on the ANSWER SHEET provided on page 13.

Complete the trace table by tracing step by step through the given code segment. **iStartValue = 4** and **iEndValue = 6**.

Step	Line no	iLoop	iSum	Output
1				
2				
3				
.				
.				
.				

(4)

5.4 The following UML (Unified Modelling Language) class diagram represents a TSmartSwitch class.

TSmartSwitch	
- fSwitchID - String	
- fDevice - String	
- fPowerUsage - String	
- fSwitchStatus - Boolean	
+ Constructor Create (sSwitchID, sDevice : String; iPowerUsage:Integer; bSwitchStatus:Boolean)	
+ GetSwitchID : String	
+ ComputeEnergyUsed : Real	
+ SetSwitchStatus	
+ toString : String	
+ DetermineSwitchStatus : String	

5.4.1 List a method that is used to instantiate the object. (1)

5.4.2 Give an example of each of the following methods in the given class diagram:

(a) Accessor (1)

(b) Mutator (1)

5.4.3 What is the purpose of the toString method as shown in the class diagram? (1)

5.4.4 What do the minus (-) and plus (+) symbols in the class diagram represent respectively? (2)

TOTAL SECTION D: 25

SECTION F: INTEGRATED SCENARIO**QUESTION 6**

A new shopping centre has been built in town. The project managers and developers want to incorporate Information and Communication Technologies in many areas of the centre.

- 6.1 Location-based computing offers both advantages and disadvantages to the consumers and the businesses operating within the centre.
- 6.1.1 Discuss TWO ways in which location-based computing can be utilised to enhance the shopping experience within the centre. (2)
- 6.1.2 State TWO disadvantages or risks associated with location-based data collection. (2)
- 6.2 The project manager makes use of a Wiki to centralise project material and information.
- Name TWO challenges/disadvantages of using Wikis. (2)
- 6.3 Project management often makes use of distributed computing.
- Briefly explain the concept *distributed computing*. (2)
- 6.4 The developers make use of an intranet to access internal databases and to collaborate on projects.
- 6.4.1 Explain what an *intranet* is. (1)
- 6.4.2 Some team members are complaining about information overload.
- Explain what *information overload* is. (1)
- 6.4.3 The Internet of Things is a possible solution for information overloading.
- Briefly explain what the *Internet of Things* is. (2)
- 6.5 Some team members have been cyberslacking.
- 6.5.1 Explain what is meant by *cyberslacking*. (2)
- 6.5.2 Suggest TWO measures that the team members can take to limit the time spent on social media. (2)
- 6.5.3 People often confuse the terms, social networking and social engineering.
- Differentiate between *social networking* and *social engineering*. (2)

- 6.6 The project managers make use of blockchain technology.
- 6.6.1 Define the concept *blockchain technology*. (2)
- 6.6.2 Public key encryption plays a fundamental role in blockchain technology.
- Briefly explain the process involved in public key encryption. (2)
- 6.7 The hotspots in the centre are often used by business people to connect to their company's VPN.
- 6.7.1 Write out the abbreviation VPN. (1)
- 6.7.2 Briefly explain what a VPN is. (2)
- 6.7.3 Explain how a VPN is often used for illegal purposes. (1)
- 6.8 Project management meetings often take place via Skype.
- 6.8.1 Skype makes use of encryption.
- Define *encryption* and explain its purpose. (2)
- 6.8.2 List TWO indicators displayed by a browser which indicates a secure website. (2)
- 6.9 The developers warn consumers and businesses about cybercrime and cybergangs.
- 6.9.1 Explain what a *cybergang* is. (1)
- 6.9.2 Give TWO examples of cybercrime. (2)
- 6.9.3 List TWO measures consumers and businesses can take to safeguard themselves against cybercrimes. (2)

TOTAL SECTION F: 35

GRAND TOTAL: 150

ANSWER SHEET**ATTACH THIS PAGE TO YOUR ANSWER BOOK****NAME OF LEARNER:** _____**SECTION D: DATA AND INFORMATION MANAGEMENT****QUESTION 4**

4.5.1

tblManufacturers	
	ManufacturerID
	ManufacturerName
	ContactNumber
	OnlineSupport

tblGadgets	
	DeviceID
	DeviceName
	Category
	OperatingSystem
	Price
	NumInStock
	ProducerID

SECTION E: SOLUTION DEVELOPMENT

5.3.6

Step	Line no	iLoop	iSum	Output
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				

