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A Practical Approach to

# **Computer Science 'O' Level Revision**

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With summary notes covering syllabus objectives Model ZIMSEC questions and answers

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# **Computer Science**

'O' Level Revision

With summary notes covering syllabus objectives
Model ZIMSEC questions and answers



#### **Published by:**

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## Contents

Fopic 1: Hardware and software	1
<b>Fopic 2:</b> Application of computer science	10
Fopic 3: Data representation	16
<b>Topic 4:</b> Communication networks and internet technologies	. 23
<b>Topic 5:</b> Security and ethics (unhu/ubuntu/vumunhu)	. 37
Fopic 6: System analysis and design	53
Fopic 7: Algorithm	57
Fopic 8: Programming	62
Fopic 9: Database	68
Fopic 10: Web design	81
Topic 11: Technopreneurship	. 93

#### **Examination practices**

#### **Examination practice 1**

Paper 1	97
Paper 2	103
Paper 3	105

#### **Examination practice 2**

Paper 1	108
Paper 2	113
Paper 3	115

#### **Examination practice 3**

Paper 1	118
Paper 2	123
Paper 3	126

#### **Examination practice 4**

Paper 1	. 130
Paper 2	. 137
Paper 3	. 139

#### **Examination practice 5**

Paper 1	142
Paper 2	150
Paper 3	153

#### **Examination practice 6**

Paper 1	156
Paper 2	162
Paper 3	166

#### **Examination practice 7**

Paper 1	. 169
Paper 2	. 174
Paper 3	. 180

#### **Examination practice 8**

Paper 1	182
Paper 2	187
Paper 3	192

#### **Examination practice 9**

Paper 1	. 194
Paper 2	. 200
Paper 3	. 205

#### **Examination practice 10**

Paper 1	
Paper 2	
Paper 3	
1	

#### Answers

Paper 1	
Paper 2	
Paper 3	

# Introduction

To excel in your Computer Science examinations, you must cover all the topics in the Zimsec syllabus. This book offers you an opportunity to polish your knowledge in all Zimsec syllabus areas and acquire requisite skills to pass your examinations with flying colours. This book is organised into:

(a) Summary notes section

This section has summarised notes for each topic as per the syllabus requirements.

(b) Specimen Zimsec paper 1

Here, an insight into what Computer Science paper 1 looks like is given. It then highlights the common mistakes made by learners when answering examination questions. The paper is made up of carefully selected questions that meet the latest examination standards of the new curriculum.

(c) Specimen Zimsec paper 2

A typical Computer Science paper 2 is presented. In this paper, you are required to answer all questions. The paper is made up of carefully selected paper 2 questions that meet the latest examination standards of the new curriculum.

(d) Specimen Zimsec paper 3

This section highlights the key areas that are examined in Computer Science Paper 3. It further guides you how to carry out practical tasks in order to score maximum marks.

#### **Answering techniques**

- Never skip any questions.
- Never leave any questions unanswered.
- Read and understand the demands of the questions.
- Write neatly and eligibly.
- Use a ruler, pencil and or black/ blue ink where necessary.
- Show all your working.

#### **Common errors**

- Do not waffle.
- Use proper chemistry language to explain where necessary.
- Do not spend too much time on a question. The time spent on a question must tally with the mark allocation.
- Answer the questions you know first such that while you at it, you will be unconsciously thinking of the questions you do not know.
- Cancel out neatly in pencil if you happen to make errors.
- Draw clear and annotated diagrams.
- Indicate your Name, Candidate number and Centre number on every page of your answer script.

#### Malpractice

Examination malpractice has been on the increase amongst candidates in recent years. It includes circulating and using purported exam material before taking the exam, cheating, bringing material into the examination room, impersonation among other practices. These practices are a criminal offence and candidates who are caught will be penalised or disqualified. Candidates should be well prepared for the examination.

#### **Study tips**

#### Stage 1: Planning

- Planning your revision is crucial if you are to take control of your learning and not get too stressed.
- This is not an easy task because to do it well, one has to plan in greater detail.
- Remember, 30 minutes sessions are the best and then take a short break.
- It is better to do one or two hours a night over a long period of time than cram it all in the last minute.

Date	Session 1 (30 minutes)	Session 2 (30 minutes)	Session 3 (30 minutes)
Monday	Mathematics	Science	English
22/11/2023			
Area	Number	Planets	Anthology
Method	Mind mapping	Cards	Notes
Aim	To understand	To list the	To look for

#### Stage 2: Creating an effective revision space

A clean, well equipped and ventilated study environment helps revision. It removes distractions and promotes an organised approach to studying. Include the following in your study space:

- Tidy and undisturbed place to work.
- Have a comfortable chair.
- Use a table which gives enough rooms for books and writing materials.
- A bright lamp or light source.
- Pens, pencils, highlighters (optional), scrap paper and other equipment.

#### Stage 3 : Active revision techniques

Simply reading a poor way of studying. Do the following to stay ahead.

- Summarise points on revision cards.
- Use mnemonics.
- Make mind maps or spider diagrams, stick them on the wall.
- Repeat lists or processes aloud over and over again.
- Tape notes and play them back.
- Set yourself questions from your notes go over wrong answers.

TOPIC

#### **Objectives**

# By the end of this topic, you should be able to:

- explain how hardware devices work.
- connect hardware devices.
- *identify types of software.*
- use utility software and tools.
- *identify the various applications of hardware devices.*
- compare different operating systems.
- *explain the functions of an operating system.*
- replace malfunctioning components.
- troubleshoot and fix common software and hardware problems.

#### **Hardware devices**



#### Fig. 1.1 Hardware devices

- Computer hardware involves all the tangible components of a computer.
- These include a mouse, keyboard, HDD, RAM, monitor, processor and many other parts especially the ones found in the processing unit.
- Hardware devices are used for a variety of purposes where they are utilised for many applications.

- Examples of where hardware devices are applied include POS machine especially in supermarkets when buying using electronic money (ATM) where users can withdraw money without having to get into a bank.
- In data capturing systems scanners or barcode readers are used.

#### **Output devices**



#### Fig. 1.2 Output devices

- Computer output devices receive information from the computer and carry data that has been processed by the computer to the user.
- Output devices provide data in myriad different forms, some of which include audio, visual and hard copy media.
- The devices are usually used for display, projection or for physical reproduction.
- Monitors and printers are two of the most commonly known output devices used with a computer.
- Computer output devices are all peripheral hardware and are connected to a computer by cables or by wireless networking.

#### **Input devices**



Fig. 1.3 Input devices

- Input devices are all the computer components that have the capacity to input data into the computer through various means which automatically code the data to a language that computers can understand.
- These include examples such as a mouse, keyboard, POS machine, scanner, barcode reader and a remote control.
- Output devices serve to decode data from a computer language to that understandable by humans and displaying it.
- Examples include a monitor, projector, printer as well as a fax machine.

#### **Storage devices**

Storage devices are the computer hardware used to remember/store data.

#### Hard Disk Drives (HDD)

- Hard disk drives are non-volatile magnetic storage devices capable of remembering vast amounts of data.
- An electromagnet in the read/write head charges the disk's surface with either a positive or negative charge, this is how binary 1 or 0 is represented.

- The read/write head is then capable of detecting the magnetic charges left on the disk's surface, this is how data is read.
- The disk surface is divided into concentric circles (tracks) and sectors (wedges). Dividing the surface in this way provides physical addresses to remember where data is saved.
- A circuit board carefully coordinates the rotating disk and swinging actuator arm to allow the read/write head to access any location very quickly.
- Typical HDD capacities are measured in Terabytes (TB).



#### Fig. 1.4 Hard Disk Drive (HDD)

#### Solid State Drive (SSD)

- They can be installed inside a computer or purchased in a portable (external) format.
- Solid state drives are non-volatile storage devices capable of holding large amounts of data.
- They use NAND flash memories (millions of transistors wired in a series on a circuit board), giving them the advantage of having no mechanical moving parts and immediate access to the data.

- Solid state drives perform faster than traditional hard disk drives. However, they are significantly more expensive.
- This expense means that typical capacities are usually measured in GigaBytes (GB).
- They can be installed inside a computer or purchased in a portable (external) format.
- Until we reach a point were large capacity SSDs are affordable, a compromise is to run two disk drives inside a computer. An SSD running as the primary drive for your important programs and operating system. A traditional HDD is used to store music, documents and pictures.
- The lack of moving parts in an SSD makes it very robust and reliable, ideal for a portable device.



Fig. 1.5 Solid State Drive (SSD)

#### **Random Access Memory (RAM)**

- RAM is a computer's primary memory. It is a very fast solid state storage medium that is directly accessible by the CPU.
- Any open programs or files on a computer are temporarily stored in RAM whilst being used.
- Being volatile, any data stored in RAM will be lost when power is removed. This makes RAM totally unsuitable

for the long term permanent storage of data, that is the role of a HDD or SSD instead.

- Data is copied from secondary storage (HDD, SSD) to RAM as and when it is needed. This is because using a HDD as the primary memory would cause a computer to perform much slower.
- RAM is a relatively expensive storage device and typical capacities are measured in GB.
- Computers operating with a capacity of RAM above the recommended minimum will benefit from better performance and multitasking.



Fig. 1.6 Random Access Memory (RAM)

#### **Optical Storage Discs**

- CD, DVD and Blu-Ray drives are optical storage devices.
- Binary data is stored as changes to the texture of the disc's surface, sometimes thought of as microscopic pits and bumps.
- These 'bumps' are located on a continuous spiral track, starting at the centre of the disc.
- Whilst the disc is rotating at a constant speed, a laser is pointed at the spiral track of 'bumps'.
- The laser will reflect/bounce off the disc surface in different directions depending upon whether a 1 or 0 has been read.

#### Storage of data

- Computers have the capabilities to store data in primary and secondary storage units.
- Primary storage units include the Random Access Memory (RAM) and Read Only Memory (ROM).
- Secondary storage units include the internal and external HDD, CDs as well as flash drives.
- Data in a computer is processed by a processing unit which determines the speed of the PC.

#### Software concepts

- Software refers to the applications that are used in the running of a Personal Computer (PC).
- These are found in many types such as Applications Software (AS) and Operating System Software (OSS).

#### Table 1.1

Operating Systems Software	Application Software
This is mainly designed for managing system resources.	AS is designed to accomplish tasks for specific purposes.
Programming of system software is complex.	Programming of application is comparatively easy.
A computer can not run without an OSS.	A computer can easily run without an AS.
OSS does not depend on the AS.	AS depends on OSS and cannot run without it.

- Both hardware and software components require frequent maintenance for them to continuously function properly.
- There is need to replace malfunctioning components.

- This is achieved through troubleshooting for common hardware and software errors.
- Components that require frequent maintenance include the keyboard, mouse, HDD and memory.
- For software, troubleshooting and fixing of errors can be done easily but if the errors are not common ones.
- There is need for specialist to assess the causes of errors and then fixing them.



#### Fig. 1.8 Types of system software

#### **Application Software (AS)**

- Application software is a type of software that serves a specific purpose and function.
- Examples include the following.
  - Word processing.
  - Presentation.
  - Arithmetic software.
  - Payroll.
  - Spreadsheet.
  - Database.
  - Graphics.
  - Multimedia.
  - Desktop publishing.
- Off shelf software are types of software that is readily available and is found in two type which are customised and open-source software.

**Application of Computer Science** 

#### **Objectives**

TOPIC

# By the end of this topic, you should be able to:

2

- *describe areas of computer applications.*
- design models of Agriculture systems, Ambient systems and Geographic Information Systems.

#### **Computer Science defined**

- Computer science is the study of computers and computational systems.
- Unlike electrical and computer engineers, computer scientists deal mostly with software and software systems, this includes their theory, design, development and application.

#### **Application of Computer Science**



#### Fig. 2.1 Application sectors of Computer Science

Computers have a vast array of competent and useful tools. These applications can be explored and made great use of in a variety of fields.

#### Agriculture

- Computers are used for record keeping.
- Accessing the internet for agricultural research.
- Animal tracking and viewing of crops in fields using drones.
- Compilation of information such as health of the animal, milk production, reproductive status, exchange of views and other farming skills by experts through social networking sites.
- Record inventory such as farm equipment inventory.
- Managing irrigation systems.
- Weather forecasts can be accessed using computers.
- Receiving updates on any new information that might affect agricultural activities.
- Evaluating animal information such as age, breeds and milk production.



Fig. 2.2 Irrigation of crops

#### **Banking systems**

- Making payments.
- Tracking and analysing accounts.
- Checking account balances.



Fig. 2.3 Online banking

- Making transfers.
- Accessing bank statements.
- Managing accounts.



Fig. 2.4 ATM

#### Education



Fig. 2.5 Learners in computer laboratory

- Computers help in storage of information in schools.
- They provide fast data processing.
- Access to the internet allows learners to gain more knowledge when researching.
- Quick update of information among parents, teachers and learners.
- Audio-visual aids provide an easy and effective way to gain knowledge.
- Online learning is made possible with the help of computer which improves quality of education.

#### **Social networks**



Fig. 2.6 Social media networks

- It allows people to easily connect anywhere around the world.
- It provides access to easy, fast or instant communication.
- It allows for businesses to link easily thus, bringing exposure.
- It creates a platform for fun and relaxation.
- It assists learners in the learning process in school and perform better.
- It helps shy and socially isolated people to easily connect with others.

#### **Research and Development (R&D)**

• Data collection which comes from sensors, user input or it can be created based on certain calculations.

- Storage of data in computer memory for further analysis.
- Collected data can be transmitted to longer term storage such as physical hard drives which are managed and controlled by a computer.
- Analysis, processing, correlating, transforming and presentation of information.



Fig. 2.7 Research using a computer

• Information can be used by other computers, software or human users.

#### Transport management



Fig. 2.8 Vehicle with a GPS

- It facilitates easier management of vehicles.
- Computers aid with satellite tracking of vehicles.
- The GPS can be used to help navigate new areas.

- Traffic control through traffic lights.
- Use of software to manage vehicle use.

#### Health

- Diagnostic system the computer collects data and identifies the cause of illness.
- Laboratory diagnostic system all tests can be done and reports are prepared by a computer.



#### Fig. 2.9 CT scans and ECG

- Patient monitoring system they are also used to check the patient's vitals for abnormalities such as CT scans and ECG.
- Pharmacy information system used to check medicine labels, expiry dates and harmful side effects.
- Surgery computers are used in performing complicated surgery.

#### **Environmental management**

- Maintaining company's files as electronic documents reduces the need for paper records and they can be backed up on the internet.
- They enable virtual meetings, web conferences and webcasts to replace some or even all company travel.
- Environmentally friendly computer devices reduce energy consumption.



Fig. 2.10 Solar panels

#### **Robotics**



Fig. 2.11 Human robot

- They are efficient as they can work 24/7 without the need for lunch breaks, holidays, leaves or shift time as well as being able to work on a repetitive cycle.
- Few workers enjoy doing repetitive tasks and after a certain period, concentration levels will naturally decline. This lapse in concentration can often leads to costly errors for the business and sometimes serious injury to the member of staff.
- Robotics give staff members the opportunity to expand on their skills and work in other better areas.
- Robotic automation offers the ideal solution for working in unstable or dangerous environments as they can continue to work without harm.
- Robots are error free.

#### Ambient Intelligent Systems (AIS)



#### Fig. 2.12 Ambient Intelligent System

- The AIS paradigm builds upon perversive computing, ambiguous computing, profiling, context awareness and human centric computer interaction design, of which, is characterised by system and technologies that are:
  - embedded: many networked devices are integrated into the environment.
  - context aware: these devices can recognise you and your situational context.
  - personalised: they can be tailored to your needs.
  - adaptive: they can change in response to you.
  - anticipatory: they can anticipate your desires without conscious mediation.

#### **Geographic Information Systems (GIS)**

- It provides a database that can be called on both in the execution of selective operations but also in reviewing their effectiveness by assessing historical changes.
- One operation of current interest is spatially selective application of herbicides, or "patch" spraying.



#### Fig. 2.13 GIS

- The feasibility of spatially selective spraying depends on whether weeds grow in patches or are uniformly spread throughout fields.
- For cereal fields have seen that some grass weeds grow in persistent patches.
- Early in the growing season, a widespread weed coverage is common and a field wide uniform spray may be necessary.

#### **Computer Aided Manufacturing (CAM)**



#### Fig. 2.14 Manufacturing using the computer

- CAM is the use of software and computer controlled machinery to automate a manufacturing process.
- There is no design too tough for any capable machinist shop to handle.
- Three components needed for a CAM system to function. These three components are glued together with human labour and skill.
  - (a) Software that tells a machine how to make a product by generating toolpaths.

- (b) Machinery that can turn raw materials into a finished product.
- (c) Post processing converts toolpaths into a language machines can understand.



Fig. 2.15 Manufacture of cars

#### **Intelligent Systems**

- Intelligent system is a machine with an embedded, internet connected computer that has the capacity to gather and analyse data as well as communicate with other systems.
- It has the capacity to learn from experience, security, connectivity, the ability to adapt according to current data and the capacity for remote monitoring as well as management.
- These systems include not just intelligent devices but also interconnected collections of such devices, including networks and other types of larger systems.
- Intelligent systems exist all around us in Point-of-Sale (POS) terminals, digital televisions, traffic lights, smart meters, automobiles, digital signage and airplane controls.

represents a power of 8. The rightmost digit represents 8<sup>0</sup> (which is 1), the next digit to the left represents 8<sup>1</sup> (which is 8), the next digit represents 8<sup>2</sup> (which is 64).

- Octal numbers are commonly used in computer programming because they are easy to convert to and from binary, which is the native language of computers.
- Example: The octal number 47 is equivalent to the binary number 100111, and the decimal number 39.
- Conversion from octal to decimal:

 $4*8^1 + 7*8^0 = 32 + 7 = 39$ 

• Conversion from decimal to octal:

39 divided by 8 is 4 remainder 7

4 divided by 8 is 0 remainder 4

Therefore, the octal representation of the decimal number 39 is 47.

#### **Converting decimal to binary**

#### **METHOD 1**

- You can convert any decimal value (0-255) to an eight digit binary string.
- To do this you should lay out an 8 × 2 table as shown.

#### Table 3.2

Decimal	128	64	32	16	8	4	2	1
Binary								

- Now, you need to take the given decimal number and take away the values in the table.
- If the table value is larger than the current number place a zero, if it is larger place a 1 and continue the

calculation until all eight binary digits are complete.

• Our number is 199, start by taking 199 minus 128 = 71 (As this calculation is possible, we place a 1 in the first box.

#### Table 3.3

Decimal	128	64	32	16	8	4	2	1
Binary	Ι							

Next we take the 71 and minus 64 = 7 (As this calculation is possible we place a 1 in the box).

#### Table 3.4

Decimal	128	64	32	16	8	4	2	1
Binary	1	1						

We cannot calculate 7 minus 32 or 16 or 8, so we place 0's in these boxes.

#### Table 3.5

Decimal	128	64	32	16	8	4	2	1
Binary	1	1	0	0	0			

We can calculate 7 minus 4, we place 1 in that box and complete the calculation (7 - 4 = 3).

#### Table 3.6

Decimal	128	64	32	16	8	4	2	1
Binary	1	1	0	0	0	1		

We are now left with 3 which 2 can be taken from, we place 1 in that box and complete the calculation (3 - 2 = 1).

#### *Table 3.7*

Decimal	128	64	32	16	8	4	2	1
Binary	Ι	Ι	0	0	0	Ι	Ι	

Finally we can calculate 1 minus 1 to equal zero, we place 1 in the final box leaving us with our binary conversion which is 199 = 11000111.

Decimal	128	64	32	16	8	4	2	1
Binary	1	1	0	0	0	1	1	1

#### **Converting decimal to binary**

#### **METHOD 2**

- This is an alternative method with which you can do using a calculator.
- You do not need to draw a table, just draw two or three columns.
- In this method, we divide the decimal whole number by 2 continuously until we reach zero or 0,5.
- Each time we divide by 2 we make a note of the answer.
  - We write 0 in the binary column and continue dividing with the answer.
- Not all numbers will divide to equal a whole number.
  - When this occurs we write 1 in the binary column and continue.
  - It is important to ignore the 0.5 and divide by the number without 0,5. For example, if the calculation is  $7 \div 2 = 3,5$  we must ignore the 0,5 and divide 3 next.

#### Example

Convert 145 into binary.

#### **Solution**

- Start by dividing 145 by 2 which equals 72,5.
  - As this is not a whole number, we write 1 in the binary column.
- Divide 72 (without the 0,5) by 2 which equals 36.
  - As this is a whole number, we write zero in the binary column.

- Divide 36 by 2 which equals 18.
  - As this is a whole number, we write zero in the binary column.
- Divide 18 by 2 which equals 9.
  - As this is a whole number, we write zero in the binary column.
- Divide 9 by 2 which equals 4,5.
  - As this is not a whole number, we write 1 in the binary column.
- Divide 4 (without the 0,5) by 2 which equals 2.
  - As this is a whole number, we write zero in the binary column.
- Divide 2 by 2 which equals 1.
  - As this is a whole number, we write zero in the binary column.
- Divide 1 by 2 which equals 0,5.
  - As this is not a whole number, we write 1 in the binary column.
- We stop at 0,5 or zero.



Fig. 3.4 145 into binary

#### **Converting hexadecimal to binary**

- Hexadecimal values go from 1 to F:
  - in denary these convert to 1 to 15.
  - in binary these convert to 1 to 1111.
- This means that when we represent longer hexadecimal numbers in binary, we need to use 4 bit binary throughout

Programming

#### **Objectives**

TOPIC

# By the end of this topic, you should be able to:

8

- *explain the syntax and semantics of the programming language.*
- declare variables and constants.
- *apply operators to solve problems.*
- *develop programs that use pseudocode structures.*
- *develop a program using functions.*
- test and debug programs.
- create user interfaces.
- *declare functions use objects in interface design.*
- *identify types of errors.*
- apply error handling techniques in programming.
- *develop project code using programming concepts.*

#### **Programming concepts**

- The purpose of computer programming is to create sets of instructions to enable a computer to do certain a process.
- It is the process of designing, writing, testing, debugging and maintaining the source of computer programs.



#### Fig. 8.1 Programming language example

- A programming language is a set of words, symbols and codes that enable human to communicate with computers.
- A good programming style requires using programming concepts that are usually associated with different models.
- Variables act as "containers" that "hold" information. These containers then store this information for later use.
- Data structures allow programmers to streamline data collection when a large amount of related information is involved.
- Just like in the English language, computer programming follows a syntax or a set of rules that define particular layouts of letters and symbols.
- Proper syntax ensures the computer reads and interprets code accurately.
- A tool in computer programming is a piece of software that helps programmers write code much faster.

62

#### **Functions**

- A function is a block of statements that can perform a particular task.
- The function's name is sum and the data type is internal. This task of this function is to produce the sum of two numbers:

(	int sum(int a, int b)	
	(	
	return(a+b); }	
1	,	

#### Fig. 8.2

Below, the function is declared in main():



#### Fig. 8.3

There are four types of functions namely:

1. Functions with arguments and return values:



2. Functions with arguments and without return values:



Fig. 8.5

**3.** Functions without arguments and with return values:





**4.** Functions without arguments and without return values:

2 ((m.mar)) 3 ((m.mar)) 4 (val3 sou()) 6 ) 6 )	
7 vaid swe() // function at the arguments and return data type (	
13 [print("Sum = %2",com); 13 ]	
Run	



#### Testing and debugging

#### Testing

- It is basically a process using which we verify and validate that an application or software is free of bugs, meets all the technical requirements, abides by all the requirements of development and designing and meets all the user requirements.
- Testing ensures that the intended software/application meets these requirements efficiently and effectively and handles all of the boundary cases and exceptional cases.

#### Debugging

- It is basically a process using which we fix any bug present in a software or application. In this, we first identify, then analyse and remove the errors.
- Debugging begins after the intended software fails in proper execution.

TOPIC 9 Database

#### **Objectives**

# By the end of this topic, you should be able to:

- create a database.
- create a file structure.
- design forms, reports and queries.
- *develop databases using database objects and views.*
- edit database objects.
- apply database security controls.
- create relational database.
- *import and export data.*
- apply database security.
- create queries based on multiple tables.
- link database to project modules.
- *apply security measures to database.*

#### **Microsoft Access**

- Microsoft Access is a Database Management System (DBMS) from Microsoft that combines the relational Microsoft Jet Database Engine with a graphical user interface and software development tools.
- Microsoft Access stores information which is called a database.
- A Relational Database Management System (RDBMS) is a collection of programs and capabilities that enable IT teams and others to create, update, administer and otherwise interact with a relational database.
- To use MS Access, you will need to follow these four steps.
  - Database creation Create your

Microsoft Access database and specify what kind of data you will be storing.

- Data input After your database is created, the data of every business day can be entered into the Access database.
- Query This is a fancy term to describes the process of retrieving information from the database.
- Report (optional) Information from the database is organised in a nice presentation that can be printed in an Access Report.

#### File structure elements

- MS Access uses "objects" to help the user list and organise information, as well as prepare specially designed reports.
- When you create a database, Access offers you tables, queries, forms and reports.
- Databases in Access are composed of many objects but the following are the major objects.
- Together, these objects allow you to enter, store, analyse and compile your data.

#### **Tables**

- A table is an object that is used to define and store data.
- When you create a new table, Access asks you to define fields which is also known as column headings.

#### **Database creation**

Step 1 – Let us now start by opening MS Access.



Fig. 9.1

**Step 2** – Select blank desktop database. Enter the name and click the create button.





Step 3 - Access will create a new blank

database and will open up the table which is also completely blank.

A Cat	Y 21 Au	cending T/	Selection -	G	in New	∑ Totals	Q	Sc Replace	Calibri (Detail)	- 11 - 3	E E E E H -
Paste d' Format Painter	Filter 2,0 Res	move Sort 🝸	Advanced * Topple Filter	Refresh All *	X Delete	<ul> <li>Spelling</li> <li>More *</li> </ul>	Find	Go To -	8 <i>I</i> <u>U</u>	<u>▲</u> ・空・益・ =	==
Clipboard rs		Sort & Piller			Record	8		Find		Text Formatting	5 A
Access Objects	. 4	Table1			_						×
	Q	10	- Click	to Add							
Table1											

Fig. 9.3

#### **Database objects and views**

#### Forms

- You likely have had to fill out forms on many occasions, like when visiting a doctor's office, applying for a job, or registering for school.
- Forms make entering data easier.
- Working with extensive tables can be confusing and when you have connected tables you might need to work with more than one at a time to enter a set of data.
- However, with forms it is possible to enter data into multiple tables at once, all in one place.





- Database designers can even set restrictions on individual form components to ensure all of the needed data is entered in the correct format.
- All in all, forms help keep data consistent and organised, which is essential for an accurate and powerful database.

#### Queries

A well designed query can give information you might not be able to find just by looking through the data in your tables.

e provin								
	ternal Data 0	latabase Tools	Fields Table					Muhammed Wages
AB 12 Short Number Currency	Date & Time Ves/No Mare Fields + Inte	Mete	me & Caption Indit Value Id Sine Pro	Modily Modily Lookups Expression perfiles	ab Memo Settings -	Data Type: AutoNumber Format: Formatting \$ % ? 21 43 Formatting	Required     Required     Velopae     Velopae     Velopae     Velopae     Velopae     Velopae     Velopae	~
All Access Objects	• «	Table1						×
NHON.	Q	10	Chek to Add					
baler								
		Barrowth Mar at 1	ef 1 1 1 1 1 7	No Diter Centre	_			

Fig. 9.8

• Click on the name and caption option in the ribbon and you will see the following dialogue box.

Name	EmployeeID		
Caption	Employee ID		
Description	Number created automati	caly	

Fig. 9.9

- Change the name of this field to employee ID to make it more specific to this table.
- Enter the other optional information if you want and click Ok.

	and the local	O Telescolationse Couses Muniminal Walds Documents Accesso.	
File         Home         Create         External Data         D           ▲         AB         12         S         S         Date & Time           Iew         Short         Number         Currency         Ven/No         More Fields         More Fields	Valdase Ison Pietds Table	If all mer where you want is about         Data Type: AutoNumber         Required           Modify         Modify         Fermatic         Fermatics         Disage           Modify         Modify         S % * 18 28         Indexed         Indexed	Muhammad Wega Bion
ent Lada Dovid Il Access Objects © « ent point adam a bater a	Compared to the second	ree Productor Productor	
	Record M. (14/1 ) M = T	No Tiller Kearth	

Fig. 9.10

- We now have our employee ID field with the caption employee ID.
- This is automatically set to auto number so we do not really need to change the data type.

• Add some more fields by clicking on click to add.

	Autabase Tools Fields Table 🗘 Tell me what you want to do	
AB 12 Solution A Time Deat Number Courses Of WerMa Test Add & Diriter Add & Di	Line and Calence      Cale	
	C Cynnwy C Denk Tran A Denk Tran A Denk Tran A Denk Tran A Denk Tran C Denkonderd M	
	Parts or Edit	



- Choose short text as the field.
- When you choose short text, Access will then highlight that field name automatically and all you have to do is type the field name.

ile Hom	e Create	External Data	Detabes	e Tools Field	Table	V Tell me what	rou went	to do			Muhammed We
AB NY Short 1 Text	12 Second	ES Date & Time Ven/No More Fields *	Delete	Defect Value	s b	Andity Modity solups Expression	Ab Memo Settings -	Data Type Format: \$ %	Formatting	Required     Unique     Unique     Unique     Unique     Unique     Unique     Unique     Unique     Unique	'n
	Ohis sta	0	1 10	blet	respe				· united and the second	They surged	
I Access	Objects		0	nployee ID .	FirstName	Click to Add					
ich.		Q	*	(New)							
ables											
130101											
			(Taxant	in local		the Printer Present	_				

Fig. 9.12

Type first name as the field name. Similarly, add all the required fields as shown.

		and the second				
e Home Create External Data	Database Tools	Fields Table	V Tell me what y	ou want to do		Muhammad W
AB 12 Date & Time Short Number Currency Wes/No More Fields - Add & Driete	Delete	rme & Capition fault Value M Size 255 (, Prope	Modily Modily solupe Expression S etter	abl Data Type Drot Test Format: Formatting dillege 5 % 5 10 20 Formatting	Required     Unique     Uniq	
Access Objects 🛛 🛛 🛪	Tablet					
a. D	Employee	e ID + FirstName	<ul> <li>LastName</li> </ul>	Address1 • Address2 •	City - State	<ul> <li>Zip - Phone - Phone Typ</li> </ul>
des #		(New)				
Table1						
	Record 14 4	1 H H H T	No Filter Search			

Fig. 9.13

nie Home Create Diter	2	uo vesy	A rennie war you w	214 00 0000	Period and a standard a	and approximately and approximately approxim
	te Insert Kows	= 1				
w Primary Builder Test Validation	Delete Rows	roperty indexes	Create Data Rename/	Relationships Object		
Key Rules	C Modify Lookups	Sheet	Macros * Delete Macro	Dependenci	6	
ws. Tools		Show/Hide	Field, Record & Table Events	Relationships		^
Access Objects	tbiEmployee	Table1				×
in Access Objects	Field Name		Data Type	6	Description (Optional)	
rcn_ P	ProjectID		AutoNumber			
ables a	ProjectName		Short Text			
biEmployee	ManagingEditor		Short Text			
	Author		Short Text			
	PStatus		Short Text			
	Contracts		Attachment			
ProjectStart ProjectEnd Budget			Date/Time			
		Date/Time				
			Currency			
	ProjectNotes		Long Text			
			,	ield Properties		
	General Lonium					
	Field Size	Long Integ	er .			
	New Values	Increment				
	Format					
	Caption	Tes (Dunlice	des CID			
	Text Align	General	NY ON		A field name can be up to 64 characters los	ng.
					including spaces. Press F1 for help on field	ld
					names.	

Fig. 9.17

• We now need to make project ID a primary key for this table, so let us select project ID and click on primary key option in the ribbon.

Ioyee Tablet Field Name ID Name ngEditor	Data Type AutoNumber Short Text Short Text	
Field Name ID Name ngEditor	Data Type AutoNumber Short Text Short Text	
ID Name ingEditor	AutoNumber Short Text Short Text	
Name ingEditor	Short Text Short Text	
ingEditor	Short Text	
	Chart Taut	
1	Short lext	
	Short Text	
ts	Attachment	
Start	Date/Time	
End	Date/Time	
	Currency	
Notes	Long Text	
	Field	Propertie
pokup		
Long In	nteger	
s Increme	ent	
Yes (No	Duplicates)	
	Notes bookup Is Increm Tes (Notes Genen	Solupi Increment Ves (No Duplicates) General





Fig. 9.19

• You can now see a little key icon that will show up next to that field. This

shows that the field is part of the table's primary key.

• Let us save this table and give this table a name.

- 11 - 11			
Table Name:			
tblProjects			
1	OK	Ca	ncel
	OK		IIICEI

#### Fig. 9.20

• Click Ok and you can now see what this table looks like in the datasheet view.

		ools Desig	n Q Tell me what you w				
View Primary Builder Test Validation Key Tests	Modify Lookups	hoperty Indexe Sheet Show/Hide	Create Data Rename/ Macros * Delete Macro Field, Record & Table Events	Relationships Relationships			
Access Objects   «	tbiEmployee	tbiProjects					_
Search_	Field	Field Name		D	escription (Optional)		
Tables 0	ProjectiD		AutoNumber				_
- Abfaniana	ProjectName		Short Text				
une une aproyee	ManagingEditor		Short Text				
tbiProjects	Author		Short Text				
	PStatus		Short Text				
	Contracts		Attachment				
	ProjectStart		Date/Time				
	ProjectEnd		Date/Time				
	Budget		Currency				
	ProjectNotes		Long Text				
	-			eld Properties			
	General Lookup						
	Field Size	Long Integ	er				
	New Values Increment						
	Format	-					
	Caption	Tet (No Due	dirater)				
	Text Align	General	property.		A field name can be up to 64 characters		
	induding space. Press PT for help o names.					F1 for help on fi IS	eld

#### Fig. 9.21

• Let us click the datasheet view button on the top left corner of the ribbon.

File Home Create Extern	sal Data Database Tools	Fields Table	Q Tell me what you i	want to do		Muhammad Waqas
New Clipboard G	Lascending Sele Li Descending Adv & Remove Sort & Tog Sort & Filter	ction * anced * gle Filter All *	n New ∑ Totals Save ♡ Spelling C Delete + ■ More + Records	Find Beleate	Calibri (Detail) + B J U = = = = A + 2 - A + = = Text Formattin	
All Access Objects   «  «  All Access Objects	ProjectiD · Project	tNami • Managing	Ed • Author •	PStatus •	ProjectStart	ProjectEnd • Bud
thiEmployee						
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						martine milling

Fig. 9.22

### **EXAMINATION PRACTICE 5**

#### PAPER 1

#### 4021/1

#### 1 hour

#### **INSTRUCTIONS TO CANDIDATES**

Answer **all** questions. Read all the questions carefully before choosing the answer option.

- 1. What is used to connect together the internal components of the Central Processing Unit (CPU)?
  - A. Chip.

**B.** Bus.

D.

Coaxial cable.

- C. USB cable.
- 2. The symbols used in assembly language are called
  - A. abbreviations.
  - **B.** mneumonics.
  - C. codes.
  - **D.** signs.
- **3.** The distance between the holes in the mask behind the screen of the monitor helps to determine how sharp the dots appear. This is known as the monitor's
  - A. colour depth.
  - **B.** resolution.
  - C. dot pitch.
  - **D.** pixels.
- 4. Computers are extremely fast and have fantastic memories. However, the only data they can process is
  - A. large amounts of data.
  - **B.** series of l's and 0's.
  - **C.** boolean algebra.
  - **D.** instructions.
- 5. When the school secretary was printing a letter stored in the computer memory, another member of staff accidentally switched off the computer. The printer still continued to print the letter because some text was still stored in the
  - A. immediate access store.
  - **B.** cache memory.
  - C. spooler.
  - **D.** buffer.

6. Which of the following truth tables is derived from an XOR logic gate which receives two inputs P and Q?

	Р	Q	Output
<b>A.</b>	0	0	0
	0	1	1
	1	0	1
	1	1	1
	Р	Q	Output
C.	0	0	0

1

1

1

1

0

D	Р	Q	Output
В.	0	0	0
	0	1	0
	1	0	0
	1	1	1

	Р	Q	Output
D.	0	0	1
	0	1	0
	1	0	0
	1	1	1

7. Study the logic network below.

0

1

1



The suitable boolean expression for the circuit is

- A. S = AB + A'C
- $\mathbf{B.} \quad \mathbf{S} = \mathbf{A'B} + \mathbf{AC}$

$$\mathbf{C.} \quad \mathbf{S} = \mathbf{A}\mathbf{B} + \mathbf{A}\mathbf{C}$$

**D.** 
$$S = AB' - AC$$

8. Below is a logic gate.



Which truth table represents the logic gate?

 0
 0
 1

 0
 1
 1

 1
 0
 1

 1
 1
 1



D	0	0	1
<b>D</b> .	0	1	0
	1	0	0
	1	1	0

п	0	0	1
υ.	0	1	0
	1	0	1
	1	1	1

- 16. When using SDLC, implementation is likely to include
  - A. conversion of the existing system to the new system.
  - **B.** deciding on validation techniques.
  - **C.** estimating the volume of work.
  - **D.** deciding the format of reports.
- 17. Which of the following better explains why some people find software upgrades a nuisance?
  - A. They often require internet connectivity.
  - **B.** They usually require new hardware.
  - C. They often come with viruses.
  - **D.** They are not tested fully.
- **18.** Online documentation often has technical words highlighted in a different colour. Clicking the words leads to further explanation.

This is called

- A. context-sensitive help.
- B. highlights.
- C. hypertext.
- **D.** tool tips.

#### Use the information below to answer question 19 and 20.

The flow chart below was designed from an algorithm to convert temperature from degrees centigrades to degrees Fahrenheit.



- **19.** The output for conversion if input is 1 is
  - **A.** 33,8
  - **B.** 32,8
  - **C.** 31,8
  - **D.** 30,8

#### Use the information below to answer question 25 and question 26.

A tollgate system uses sensors to detect cars as they approach the tollgate. An algorithm and a flowchart were used to design the system. The flowchart below was used in designing the system.



- 25. Which are the correct statements for the algorithm following the sequence of the flow chart?
  - A. Set counter to 0 Car detected

Add 1 to counter Has a car paid correct fare Open barrier

- B. Car detected Set counter to 1 Add 1 to counter Has car paid correct fare Open barrier
- C. Set counter to 0 Add 1 to counter Car detected Has car paid correct fare Close barrier
- D. Add 1 to counter Car detected Set counter to 1 Has car paid correct fare Close barrier

- EXAMINATION PRACTICES
  - 6. The analyst realised that two statements were left out for the system to detect the car leaving the tollgate and closing the barrier and the following statements were added to the algorithm.

car leaving detected (input) close barrier (process)

Which is the correct flow chart representation for the two statements?



- 27. In which stage of the SDLC could project termination be done?
  - A. Feasibility study.
  - **B.** Implementation.
  - **C.** Testing phase.
  - **D.** Design phase.
- 28. Structured programming languages are also known as
  - A. object oriented.
  - **B.** case sensitive.
  - C. pseudocode.
  - **D.** modular.
- **29.** Which of the following is not a benefit of modular programming?
  - A. It allows one programmer to do the job of many in the same amount of time.
  - B. It allows the creation of a library of common programming tasks.
  - C. It increases programmer productivity.
  - **D.** It increases program readability.
- **30.** Which of the following is not a basic control structure?
  - A. The sequential. B. The decision.
  - C. The process. D. The loop.

# **EXAMINATION PRACTICE 5**

#### PAPER 2

4021/2

#### 2 hours 30 minutes

#### **INSTRUCTIONS TO CANDIDATES**

Answer all questions.

1. (a) The following table shows four applications which require specialist input devices.

Application	Input device	Reason for choice of device
Virtual reality application		
A person with disability communicating with a computer system		
Automatic stock control system at a supermarket		
Information kiosk at an airport using a GUI		

For each application, suggest the input device and give a reason for your choice. [8]

(b) Write down the difference between the terms off-the-shelf and tailor made software. [2]

2. Give the uses of computers in each of the following areas.

	<b>(a)</b>	Hospital	[3]
	<b>(b)</b>	Education	[3]
3.	<b>(a)</b>	Discuss the benefits of online banking.	[5]
	<b>(b)</b>	Which banking transaction can be done through traditional banking but not	
		online banking?	[1]
	<b>(c)</b>	State the benefits of Computer-Aided Design.	[2]
4.	<b>(a)</b>	Define the term subprogram.	[2]
	<b>(b)</b>	Give the advantages of subprograms.	[3]
5.	Net	works can be ring, bus or star topology.	
	<b>(a)</b>	Name and draw any <b>two</b> topologies stated above.	[6]
	<b>(b)</b>	State the benefit and drawback of using each of the following communication methods in business.	
		(i) Mobile phone	[2]

		<ul><li>(ii) Video conferencing</li><li>(iii) Email</li></ul>	[2] [2]
	(c)	Describe other applications of mobile phones besides access to the internet.	[4]
6.	Hac or ne	kers may use their technical skills to gain unauthorised access into computers etworks.	
	<b>(a)</b>	State the prevention measures against hacking.	[4]
	<b>(b)</b>	List the protection measures against accidental data loss.	[3]
	<b>(c)</b>	State the unethical practices which may be done by youths when they are in an internet environment.	[3]
7.	Ane	ew computerised information system is designed to keep student's records.	
	<b>(a)</b>	Suggest the fact-finding techniques that can be used by the system analysts.	[4]
	<b>(b)</b>	State the activities carried out during the design stage of the systems development	
		life cycle.	[4]
	<b>(c)</b>	Describe any one type of test data.	[2]

**8.** A school office sells stationery items to learners. A database used to keep details of stock is shown below.

Code	Item	In Stock	Sold	On Order	Price (\$)
G302	Floppy disk	24	16	20	1,50
G101	Rubber	16	14	10	1,00
G102	Pencil	5	25	30	1,00
G103	Protractor	8	12	20	1,50
M101	Pen	18	22	20	2,00
M202	Compass	8	12	20	2,00

- (a) Write a query that extracts items with prices less that \$2,00. [3]
- (b) Write down the items output if the search below is used.

#### code contains "m" or [in-stock<15]

- (c) Differentiate the terms below.
  - (i) String and numeric data
  - (ii) A field and a record
- **9.** The economic environment of a business plays an important role in determining its success or failure. State the economic factors that can affect computer-based businesses. [5]

[3]

[2]

[2]

10.	Dail	y temperatures were recorded ten times a day by learners over a period of a year.	
	(ass	unie that a year contains 505 days)	
	Wri	te an algorithm, using pseudocode or flowchart which performs the actions below.	
		inputs all the temperatures (ten per day)	
		outputs the highest temperature taken over the year	
		outputs the lowest temperature taken over the year	
		outputs the average temperature per day	
		outputs the average temperature per year	
11.	<b>(a)</b>	Define the term byte, giving an example.	[2]
	<b>(b)</b>	The acronym ASCII stands for	[1]
	<b>(c)</b>	(i) Convert 101011, to base ten.	[2]
		(ii) Calculate $11001_{2}$ $110_{2}$ .	[2]
	(d)	(i) Draw a circuit diagram of the function.	[4]
		(ii) For the function in (d)(i), find the output of F when $A = 0$ and $B = 1$ .	[2]
12.	<b>(a)</b>	Define the terms below.	
		(i) html	[1]

	(i)	html	[1]
	<b>(ii)</b>	cookie	[1]
<b>(b)</b>	Stat	e the features found on a good website.	[3]

# **EXAMINATION PRACTICES**

## **EXAMINATION PRACTICE 5**

#### PAPER 3

4021/3

#### **3** hours

#### **INSTRUCTIONS TO CANDIDATES**

Answer **all** questions. For each question, use the software indicated.

#### Programming [50 marks]

1. Design an interface for a program which prompts the user to enter his or her name then the output will be shown as "Hello Bekky".

Add the corresponding code to the button that will display the "Hello Bekky". [10]

2. (a) Design an interface below which shows a simple calculator.

CALCULA	TOR
NUMBER 1	
NUMBER 2	
ADD	DIVIDE
SUBTRACT	MULTIPY
CLEAR	EXIT

The interface should consist of: Five command buttons Four labels Three textboxes

Red	raw the interface to include a 'Result' label and a 'Result' text box.	[8]
<b>(b)</b>	Add code on ADD, SUBTRACT, DIVIDE and MULTIPLY buttons to display the result of calculation on the numbers entered	[12]
(c)	Add code on CLEAR and EXIT buttons to clear the textboxes and exit the	
	program.	[4]

#### (a) Design the interface below.

STRIN	GS
ENTER TEXT	
LENGTH	REVERSE
RESULT	

(b) Add code to the following buttons.

(i)	Length button that will display the number of characters of text entered in	
	result textbox.	[5]
(ii)	Reverse button that will display text entered in reverse in the result	
	textbox.	
	Save the work as Reverse.	
	Print the interface and all the codes.	[5]

[6]

[10]

[5]

[5]

#### Database [30 marks]

- 4. Wim Car Sales keeps its car sales details in a computerised database.
  - (a) Create a database table below using a database package of your choice.

Car Reg. No.	Model	Colour	Fuel	Year	Capacity	Price	Doors
ABO 200	Mazda	Blue	Diesel	1997	2,8	\$1 200	2
ABD 100	Toyota	White	Diesel	1999	1,5	\$1 900	4
AAA 400	Honda	Black	Petrol	2012	1,0	\$6 000	4
ABD 300	Subaru	Yellow	Petrol	2005	3	\$1 500	2
AAO 100	Nissan	Red	Petrol	2012	3	\$2 000	4

- (b) Create a form to enter details about cars. The form must have buttons such as ADD, SAVE, NEXT and PREVIOUS.
   [6]
- (c) Create a query that displays all cars with models that end with letters 'a' and use diesel.
- (d) Create a report titled Cars Report that displays all cars, sorted in ascending order of model.
- (e) Create a query that deletes record where CARREG No. = ABD300. [4]

3.

#### Web design [20 marks]

5.

Des	ign a home page for a school. The page shou	ld include the following.			
<b>(a)</b>	Name of the school in the title bar.		[2]		
<b>(b)</b>	A centred heading of the school name.		[2]		
<b>(c)</b>	A paragraph with the motto or co-values of	the school.	[2]		
<b>(d)</b>	At least five subjects offered at the school.				
<b>(e)</b>	A picture, clip art or logo of the school.				
<b>(f)</b>	A link to university scholarships at NUST using the following address				
	https://www.nust.ac.zw		[3]		
<b>(g)</b>	A calendar of events in a table as follow.				
	3 <sup>rd</sup> term starts	3 <sup>rd</sup> term ends			
	10 September 2019	5 December 2017			
	Save your work as school.html.				
	Print the code and web page.		[5]		

# **EXAMINATION PRACTICE 7**

#### PAPER 2

4021/2

#### 2 hours 30 minutes

#### **INSTRUCTIONS TO CANDIDATES**

Answer all questions.

- 1. Julia inputs personal data into her computer. She stores three copies of the data using a hard disk drive (HDD), a solid state drive (SSD) and a USB flash memory drive.
  - (a) Identify the devices Julia can use to input personal data into her computer.
  - (b) Six statements are shown about HDDs, SSDs and USB flash memory drives. Tick (✓) to show which statements apply to each type of storage. Some statements can apply to more than one type of storage.

[6]

[3]

Statement	HDD	SSD	USB flash memory
It has no moving parts.			
It is non-volatile.			
It can use NAND gates to store data.			
It uses magnetic properties to store data.			
It has the smallest physical size.			
It has the slowest read/write speeds.			

- 2. A firewall can be used to help keep the data secure that is stored on a computer.
  - (a) The given paragraph describes how the firewall operates to help keep the data secure. Complete the paragraph using the most appropriate terms from the given list. Not all of the terms on the list need to be used.

Accept	Network		Reject	
Criteria	Outgoing		Software	
Hacking	Output		Store	
Input	Processor		Storage	
A firewall can be	or hardware base	ed. It monitors tr	affic between the	•
computer and the	The user sets	f	or the traffic.	
The firewall will	or	the		
traffic based on this. It can help pu	revent	and malic	ious software tha	t
could be a threat to the security of	f the data.			[6]

(b) Identify three other methods that could be used to keep the data secure. [3]

6. Tick one box in each row to identify if the statement is about validation, verification or both.

Statement	Validation $(\checkmark)$	Verification (√)	Both $(\checkmark)$	
Entering the data twice to check if both entries are the same				
Automatically checking that only numeric data has been entered.				
Checking data entered into a computer system before it is stored or processed.				
Visually checking that no errors have been introduced during data entry.				

7. Name and describe the most appropriate programming data type for each of the examples of data given. Each data type must be different.

[6]

8. The flowchart represents an algorithm. The algorithm will terminate if -1 is entered.



(a) Complete the trace table for the input data: 50, 75, 99, 28, 82, 150, -1, 672, and 80.

176

Value	Diff1	Diff2	Output

- (b) Describe the purpose of the algorithm.
- **9.** A library uses a database table, GENRE, to keep a record of the number of books it has in each genre.

ID	GenreName	Total	Available	Loaned	Overdue
ABI	Autobiography	500	250	250	20
BIO	Biography	650	400	250	0
EDU	Education	20200	10000	10200	1250
FAN	Fantasy	1575	500	1075	13
GFI	General fiction	35253	23520	11733	0
GNF	General non-fiction	25200	12020	13180	0
HFI	Historical fiction	6300	3500	2800	0
HNF	Historical non-fiction	8000	1523	6477	0
HUM	Humour	13500	9580	3920	46
MYS	Mystery	26000	13269	12731	0
PFI	Political fiction	23561	10523	13038	500
PNF	Political non-fiction	1823	750	1073	23
REF	Reference	374	374	0	0
ROM	Romance	18269	16800	1469	0
SAT	Satirical	23567	12500	11067	0
SCF	Science fiction	36025	25000	11025	0
SPO	Sport	45720	32687	13033	3256
THR	Thriller	86000	46859	39141	0

(a) State the reason ID could be used as a primary key in the table GENRE.

- (b) State the number of records in the table GENRE.
- (c) Complete the query-by-example grid to display any genres with overdue books.
   Only display the ID, Genre Name and Overdue fields in order of the number of books overdue from largest to smallest.

[6]

177

[1]

[2]

Field			
Table			
Sort			
Show			
Criteria			
or			

**10.** The website has a uniform resource locator (URL). An example of a URL is given. https://www.cambridgeassessment.org.uk/index.html. Complete the table to identify the name of each section of the URL.

URL	Name
https	
cambridgeassessment.org.uk	
/index.html	

- **12.** A computer has a Von Neumann architecture.
  - (a) Circle three components that are part of the central processing unit (CPU) in this computer:

	acci mei ran sens	umulator (ACC) nory address register (MAR) dom access memory (RAM) sor	hard disk drive (HDD) program counter (PC) read only memory (ROM), solid state drive (SSD)	[3]
(b) (c)	Des The	cribe the purpose of the control unit computer has a single core CPU.	t (CU) within this computer.	[2]
	<b>(i)</b>	State <b>one</b> purpose of a core in a C	PU.	[1]
	(ii)	The computer is upgraded to a du can affect the performance of the	al core CPU. Explain how the upgrade computer.	[2]
Ap	rogra	mmer uses a high-level language to	o create a computer program.	
(a)	(i) (ii)	Identify <b>two</b> advantages to the pro- instead of a low-level language. Suggest <b>one</b> disadvantage to the p instead of a low-level language.	ogrammer of using a high-level language rogrammer of using a high-level language	[2] [1]
<b>(b)</b>	The crea	programmer uses an integrated de ting the computer program. State v	velopment environment (IDE) when what is meant by an IDE.	[2]
Rob	ots a	re used in a factory to build cars.		
(a) (b)	One Stat	e characteristic of a robot is its meel e <b>two</b> other characteristics of a robot gest <b>two</b> advantages of using robot	nanical structure. ot.	[2]
(0)	fact	ory.	s, instead of numaris, to build cars in the	[2]

[5]

[5]

178

13.

14.

# **EXAMINATION PRACTICE 7**

#### PAPER 3

4021/3

[1]

[8]

#### **3** hours

#### **INSTRUCTIONS TO CANDIDATES**

Answer **all** questions. For each question, use the software indicated.

#### **Programming** [50 marks]

1.	Design an interface and write a program that prompts the user to enter a number	
	between 10 and 20. If it is between 10 and 20, then a message box will display the	
	number from the Textbox. If the number entered is not between 10 and 20 then the	
	user will be invited to try again and whatever was entered in the Textbox will	
	be erased.	[10]
2.	Design an interface and write a program that accept marks of 20 students using an	
	Input box and display the highest mark.	[10]
3.	Design an interface and write a program that accept numbers using an Input box	
	until the user enter number 101. Display the lowest number entered excluding 101.	[10]
4.	Write a program to find the largest number among three numbers entered by the user.	[10]
5.	Write a program to check whether a number entered by the user is even or odd.	[10]
	Web design [20 marks]	
6.	Create a simple business website using HTML, including a homepage, an about	
	page, a services page, and a contact page.	
	Database [30 marks]	
7.	The school has decided to computerise information about its students and has	

- requested to do this task.
  - (a) Create and save a database called STUDENTDATABASE [2]
  - (b) StudNumb is to be used as the primary key (provide screen dump as proof)
  - (c) Create the table using information given below in the database you have created, type all the records and save the table as Student File and print.

Surname	First Name	StudNumber	Sex	Date of Birth	Amount	Units
Buzuzi	Farai	0128474H	М	01/01/99	\$350	10
Muusha	Flavia	0218474G	М	01/01/00	\$290	4
Mangere	Rutendo	0264774F	М	01/01/98	\$299	5

Mtetwa	Natasha	0321857B	F	09/08/97	\$321	6
Muzomba	Lister	0885767B	М	01/05/97	\$320	6
Manzvera	Tapiwa	0509587K	М	05/05/01	\$397	7
Aphiri	Destiney	0645476P	М	01/01/01	\$309	4
Dube	Munyaradzi	0647464P	М	01/01/99	\$400	9
Kaunda	Faith	0837635V	F	01/01/01	\$290	6
Dzimba	Eddie	0890234R	М	06/11/96	\$366	5

8.	Save the Student File as Sorted Student File and sort the Sorted Student File recordsin descending order of their Units and print it.[1]					
9.	Save Stue	e the <b>Student File</b> as Modified Student File and perform the following on the <b>Modified Student File table.</b>	ed			
	(a) (b) (c)	Rename the field <b>Amount</b> to <b>AmountPaid</b> . Delete the record of <b>MuushaFlavian</b> . Add a record of Mapfumo Isaac, StudentNumber 0300978G, Female, born on 01/06/1999, paid \$305 and has 4 units, Print it.	[1] [1] [2]			
10.	10. Using the Sorted Student file, perform the following.					
	Crea	ate a Columnar Form and name its form header as Sorted Student Form.	[2]			
11.	Usir	ng the Student File table, perform the following.				
	<b>(a)</b>	Create a Select Query that will only display records of students whose Surname start with M. Name it <b>SurnameM Query.</b>	[3]			
	<b>(b)</b>	Create a Select Query that display records of students who were born after 1998 whose amount is more than \$300.00. Name is <b>DateBornand amount Query.</b>	[2]			
	<b>(c)</b>	Create a Select Query that displays record of students who have more than 5 units or whose amount is less than \$305.00. Name it <b>Units or amount query.</b>	[2]			

- 12. (a) Create a report, in tabular and landscape form, that will display all records in the SurnameM Query and name it SurnameM Report.
  - (b) Create a report called **All Records Report** that will have all records in the Student File but excluding the FirstName and Sex fields on it.

[3]

[2]

# **EXAMINATION PRACTICE 8**

#### PAPER 3

#### 4021/3

#### **3** hours

#### **INSTRUCTIONS TO CANDIDATES**

Answer **all** questions. For each question, use the software indicated.

#### Programming [50 marks]

1.	Write a VB.Net program to calculate the total production cost for a manufacturing business, given the cost of raw materials, labor costs, and overhead expenses.	[10]
2.	Write a VB.Net program to calculate the production efficiency of a manufacturing process, given the total number of units produced and the total labor hours used.	[10]
3.	Write a program to check if a given number is prime or not.	[10]
4.	Write a program to print all the even numbers from 1 to 100 using a 'For' loop.	[10]
5.	Write a program to print the sum of all the odd numbers from 1 to 50 using a 'While' loop.	[10]

#### Web design [20 marks]

6.	Design a website for an educational institution using HTML, including a homepage,	
	an about page, a courses page, and a contact page.	[20]

#### Database [30 marks]

7. Create a new Jobs database and design the following table and save as Job Details. [3]

Field Names	Data Types
Employer	Text
Job	Text
Salary	Currency
Location	Text
Contact	Text
Closing Date	Date

8. Enter the following details into the table and print it.

Employer	Job	Salary	Location	Contact	<b>Closing Date</b>
Connell	Sales	£18,000.00	Oxford	0186576333	20/02/02
St. Mary's	RE Teacher	£23,000.00	Milton Keynes	0184422366	15/02/02
Hedges	Secretary	£16,500.00	Oxford	0186556699	01/03/02

[6]

# **EXAMINATION PRACTICES**

4021/1

## **EXAMINATION PRACTICE 10**

#### PAPER 1

#### 1 hour

#### **INSTRUCTIONS TO CANDIDATES**

Answer all questions.

Read all the questions carefully before choosing the answer option.

- 1. Any item of hardware connected to a computer processor unit is called
  - A. an input device.

- **B.** a peripheral.
- C. an output device.
- **D.** a storage unit.
- 2. Which of the following input devices is an alternative to a mouse?
  - A. Joystick.
  - **B.** Digitizer.
  - C. Touch pad.
  - **D.** Graphics pad.
- **3.** Which of the following input devices is used to enter magnetically encoded data at the back of bank debit cards?
  - A. Magnetic ink character reader.
  - B. Optical character reader.
  - C. Magnetic strip reader.
  - **D.** Optical mark-sense reader.
- **4.** Amina is a garage owner. She needs printer to print bills on self-copying three-part paper and a printer to produce high quality leaflets to promote special offers such as winter servicing. Which two printers would you recommend?
  - A. Dot-matrix and laser jet printers.
  - **B.** Dot-matrix and drum printers.
  - C. Laser jet and inkjet printers.
  - **D.** Dot matrix and Braille printers.
- 5. A system of web pages designed for use within one organisation is called
  - A. internal mail.
  - **B.** an intranet.
  - C. an extranet.
  - **D.** local network.

# **EXAMINATION PRACTICE 10**

#### PAPER 2

2.

3.

4021/2

#### 2 hours 30 minutes

#### **INSTRUCTIONS TO CANDIDATES**

Answer all questions.

#### 1. A computer has a Von Neumann architecture.

(a) Circle three components that are part of the central processing unit (CPU) in this computer.

	accum	ulator (ACC)	hard disk drive (HDD)	
	memo	ry address register (MAR)	program counter (PC)	
	sensor	sold state drive (SSD)	read only memory (KOM)	[6]
<b>(b)</b>	Descri	be the purpose of the control unit (CU	) within this computer.	[8]
(c)	The co	omputer has a single core CPU.		
(-)	(i) St	tate the purpose of a core in a CPU.		[3]
	(ii) T	he computer is upgraded to a dual cor	e CPU. Explain how the upgrade can	
	af	fect the performance of the computer		[5]
Ap	rogramn	ner uses a high-level language to crea	te a computer program.	
<b>(a)</b>	(i) Id	lentify the advantages to the program	mer of using a high-level language	
	in	stead of a low-level language.		[4]
	(ii) S	uggest the disadvantage to the program	nmer of using a high-level language	
	in	stead of a low-level language.		[3]
<b>(b)</b>	The pr	ogrammer uses an integrated develop	ment environment (IDE) when	
	creatin	g the computer program.		
	State v	what is meant by an IDE.		[2]
Cor	nplete th	ne sentences about symmetric encrypt	ion.	

Use the terms from the list.

Some of the terms in the list will not be used. You should only use a term once.

algorithm	cipher	copied	delete	key	plain
private	public	standard	stolen	understood	unreadable

The data before encryption is known as \_\_\_\_\_\_ text. To scramble the data, an encryption \_\_\_\_\_\_, which is a type of \_\_\_\_\_\_ is used. The data after encryption is known as \_\_\_\_\_\_ text. Encryption prevents the data from being \_\_\_\_\_\_ by a hacker.

[10]

#### **Examination 1 Paper 2 Answers**

- 1. (a) (i) Hardware refers to the physical components of a computer system such as the monitor, keyboard, motherboard, and processor. Example: A computer's hard drive.
  - (ii) Software refers to the programs and data used by a computer system to perform specific tasks. Example: Microsoft Word.
  - (b) Three functions of a computer operating system are:
    - (i) managing computer resources such as memory and processing power.
    - (ii) providing an interface for users to interact with the computer system.
    - (iii) running and managing software applications.
  - (c) Three applications of computers in agriculture are:
    - (i) precision farming using sensors and data analysis to optimise crop yields and reduce waste.
    - (ii) livestock management using data analysis and monitoring systems to track animal health and productivity.
    - (iii) **agricultural research** using computer simulations to model crop growth and test new farming techniques.
  - (d) Three areas where supercomputers can be used are:
    - scientific research running complex simulations and calculations for fields such as physics, chemistry, and biology.

- (ii) weather forecasting analysing large amounts of data to predict weather patterns and natural disasters.
- (iii) financial modeling running simulations and calculations for stock market analysis and risk management.
- (a) Geographical Information System (GIS)

   a computer system used to capture, store, manipulate, analyse, manage and present spatial or geographic data.
  - (b) Five components of an expert system are:
    - (i) **knowledge base** contains the information and rules used by the system to make decisions or provide advice.
    - (ii) inference engine uses the rules and information in the knowledge base to make decisions or provide advice.
    - (iii) user interface allows the user to interact with the system and receive advice or make decisions.
    - (iv) explanation system provides explanations for the system's decisions or advice.
    - (v) knowledge acquisition system

       allows the system to learn and
       improve over time by adding new
       information to the knowledge
       base.
- 3. (a) (i) 111010 base  $2 = 1 \times 2^5 + 1 \times 2^4 + 1 \times 2^3 + 0 \times 2^2 + 1 \times 2^1 + 0 \times 2^0 = 32 + 16 + 8 + 2 = 58$  base 10
  - (ii) 101011 base  $2 = 1 \times 2^5 + 0 \times 2^4 + 1 \times 2^3 + 0 \times 2^2 + 1 \times 2^1 + 1 \times 2^0 = 32 + 8 + 2 + 1 = 43$  base 10

- Data security and integrity: DBMS provides security measures to protect data from unauthorised access and ensures that the data is accurate and consistent.
- Data backup and recovery: DBMS provides mechanisms for backing up data regularly and recovering data in case of system failures or disasters.
- **12.** (a) Two factors that affect marketing strategy are:
  - Market conditions: The state of the market, including competition, customer preferences, and industry trends, can influence marketing strategy.
  - Internal factors: The organization's goals, resources, and capabilities can also impact the marketing strategy.
  - (b) Three elements of intellectual property are:
    - Patents: Legal rights granted to inventors for their inventions, giving them the exclusive right to use, sell, and license their inventions for a certain period.
    - Trademarks: A symbol, word, or phrase used to identify and distinguish a brand or product from others in the market.
    - Copyrights: Legal rights granted to the creator of an original work, giving them the exclusive right to use, distribute, and sell their work.

#### **Examination 5 Paper 2 Answers**

 (a) For each application, suggest one input device and give a reason for your choice.

Application	Input device	Reason for choice of device
Virtual reality application	VR headset	Because VR technology provides an immersive experience for the user, allowing them to interact with the virtual environment through head and hand movements.
A person with disability communicating with a computer system	Voice recognition software	Is because individuals with disabilities may have difficulty using traditional input devices like a keyboard or mouse, but can easily use their voice to communicate with the computer system.
Automatic stock control system at a supermarket Barcode scanner		Because barcode scanners can quickly and accurately scan the barcodes on products, allowing for efficient tracking of inventory levels.
Information kiosk at an airport using a GUI (graphic user interface)	Touch screen monitor	Because touch screen monitors provide an intuitive and user- friendly interface for users to navigate through the information kiosk's GUI.

(b) The main difference between off-theshelf and tailor-made software is that off-the-shelf software is pre-designed and packaged for a wide range of uses, while tailor-made software is custombuilt to meet the specific needs and requirements of a particular business or organisation.

#### **Examination 1 Paper 3 Answers**

Programmin	ıø (50	marks
i i ugi aminin	ig (Ju	mai KS

#### Question 1

🛃 Form1	-		×
ENTER AN INTEGER	5		
OUTPUT	You have enter	ed 5	
COMPUTE CLE	AR	EXIT	

#### □Public Class Form1

```
Private Sub btnclear_Click(sender As Object, e As EventArgs) Handles btnclear.Click
    txtnumber.Clear()
    txtoutput.Clear()
    End Sub
Private Sub btnexit_Click(sender As Object, e As EventArgs) Handles btnexit.Click
    Application.Exit()
End Sub
Private Sub btncompute_Click(sender As Object, e As EventArgs) Handles btncompute.Click
    txtoutput.Text = "You have entered " & txtnumber.Text
End Sub
End Class
```

#### **Question 2**



Table:	Student Name Student	Student Surname Student	Sex Student	Student No Student	DOB Student	Address Student
Sort: Show: Criteria: or:			-F-		>#1/1/2005#	
StudentRport	\				2	
Student	tRport	Stu	dent Surname		Student No	
Student I	tRport	Stu	dent Surname		Student No	
Studen Student I Jane Melissa	tRport	Stu Dul Joh	dent Surname be n		Student No N010 N009	
Student Student I Jane Melissa Mufaro	tRport Name	Stu Dul Joh Sar	dent Surname be n nu		Student No N010 N009 N001	
Studen Student I Jane Melissa Mufaro Ossam	tRport Name	Stu Dul Joh San Hw	dent Surname be n nu ata		Student No N010 N009 N001 N111	

#### **Examination 7 Paper 3 Answers**

#### Programming [50 marks]

1. Dim number\_in\_textbox As Integer

number\_in\_textbox = Val(TextBox1.Text) If number in textbox > 10 And number in textbox < 20 Then

MessageBox.Show("Number entered was: " & number\_in\_textbox) Else

MessageBox.Show("Number entered was not between 10 and 20") TextBox1.Text = "" End If

2. Here is the code for a VB.NET program that accepts marks of 20 students using an Input box and displays the highest mark:

Public Class Form1 Private Sub btnHighestMark\_Click(sender As Object, e As EventArgs) Handles btnHighestMark.Click 'declare an array to store marks of 20 students Dim marks(19) As Integer Dim highestMark As Integer = 0 'use a loop to get input for all 20 students For i = 0 To 19 marks(i) = InputBox("Enter the mark for student " & (i + 1)) 'check if the current mark is higher than the highest mark so far If marks(i) > highestMark Then highestMark = marks(i)