First Semester

Computer Studies

كلية الحرس التقنية

(Answers)

SULTANATE OF OMAN
MINISTRY OF EDUCATION

Marking Guide of Technical Diploma for Royal Guard

Technical College of Oman

2023/2024

Semester One – First Session

Subject: Computer Studies

مركز القياس والتقويم التربوي
The Center for Educational Assessment and Measurement (CEAM)

Note: There are 5 pages in this guide

First: Answers for the Multiple-Choice Items (6 Marks):

Item N.	Answer	Mark	Page(s)		Learning Level
1	D Motherboard.	1	7		Knowledge
2	B Trojan.	1	2		Application
3	C 32 bits.	1	19		Application
4	A Data Bus.	1	36		Knowledge
5	D 4.2 GHz	1	41		Application
6	C A step-by-step problem-solving procedure.	1	49		Knowledge

Second: Answers for the Extended Answer Items (24 Marks):

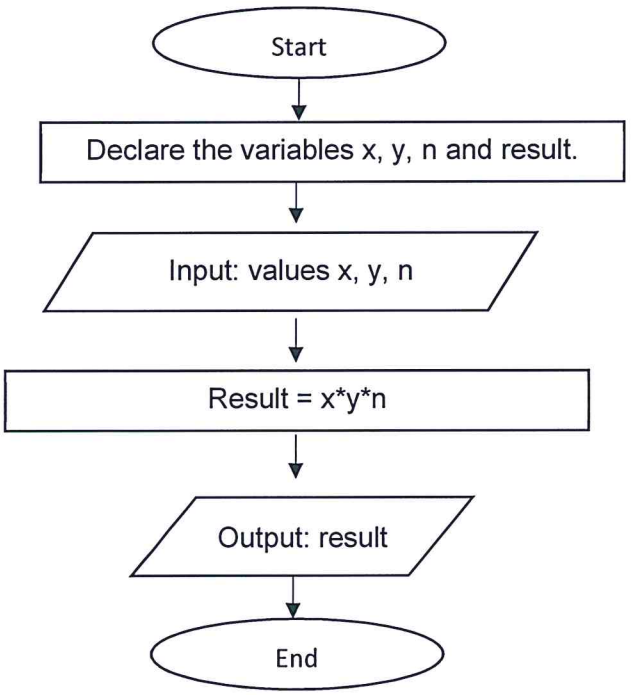
General Notes

- There may be different ways of answering questions, but a basic requirement for all answers is that they are RELEVANT.
- If the answer is clearly not relevant, and the student has clearly made no attempt to answer the question that was set, NO marks should be awarded. However, if the student has genuinely attempted the answer, but his answer is only partly relevant, then a reduced mark (not zero) should be awarded.

Item N.	Correct Answer	Mark	Page(s)		Learning Level
7	- Programmable Logic Controller (PLC) is a compact industrial computer designed to control system processes from one location. ***(2 marks)***	2	9		Knowledge
8	A. Process scheduling. ***(1 mark)*** B. Any of the following activities is acceptable. ***(1 mark)*** - Keeps track of processor and status of process. - Allocates the processor (CPU) to process. ***(1 * 2 = 2 marks)***	2	13		Knowledge
9	**Utility software primary function:** ***(0.5 mark)*** Assist a computer user to analyze, configure, optimize, or even maintain a computer. These kinds of software provide support to computer infrastructure. **Utility software Example:** ***(0.5 mark)*** System Utilities, Storage device management utilities, file management utilities, or any other relevant software. **Application software primary function :** ***(0.5 mark)*** Perform a specific task for a user. It acts as a mediator between the end user and system software. **Application software Example:** ***(0.5 mark)***	2	15-17		Knowledge

	Microsoft word, PowerPoint, database, Excel, Google chrome paint, Photoshop, or any other relevant software. ***(0.5 * 4 = 2 marks)***				
10	Von Neumann Architecture cannot read the instruction and read\write data at the same time because instructions and data are stored in the same memory. So the same buses are used to fetch instructions and data. ***(2 marks)***	2	37		Reasoning
11	A. a. RAM, ***(0.5 mark)*** b. Decode ***(0.5 mark).*** B. The bigger the cache size, the less time a processor must wait for instructions to be fetched ***(1 mark).*** ***(1 + (0.5 + 0.5))= 2 marks***	2	40-41		Knowledge
12	A. MDR\ Memory data register. ***(1 mark)*** B. MAR\ Memory address register. ***(1 mark)***	2	46		Application

Item N.	Correct Answer	Mark	Page(s)		Learning Level
13	A. Any two of the following answers are acceptable: ***(0.5 for the example and 0.5 for the definition). (0.5 * 4 = 2 marks)*** - **Computer Viruses:** is a program written to alter the way the computer operates, without the permission or knowledge of the user. A virus replicates and executes itself, usually doing damage to the computer. - **Spyware Threats:** is any program that monitors your online activities or installs programs without your consent for profit or to capture personal information. - **Hackers and Predators:** people who victimize others for their own gain by breaking into computer systems to steal, change, or destroy information as a form of cyberterrorism. - **Phishing:** phishers attempt to steal sensitive financial or personal information through fraudulent emails or instant messages. - ***B.*** Any four of the following are acceptable: ***(0.5 for each) (0.5 * 4 = 2 marks).*** - Access control: User authentication and Role based access control. - Firewall and network security. - System and software security updates. - Antivirus and anti-spyware software. - User training. - Password protection. - Using VPN.	4	2-9		Knowledge
14	***(2 marks for conversion & 2 marks for addition).*** Converting 200 to binary: 2^7 2^6 2^5 2^4 2^3 2^2 2^1 2^0 128 64 32 16 8 4 2 1 1 1 0 0 1 0 0 0 200 = 11001000	4	21-25		Application

	Adding 0110 to the result: 11001000 + 0110 11001110				
15	A. ***(0.5 for each correction, 0.5*4 =2 marks)*** Declare: Three variables x, y, n and **result.** **input**: values x, y, **n** Process: multiply x, y, and n. **output:** the result B. ***(1.0 mark)*** for the parts of the flowchart and ***(1.0 mark)*** for the good representation of each component in the flowchart. 	4	51		Reasoning

The End of the Marking Guide

SULTANATE OF OMAN
MINISTRY OF EDUCATION

Marking Guide of Technical Diploma for Royal Guard Technical College of Oman

2023/2024

Semester One – Second Session

Subject: Computer Studies

مركز القياس والتقويم التربوي
National Center for Educational Assessment and Measurement (CEAM)

Note: There are 9 pages in this guide

First: Answers for the Multiple-Choice Items (6 Marks):

Item N.	Answer	Mark	Page(s)	Learning Outcome	Learning Level
1	**B** ROM	1	7		Knowledge
2	**A** Phishing	1	3		Application
3	**D** 11000	1	25 – 28		Application
4	**C** Control unit, Arithmetic logic unit, Registers, Cache, Buses, and Clock	1	34		Knowledge
5	**D** 4.2 GHz.	1	41		Application
6	**A** provide a visual representation of the algorithm's logic	1	50		Knowledge

Second: Answers for the Extended Answer Items (24 Marks):

General Notes

- There may be different ways of answering questions, but a basic requirement for all answers is that they are RELEVANT.
- If the answer is clearly not relevant, and the student has clearly made no attempt to answer the question that was set, NO marks should be awarded. However, if the student has genuinely attempted the answer, but his answer is only partly relevant, then a reduced mark (not zero) should be awarded.
- Extra correct answers, and explanations related to some items are provided in the **Appendix.**

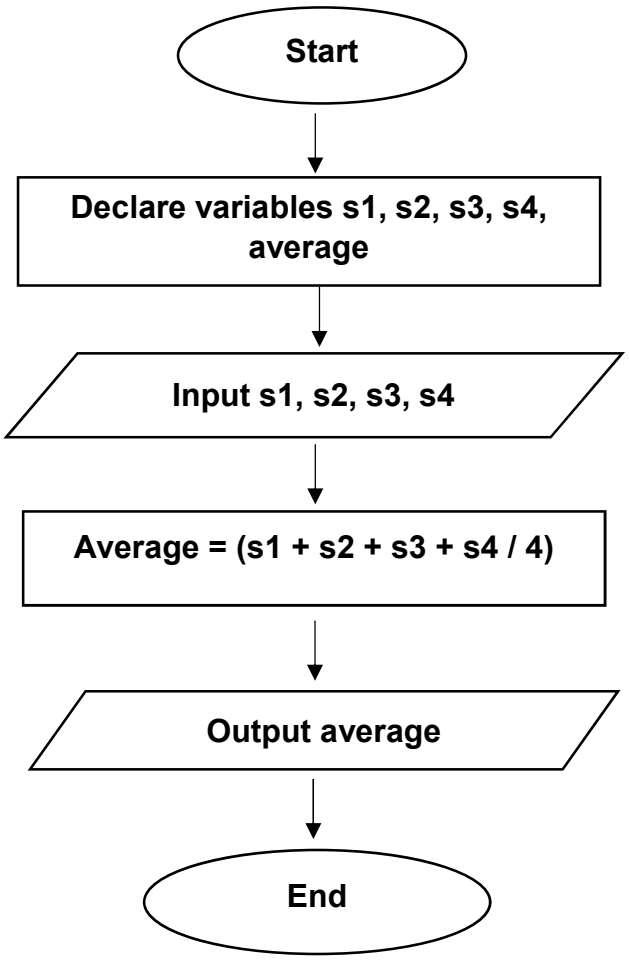
Item N.	Correct Answer	Mark	Page(s)	Learning Outcome	Learning Level
7	-two primary parts: -The **central processing unit (CPU).** (1 mark) -The **input/output (I/O) interface system.** (1 mark)	2	9		Knowledge
8	An operating system performs two main activities for processor management: • Tracking processor and process status using the scheduler. (1 mark) • Allocating the processor (CPU) to processes. (1 mark)	2	13		Knowledge
9	Any two of the following answers are correct: (0.5 mark for the type and 0.5 mark for the example) ***System Utilities*** **Examples:** Anti-virus, Diagnostic programs, Network utilities, Package Managers, Registry Cleaners, System monitors, and System profilers. ***Storage Device Management Utilities*** **Examples:** backup software, disk compression, disk defragmenters, disk formatters, disk partition editors, and disk space analyzers. ***File Management Utilities*** **Examples:** archivers, cryptographic utilities, data compression utilities, data conversion, data recovery, data synchronization, disk cleaners.	2	15		Knowledge
10	Cache memory in a processor speeds up a computer **by storing frequently used data and instructions**. This means the processor doesn't have to wait for them to be	2	35		Reasoning

	fetched from slower RAM, making tasks faster. Cache memory is also **faster than RAM**, so it **quickly provides the data the processor needs**, improving overall computer performance. So, the **bigger** its cache, the less time a processor must wait for instructions to be fetched. (2 marks) *Another correct answer. Please refer to appendix 1*				
11	**A. Multiprocessing** system has more than two processors. The CPUs are added to the system that helps to increase the computing speed of the system. (1 mark) **B. Multithreading** is a program execution technique that allows a single process to have multiple code segments. (1 mark)	2	44		Knowledge
12	**Situation A:** memory data register (MDR). (1 mark) **Situation B:** memory address register (MAR). (1 mark)	2	46		Application

Item N.	Correct Answer	Mark	Page(s)	Learning Outcome	Learning Level
13	Any four security measures from the following are correct (0.5 mark for name of the security measure and 0.5 for the discussion). The security measures: **1. Access Control:** ➢ **User Authentication:** Enforce strong password policies, multifactor authentication (MFA), and biometric authentication to verify the identity of users. ➢ **Role-Based Access Control (RBAC):** Assign permissions and access rights based on job roles and responsibilities to limit access to sensitive information. **2. Firewalls and Network Security:** A firewall acts as a barrier between your computer or network and the internet. It effectively closes the computer ports that prevent communication with your device. This protects your computer by stopping threats from entering the system and spreading between devices. It can also help prevent your data leaving your computer. **3. System and software security updates:** While software and security updates can often seem like an annoyance, it really is important to stay on top of them. Aside from adding extra features, they often cover security holes. This means the provider of the operating system (OS) or software has found vulnerabilities which give hackers the opportunity to compromise the program or even your entire computer. **4. Antivirus and anti-spyware software:** Any machine connected to the internet is inherently vulnerable to viruses and other threats, including malware, ransomware, and Trojan attacks. Antivirus software is not a completely fool proof option, but it can definitely help. Spyware is a specific type of malware that is designed to secretly infect a computer. It then sits in the system, gathers information, and sends it to a third party. The information is typically of a sensitive nature; such as credentials or banking information.	4	7-9		Knowledge

	5. User Training: Educate users about the importance of security practices, including safe web browsing, avoiding suspicious emails, and reporting security incidents. **6. Passwords protect your software and lock your device:** Most web-connected software that you install on your system requires login credentials. The most important thing here is not to use the same password across all applications. This makes it far too easy for someone to hack into all your accounts and possibly steal your identity. If you're having trouble remembering a whole bunch of passwords, then you could try a password manager. This will keep all your passwords safe, and you only have to remember one. A password can be combined with an email or SMS as part of a two-step verification (2SV) method for extra security. **7. Using VPN:** A Virtual Private Network (VPN) is an excellent way to step up your security, especially when browsing online. While using a VPN, all of your internet traffic is encrypted and tunneled through an intermediary server in a separate location. This masks your IP, replacing it with a different one, so that your ISP can no longer monitor your activity. A VPN encrypts the data transmitted between your computer and the VPN server. This means that even if someone intercepts the data, it would be in an encrypted form, making it extremely difficult to read or decipher.				
14	**(2 marks for conversion)** **2 2 2 2 2 2 2 2** **128 64 32 16 8 4 2 1** **1 0 0 1 1 0 1 1** (1 mark for steps) **155 in decimal is 10011011 in binary.** **155 = 10011011** (1 mark for result)	4	21-31		Application

	(2 marks for subtraction) Subtract 0110 from 10011011. 10011011 - 0110 10010101 Therefore, **the result is 10010101 in binary.**				
15	***(2 marks for the algorithm and 2 marks for the flowchart)*** **Algorithm:** Declare: five variables s1, s2, s3, s4 and average. Input: Values of s1, s2, s3 & s4. Process: Calculate the average of s1, s2, s3 & s4. Output: The average. **Flowchart:** Here's a simple textual representation of the flowchart:	4	51		Reasoning



The End of the Marking Guide

Appendix 1

This appendix includes extra correct answers, other than those provided in the marking guide, which should be awarded marks.

Question Two: Item ten:

-Cache is a small amount of high-speed random-access memory (RAM) built directly within the processor. It is used to temporarily hold data and instructions that the processor is likely to reuse. This allows for faster processing as the processor does not have to wait for the data and instructions to be fetched from the RAM.

General Technical Diploma for
Royal Guard of Oman Technical College

Computer Studies

First Semester

First Session

2022/2023

Marks Scheme

Answers One: Multiple Choice [6 Marks]

Item	1	2	3	4	5	6
Answers	c	d	C	c	a	c

Answers Two: Filling the Gaps [6 Marks]

Item	Answers
7	Direct Memory Access (DMA) *or* Direct Access Memory (DM)
8	system utility
9	ALU or Arithmetic Logic Unit
10	Instruction
11	General purpose
12	Memory data or MDR

Answers THREE: Extended Response -1 [6 Marks]

13. (2 marks)

RAM *(1 Mark)*	ROM *(1 Mark)*
This memory stores operating system software, software applications and other information for the CPU to have fast and direct access when needed to perform tasks.	This memory stores the instructions that are required to start a computer (bootstrap).

14. (2 marks)

Memory management.

Processor management.

Device management.

File management.

Security.

Coordination between other software and users

0.5 Mark for each function

15. (2 marks)

2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0	
128	64	32	16	8	4	2	1	*1 Mark*
1	1	1	1	0	1	0	1	*1 Mark*

The Binary Value of 245 is 11110101

Answers Four: Extended Response -2 [6 Marks]

16. (2 marks)

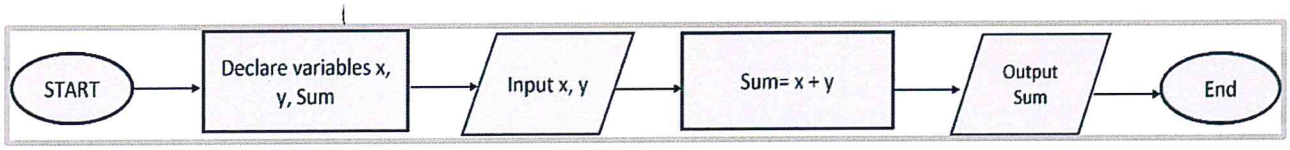
	bytes	bits
Peace	**5** *(0.5 Mark)*	**40** *(0.5 Mark)*
Musandam	**8** *(0.5 Mark)*	**64** *(0.5 Mark)*

17. (2 marks)

- It fetches, decodes, and executes instructions
- It issues control signals that control hardware
- It moves data around the system.

1 Mark for each function

18. (2 marks)



1 Mark for the input/output shape correction, and 1 mark for the direction correction

Answers Five: Extended Response -3 [6 Marks]

19. (2 marks)

a) 00101 *(1 Mark)*

b) the decimal number for 11011 is equal to 27 *(0.5 Mark)*

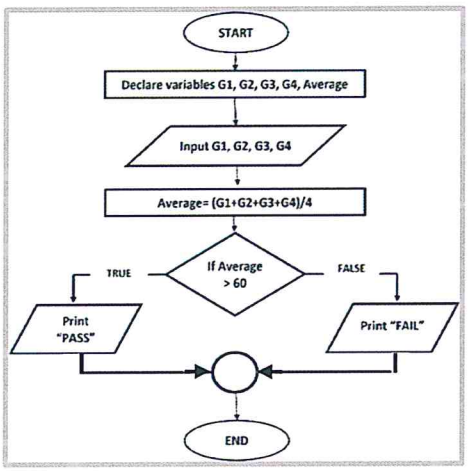
the decimal number for 10110 is equal to 22 *(0.5 Mark)*

the decimal number for 00101 is equal to 05

20. (2 marks)

The higher the clock speed, the faster the processor perform the instructions in a given moment of time.
Or
The higher the frequency in the clock, the more instructions can be performed in a given moment of time.

21. (2 marks)



1 Mark for the completeness of flowchart, and 1 mark for using the correct shapes and directions

General Technical Diploma for

Royal Guard of Oman Technical College

Computer Studies

First Semester

Second Session

2022/2023

Marks Scheme

Answers One: Multiple Choice [6 Marks]

Item	1	2	3	4	5	6
Answers	c	d	B	d	b	c

Answers Two: Filling the Gaps [6 Marks]

Item	Answers
7	Non-Volatility
8	Anti-Virus
9	Buses
10	Pipelining
11	Memory Address Register (MAR)
12	Memory Data (MDR)

Answers THREE: Extended Response -1 [6 Marks]

13. (2 marks)

A

The main function of the motherboard is to integrate all the components so they can communicate and operate together. *1 Mark*

B

CPU-RAM-DRIVES-POWER SUPPLY. *1 Mark (0.5 Mark for each component)*

14. (2 marks)

-Backup Software
-Disk Checkers
-Disk Defragmenters
-Disk Formatters
-Disk Partition

0.5 Mark for each software

15. (2 marks)

2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0	
128	64	32	16	8	4	2	1	*1 Mark*
1	1	0	1	0	1	0	0	*1 Mark*

The Binary Value of 212 is 11010100

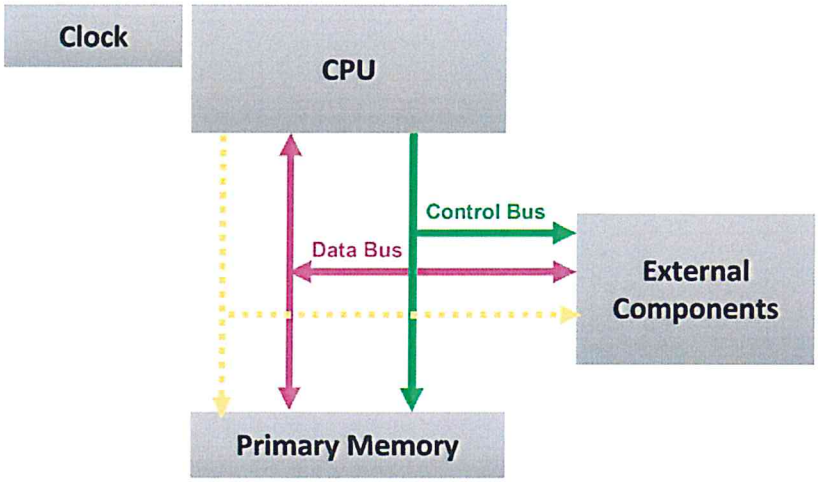
Answers Four: Extended Response -2 [6 Marks]

16. (2 marks)

11100011

17. (2 marks)

a) *1 Mark*



b) *1 Mark (0.5 Mark for each bus)*

The data bus carries the actual data between the processor and other components.
The Control bus carries the control signals and the clock's pulses from the processor to other components.

18. (2 marks)

The algorithm with mistakes:	The correct algorithm
Declare: Three variables x, y, and n. Output: values x, y, Process: multiply x, y, and n. Input: result	**Declare: four variables x, y, n and result.** *0.5 Mark* **input: values x, y, n** *1 Mark* **Process: multiply x, y, and n.** **output: result** *0.5 Mark*

Answers Five: Extended Response -3 [6 Marks]

19. (2 marks)

a) 10101101 *(1 Mark)*

b) the decimal number for 10110111 is equal to 183 *(0.5 Mark)*

the decimal number for 0001010 is equal to 10 *(0.5 Mark)*

the decimal number for 10101101 is equal 173

20. (2 marks)

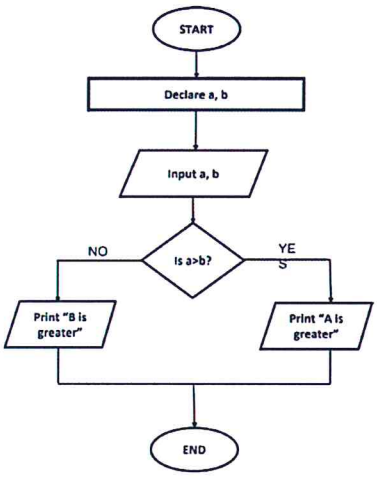
A

To coordinate all of the computer's components. It sends out a regular electrical pulse which synchronizes (keeps in time) all the components. *(1 Mark)*

B

- The Higher the clock speed (the frequency of the clock pulses)، the faster the processor perform the instructions in any given moment of time *Or* the higher the frequency in the clock, the more instructions can be performed in a given space of time. *(1 Mark)*

21. (2 marks)



1 Mark for the completeness of flowchart, and 1 mark for using the correct shapes and directions

General Technical Diploma for Royal Guard of Oman Technical College

Computer System principles and practice

BTEC National Diploma

First Session

2021/2022

Marks Scheme

Question One: Multiple Choice (6 Marks)

1) Which of the following is an example of an external computer component?
   A. Central Processing Unit
   B. Random Access Memory
   C. Universal Serial Bus port
   D. USB Drive

2) A person who uses his or her expertise to gain access to other people's computers to get information illegally or do damage is called a:
   A. Analyst
   B. Hacker
   C. Spammer
   D. Firewall

3) Which one of the following options is not a valid value of the hexadecimal (Base-16) number system?

   a. 23HF3E

   b. EE429C

   c. B1998F

   d. 100100

4) Calculations are done in the CPU, and decisions are made in the:

   a. Registers

   b. Cache

   c. Arithmetic Logic Unit

   d. Clock

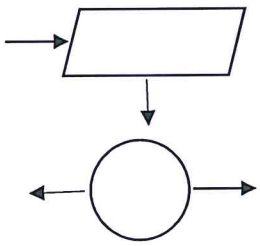
5) In the event of an overlap, what is the technique used to deal with this problem?
   A. Pipelining
   B. A small amount of memory which is a part of the CPU CONTROL
   C. A processing unit within a CPU
   D. High-speed random-access memory

6) Regarding the rules of flowcharts, which of the following shapes is correct?

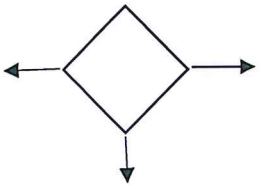
A.



B.



C.



D.

Question Two: Fill the gaps (6 Marks)

1) Direct access memory (DAM) is a method that allows an input/output (I/O) device to send or receive data directly to or from the main memory, bypassing the CPU to speed up memory operations.

2) Ahmed was browsing the internet. While browsing he clicked on a link that downloaded a free game from some un-verified source. What kind of malware could be hidden in the downloaded file? Trojan Horse

3) Seven megabytes (7 MB) of data is equal to 7168 kilobytes(KB).

4) The CPU regularly sends signals to synchronize all other hardware components. The component responsible for synchronization is the clock.

5) One of the reasons behind the increase of the computing speed in a multiprocessing system is the number of Cores/CPUs.

6) Graphic representation of an algorithm is known as a flowchart.

Question Three: Extended Response -1 (6 Marks)

1. List four types of industrial applications.
   - Manufacturing applications
   - Automotive applications
   - Aerospace applications
   - Process applications

2. What is a Programmable Logic Controller (PLC)? Write one example where a PLC is used?
   PLC, or programmable logic controller, is a compact industrial computer designed to control system processes from one location.
   Traffic light signals are a great example of a PLC application. Instead of having someone reading data and pushing buttons, there is now a PLC system in place to control and monitor this function within one unit.

3. Write four important functions of an Operating System
   - Memory Management
   - Processor Management
   - Device Management
   - File Management
   - Security
   - Coordination between other software and users

Question Four: Extended Response -2 (6 Marks)

1. Identify the security threats based on the given scenarios

Scenario	Security Threats
When you browse the internet this program tracks your online activities without your permission and captures your personal information.	Spyware
You have received a fraudulent email (as if from a bank) informing you that you have won some prize money and have been asked for your bank account or card details in order to credit the amount.	Phishing
An unknown person gains access into your school network to access and change the email passwords and delete files. Who is this person?	Hacker
A program that replicates and executes itself, usually doing damage to your computer in the process.	A virus

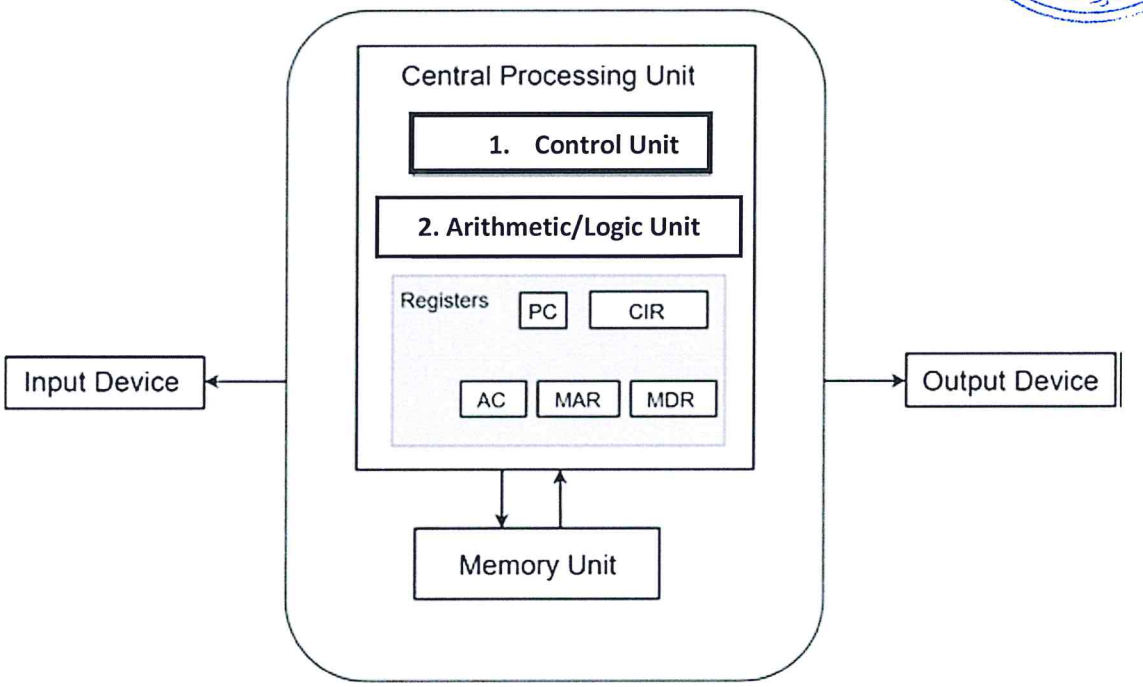
2. Convert 42 to a binary number and add (01011100) to the result of the conversion. (Show the conversion in clear steps).

42= 00101010

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

00101010 + 01011100= 010000110

3. Complete the missing components and write one function for each.



1. **Control Unit:**
   - Fetches, decodes and execute instructions.
   - Issue control signals that control hardware.
   - Moves data around the system
2. **Arithmetic logic unit**
   - Perform arithmetic and logic operations
   - Acts as a gateway between primary memory and secondary storage. Data transferred between them passes through the ALU.

Question Five: Extended Response -3 (6 Marks)

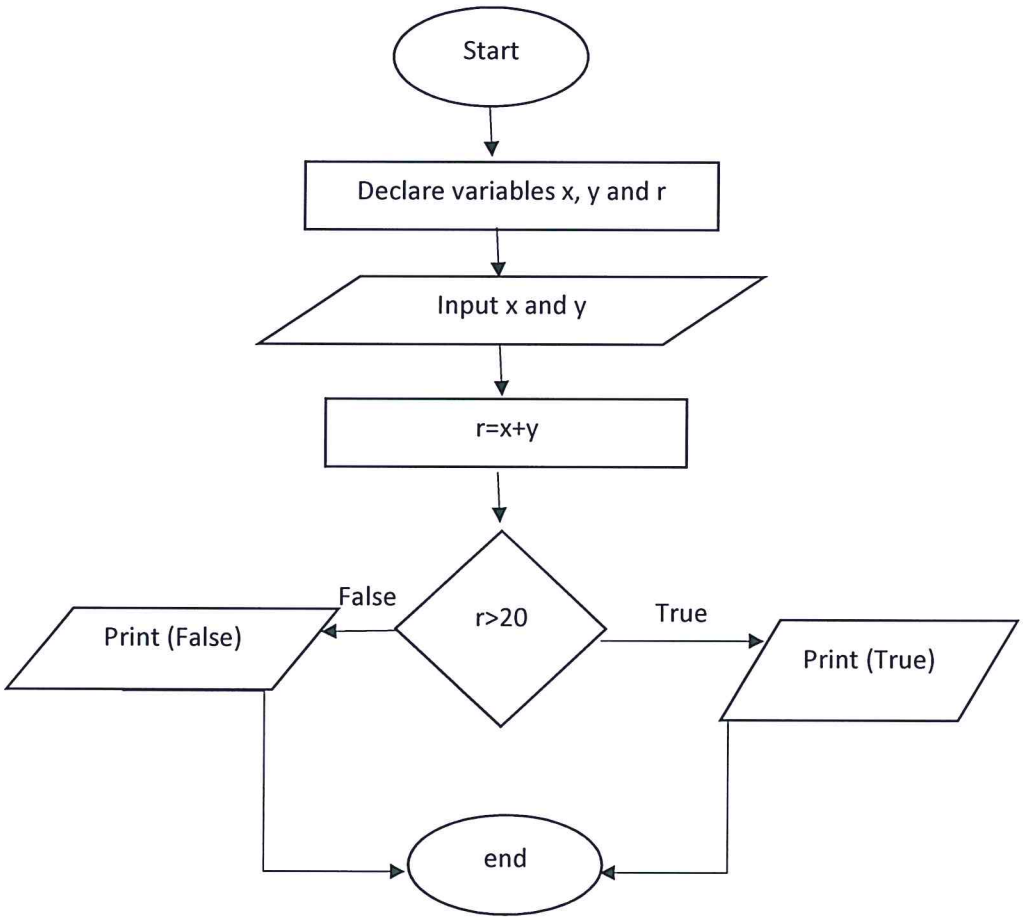
1. Explain how Cache size could affect the execution speed of a computer.

   The bigger its cache, the less time a processor must wait for instructions to be fetched

2. List three general-purpose register pairs and explain the purpose of these registers?

   register pairs - AX, BX, CX, DX,. These registers are used to store or copy temporary data, by using instructions, during the execution of the program.

3. Draw a flowchart to add two numbers (x and y) as entered by a user. If the result of the addition (r) is bigger than 20, print (True), otherwise print (False).



General Technical Diploma for Royal Guard of Oman Technical College

Computer System principles and practice

BTEC National Diploma

Second Session

2021/2022

Marks Scheme

Question One: Multiple Choice (6 Marks)

1. Which one of the following is an internal computer component?
   a. Headphone
   b. Heat sink
   c. Printer
   d. Joystick

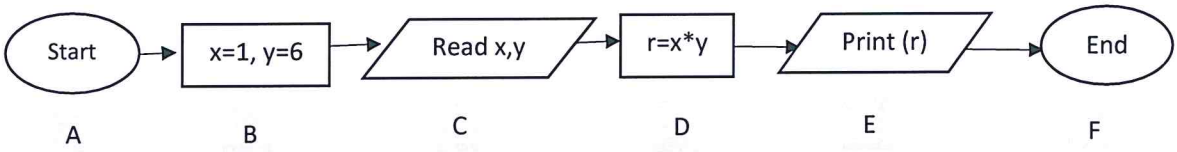
2. You have received a link via your WhatsApp from a stranger who asked you to send your credit card details in order to gift you some money. What type of threat is this called?
   a. Spyware.
   b. A virus.
   c. Phishing.
   d. Trojan.

3. 4 KB is equal to:
   a. 1024 bytes
   b. 2048 bytes
   c. 3072 bytes
   d. 4096 bytes

4. A small amount of high-speed memory contained within a CPU is called a:
   a. Memory Address Register (MAR)
   b. Memory Data Register (MDR)
   c. Cache
   d. Read Only Memory (ROM)

5. A program execution technique that allows a single process to have multiple code segments is called:
   a. Multithreading.
   b. Multiprocessing.
   c. The memory size
   d. Pipelining

6. The letter that indicates the output in the following flowchart is:



A B C D E F

a. A and B
b. F
c. E
d. C and E

Question Two: Fill the gaps (6 Marks)

1. **Programmable logic controller/ PLC** is a compact industrial computer designed to control system processes from one location.

2. Ahmed visited an unverified website and downloaded a free game in his device. He thought that it was an actual game, but it hid a malicious code. This type of security threat is called a **Trojan Horse**

3. All the data transmitted between digital devices is encoded as **bits**

4. When data, addresses, and control signals are sent to other components in a computer, they are transmitted through **Buses**

5. The **instruction set** is a set of binary or hexadecimal codes that provides commands to the processor.

6. Ali is given a task of developing an application for a school where he needs to describe the given sentences, words and mathematical expressions given to him

into a tool before writing the actual program. The tool referred to here is called **Pseudocode**

Question Three: Extended Response - 1 (6 Marks)

1. What is an application? Write two examples of Automotive applications.
   An application is a software program that runs on a computer.
   Steering System/ Braking System/Engine Management.

2. List four of the internal components of a computer.
   Motherboard, Central Processing Unit, Random Access Memory, Read Only Memory, Direct Access Memory, Address Bus, Control Bus, System Bus.

3. Write four important uses of utility software.
   - They help to scan the computer for viruses (antivirus)
   - They help in File compression (E.g. WinZip)
   - Can help backup your information stored on your disk
   - Assist in encrypting and decrypting files (cryptographic software)
   - Utility programs can help remove unnecessary files on your computer.

Question Four: Extended Response – 2 (6 Marks)

1. Specify the potential risk and write the solution for the following scenarios in the given columns:

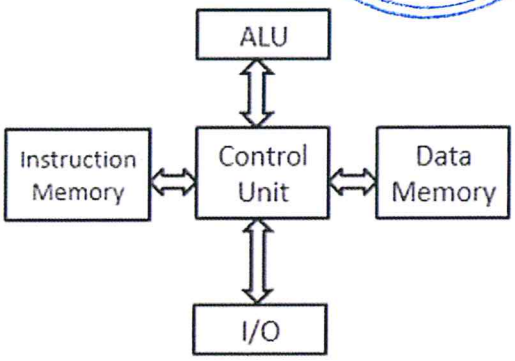
Scenario	The potential risk	Solution
Ali connected his laptop to an unknown network hence his laptop has a vulnerability of threats.	Open port/ Trojan/Phishing	Enable firewall
Sara adjusted Google Chrome browser settings and lowered the level of privacy and security options.	Increase the risk of malware attack /Trojan/Phishing	Adjust browser settings

2. Find the sum of binary values 1010 and 1010, and convert the result to denary number.

```
  1010
  1010
 ......
 10100
```

$(10100)_2 = (1x2^4)+(0x2^3)+(1x2^2)+(0x2^1)+(0x2^0)=(20)_{10}$

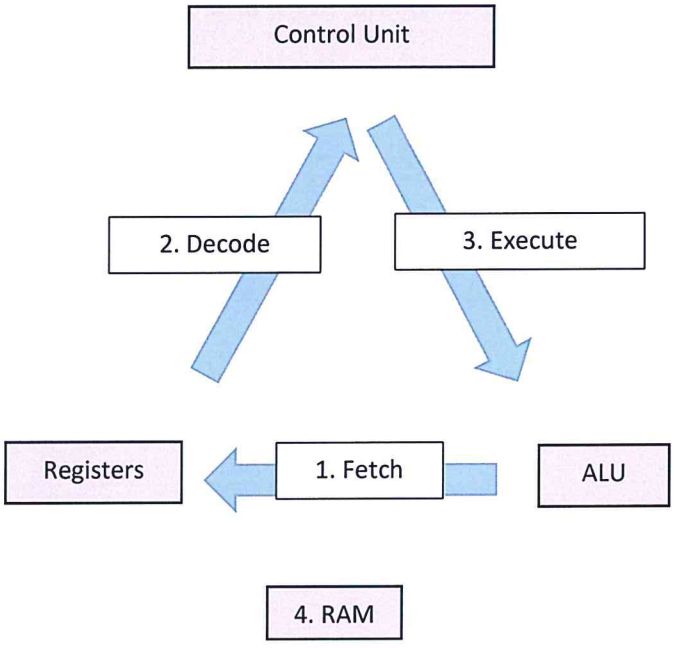
3. Draw the components of Harvard architecture



Harvard Model

Question Five: Extended Response – 3 (6 Marks)

1. Complete the following chart that describes the sequence of steps that the CPU follows to process instructions.



2. Write the difference between a general-purpose register and a special purpose register in terms of its use in the table below.

General-Purpose Register	Special Purpose Register
Used to store temporary data during different operations in a microprocessor.	Used to control or monitor various aspects of a microprocessor's function.

3. Draw the flowchart for finding the Addition of **3** and **5**.

