

## **Aga Khan University Examination Board**

### **Notes from E-Marking Centre on HSSC-I Computer Science Examination May 2018**

#### **Introduction:**

This document has been produced for the teachers and candidates of Higher Secondary School Certificate (HSSC-I) Computer Science. It contains comments on candidates' responses to the 2018 HSSC-I Examination, indicating the quality of the responses and highlighting their relative strengths and weaknesses.

#### **E-Marking Notes:**

This includes overall comments on candidates' performance on every question and *some* specific examples of candidates' responses which support the mentioned comments. Please note that the descriptive comments represent an overall perception of the better and weaker responses as gathered from the e-marking session. However, the candidates' responses shared in this document represent some specific example(s) of the mentioned comments.

Teachers and candidates should be aware that examiners may ask questions that address the Student Learning Outcomes (SLOs) in a manner that requires candidates to respond by integrating knowledge, understanding and application skills they have developed during the course of study. Candidates are advised to read and comprehend each question carefully before writing the response to fulfill the demand of the question.

Candidates need to be aware that the marks allocated to the questions are related to the answer space provided on the examination paper as a guide to the length of the required response. A longer response will not in itself lead to higher marks. Candidates need to be familiar with the command words in the SLOs which contain terms commonly used in examination questions. However, candidates should also be aware that not all questions will start with or contain one of the command words. Words such as 'how', 'why' or 'what' may also be used.

#### **General Comments:**

In general, questions related to software development life cycle (SDLC), computer networks, applications and uses of computers, searching through the internet, computer virus and computer architecture were well attempted. However, questions based on input/ output devices, storage devices, storage capacity, OSI model and spreadsheet (MS Excel) were generally not well attempted.

**Detailed Comments:**

**Constructed Response Questions (CRQs)**

**Question 1a:**

Amjad has recently joined an organisation as a civil engineer. He needs a number of input and output devices to perform various tasks at the office. Suggest ONE appropriate device to perform each task.

- i. He needs a device with built-in CAD programs for designers. The device would move pens of different colours in vertical and horizontal directions to draw on paper while the paper remains stationary.
- ii. He needs a device that prints coloured printouts of documents containing photos with vivid colours and high contrast.
- iii. He requires a device which converts handwritten documents into digital form which can be stored and viewed on the computer.

*Better responses* showed a good understanding of the use of input and output devices and wrote the names of devices that best fit the scenario given in this question, i.e. flat-bed plotter, inkjet printers and scanner for part i, ii and iii respectively.

**Example (i):**

Flat bed plotter

**Example (ii):**

Inkjet Printer

**Example (iii):**

Scanner

*Weaker responses* exhibited that candidates did not pay attention to the description of given scenario and wrote the general names rather than writing types of the names such as plotter instead of the flat-bed plotter, printer instead of inkjet printer and optical character reader instead of a scanner. However, few of these responses were able to understand the scenario for the scanner given in the question and wrote scanner in part iii.

**Example (i):**

Plotters.

**Example (ii):**

Laser printer.

**Example (iii):**

Optical character reader

**Question 1b:**

Describe the following two phases of the system development life cycle.

- i. System Analysis
- ii. System Design

*Better responses* depicted good understanding of software development life cycle (SDLC) and described its two phases that were asked in this question, i.e. system analysis and system design and wrote such as system analysis phase is concerned with the specification of the system that it requires to achieve and in system design phase, specifications are converted into detailed charts.

**Example (i):**

The Programmers take analysis of current system by gathering data to know about the requirements of new system

**Example (ii):**

In this Phase Logical and Physical design should be make of a <sup>new</sup> ~~sys~~ system. It use Case tool for this Purpose.

*Weaker responses* failed to describe two phases of SDLC, i.e. system analysis and system design and described them in general words such as system analysis means to analyse the system and system design means to design the system.

**Example (i):**

In this Phase the System is analysed for other Phases

**Example (ii):**

In this phase the system is designed for manufacturing

**Question 2a:**

Name a storage device that uses the sequential memory access method.

(**Note:** Most of the candidates were not able to answer this question correctly.)

*Better responses* wrote the correct name of storage device that uses the sequential memory access method, i.e. magnetic tape.

**Example:**

Magnetic tape.

*Weaker responses* showed a poor conceptual knowledge of sequential memory access method and wrote the incorrect name of storage device that uses the sequential memory access method such as RAM/ floppy disk/ memory card/ hard disk/ ROM etc.

**Example:**

Memory card

**Question 2b:**

Show whether the given statements are TRUE or FALSE. Justify your answer with the help of working.

(Note: No marks will be awarded if working is not shown)

Statement	TRUE/ FALSE	Working
1536 GB is greater than 1.5 TB.		
700 KB is smaller than 1 MB.		
56320 bytes is equal to 55 KB.		
5200 bits is greater than 650 bytes.		

*Better responses* accurately identified the statements given in this question as true or false after doing the required working as shown in the example.

**Example:**

Statement	TRUE/ FALSE	Working
1536 GB is greater than 1.5 TB.	False	$1\text{TB} = 1024\text{GB} \text{ or } 2^{40}\text{bytes}$ $1.5\text{TB} = 1536\text{GB}$ so $1.5\text{TB} = 1536\text{GB}$
700 KB is smaller than 1 MB.	True	$1\text{MB} = 1024\text{KB} \text{ or } 2^{20}\text{bytes}$ $700\text{KB} < 1024\text{KB}$
56320 bytes is equal to 55 KB.	True	$1\text{KB} = 1024\text{bytes}$ $55\text{KB} = 56320\text{bytes}$
5200 bits is greater than 650 bytes.	False	$1\text{byte} = 8\text{bits}$ $650\text{bytes} = 5200\text{bits}$

Weaker responses were not able to identify the statements given in this question as true or false and nor they were able to perform the required working. However, few of these responses were able to identify the second statement as true and performed the required working as well.

**Example:**

Statement	TRUE/FALSE	Working
1536 GB is greater than 1.5 TB.	True	As 1024 GB is equal to 1TB.
700 KB is smaller than 1 MB.	True	As 1024 KB is equal to 1MB.
56320 bytes is equal to 55 KB.	True	As 1KB = 1024 Bytes.
5200 bits is greater than 650 bytes.	False	As 8 bits is equal to 1bytes so 5200 bits is almost equal to 650 bytes.

**Question 3a:**

In the open system interconnection (OSI) model, the protocol data unit (PDU) is the data which moves from one layer of the OSI model to another. At different layers of the OSI model, the PDU is given different names.

Some OSI model layers and names of PDUs are given below. Match the appropriate layer with the corresponding PDU with the help of an arrow.

**Name of OSI Model Layer**

**Name of PDU**

Physical Layer

Segment

Data Link Layer

Packet

Network Layer

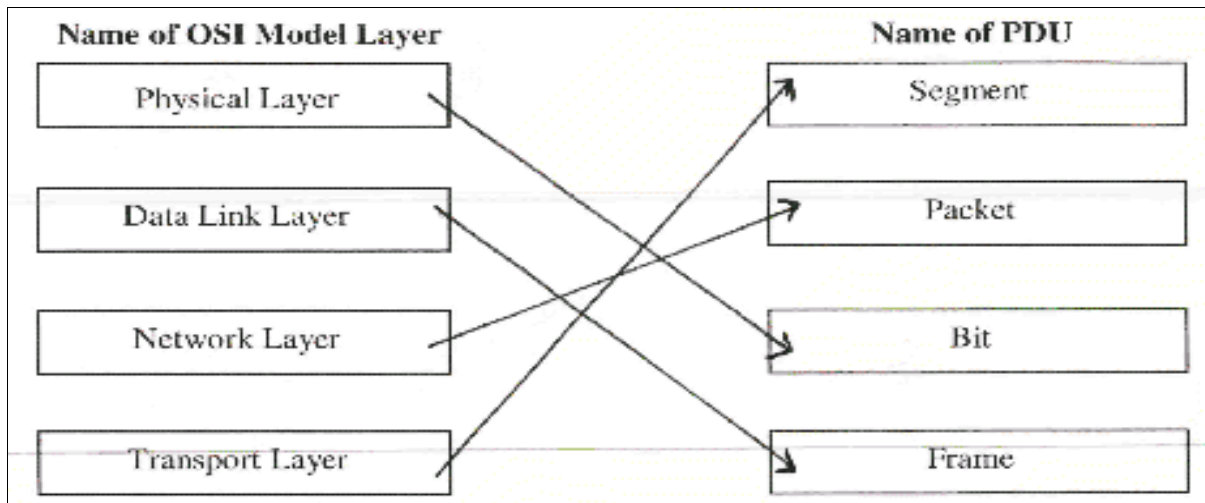
Bit

Transport Layer

Frame

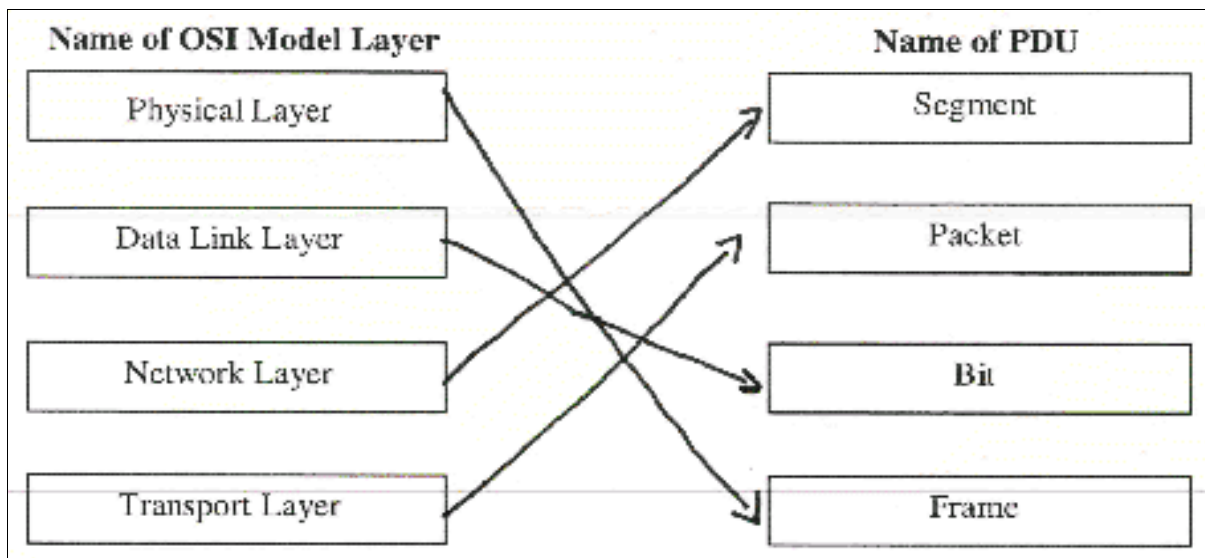
*Better responses* depicted good understanding of the type of data that moves across different layers of open system interconnection (OSI) model and matched the protocol data unit (PDU) with relevant OSI model layer correctly.

**Example:**



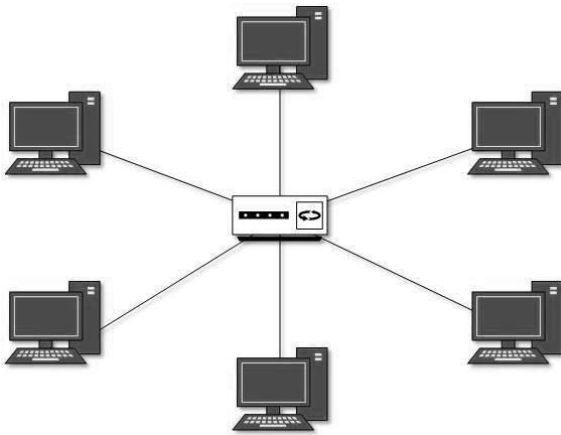
*Weaker responses* showed that candidates mixed the concept of PDU across different layers of the OSI model and matched PDUs with incorrect OSI model layer as shown in the example below.

**Example:**



**Question 3b:**

- i. Name the device to which all the computers are connected in the given star topology.



- ii. Mention any ONE advantage of using the bus topology instead of the star topology.

(Note: Most of the candidates performed well in this question.)

*Better responses* wrote the correct name of the device shown in the diagram given in the question, i.e. hub or switch. Moreover, these responses mentioned the correct advantage of bus topology over start topology such as bus topology is cheaper than start topology/ it required less cable length than a start topology/ it is easy to maintain/ it is easy to build small connections with the star topology.

**Example (i):**

Hub

**Example (ii):**

Bus topology is Cheap in Coast

*Weaker responses* mostly wrote the advantage of the bus topology over the star topology but they failed to identify the device given in the diagram of this question as a hub or a switch. These responses showed that candidates got confused among various communication devices such as router/ main server/ gateway etc. Likewise, few of these responses wrote the name and/ or the definition of the star topology instead of the hub or switch.

**Example (i):**

It is a router.

**Example (ii):**

① Bus topology requires less cabling (cable management) than star topology.

**Question 4a:**

Describe any THREE differences between peer-to-peer and client/ server network model.

Peer-to-Peer Model	Client/ Server Model

*Better responses* differentiated between peer-to-peer model and client/ server model by writing to the point and correct descriptions such as in client/ server model each client is connected to a server but in peer-to-peer model all nodes can as both client and server/ peer-to-peer model is used by home users but client/ server model is used by large organisations/ peer-to-peer model is less secure but client/ server model is more secure/ peer-to-peer model is cheaper than client/ server model.

Example:

Peer-to-Peer Model	Client/Server Model
1. There is no server in the Peer-to-Peer network.	There is one server and other PCs are clients.
In Peer-to-Peer model, every PC has the same relationship as other PCs. <del>Peer</del> No one has to ask for permission for accessing any file.	The server is the main PC where the clients are connected to it. The client PCs have to take permission of the <sup>document</sup> server to share or access any A.
It is less secure, because everyone can see each other's personal information.	It is more secure because the records are kept and maintained in the server PC.

Weaker responses depicted that most of the candidates were confused between peer-to-peer model and client/ server model and swapped their differences with each other. Likewise, some of these responses differentiated these models on the basis of interruption in their physical layout (topology). However, some of these responses wrote a common difference, i.e. there is specific server and client connected to that server in the client/ server model but each node is equal in a peer-to-peer model.

Example:

Peer-to-Peer Model	Client/Server Model
In a Peer-to-Peer model all the computers/nodes are connected to each other.	In client server model <sup>one</sup> the client PC <sup>is</sup> connected to a server and others are connected with it in a sequence.
There is no <del>server</del> server PC, the starting point <del>is</del> or PC is the initial node.	There is a server (main PC) that stores all the information.
If a connection is broken from somewhere it does not affect whole system. <del>as an alternative node is present.</del>	If the connection <sup>is broken</sup> from somewhere the whole system goes down.

**Question 4b:**

The computer is an essential hardware component of a computer network.

List the names of any TWO other hardware components, other than the computer, that are required for a computer network.

*Better responses* depicted that candidates had a clear understanding of components of a computer network and listed the names such as network interface card (NIC), hub, router, modem, cables, etc.

**Example:**

1) Network Interface Card. (NIC)  
2) Router

*Weaker responses* failed to list the names of components required in a computer network and listed the names such as printer, scanner, mouse, keyboard, etc.

**Example:**

(i) Printers.  
(ii) Scanners.

**Question 5a:**

Write ONE difference between guided and unguided media and give an example of unguided media.

*Better responses* showed that candidates knew the key difference between guided and unguided media, i.e. guided media transfer signals on physical path but unguided media transfer signals through the air. Moreover, these responses gave a correct example of unguided media such as radio waves, microwave, infrared, Bluetooth, WiFi, mobile signals, satellite transmission, WiMAX, cellular transmission, etc.

**Example:**

Guided media is bounded media or wired.  
Unguided media is unbounded or wireless, as it data travels in the form of signals. The example of unguided media is radiowaves, satellite.

Weaker responses mostly wrote the difference between guided and unguided media but they either did not give an example of unguided media or wrote the incorrect example such as USB, web pages, popups, wireless modem, etc.

**Example:**

In guided media, the transmitter and receiver are connected with physical wires.  
In unguided media, the transmitter and receiver are not physically connected.

**Question 5b:**

Describe simplex and half-duplex communication mode and give an example for each.

Better responses correctly described simplex and half-duplex communication modes with the help of correct example for each mode such as the simplex transmission is the one in which data is sent in one direction only. Examples are radio transmission, tv transmission, keyboard, mouse, printer, etc. The half-duplex transmission can send data in both directions but only in one direction at a time/ sender and transmitter sends and/ or receives data one by one. Examples are walkie talkie and wireless transmitter.

**Example:**

Simplex Mode: In this type of mode data is sent only in one direction which is from sender to receiver. In this mode data can't be received. Example: Radio & television.  
Half Duplex Mode: In this type of mode data can be sent in both directions but not simultaneously only one at a time. Example: Walkie-Talkie.

Weaker responses exhibited that candidates mixed the concepts of the simplex with the half duplex and the full duplex with the half-duplex communication modes. Moreover, these responses gave irrelevant examples of simplex and half-duplex modes such as walkie-talkie is an example of simplex and telephone is an example of half-duplex.

**Example:**

① Simplex:- In simplex mode data is transferred one way at a time, from source to receiver or vice versa. Example of Simplex mode is TV antenna, signal.  
② Duplex:- In duplex mode data can be transferred both ways at a time, it is sent and received at a time. Example of Duplex mode will be telephone communication.

**Question 6:**

Computer-controlled robots have minimised human labour in different industries.

Describe any FIVE advantages of using robots instead of humans in industries.

(Note: Most of the candidates performed well in this question.)

*Better responses* showed that candidates had a good conceptual understanding of the uses of computers in different fields of life and wrote the relevant advantages of using robots instead of humans in industries. For example, they can do repetitive work easily/ they can work 24 hours a day due to which production will increase/ robots do lesser mistakes than humans until there is some issue in their hardware or software/ robots can lift heavy objects easily/ they can work in those environments that are dangerous for humans.

**Example:**

- 1) As compared to humans, robots do not get tired, they perform their task with same precision and accuracy.
- 2) Robots are much faster than humans in performing tasks, that's why they are time saving.
- 3) Robots are capable of doing very dangerous tasks that humans cannot do.
- 4) Robots cut labour costs, therefore more money can be spent on Industrial work instead of labour.
- 5) Humans sometime can produce errors in performing tasks while robots cannot produce errors until there is bug in program.

*Weaker responses* mostly wrote two or three most common benefits of using robots instead of humans in industries such as robots can work faster than humans/ robots can work without taking rest/ robots do not need salary/ robots can do the dangerous tasks that humans cannot do etc. However, these responses also mixed some uses of robots with benefits and wrote such as robots are used in showrooms to spray paints/ help paralyzed people/ weld the iron etc.

**Example:**

- 1) Robots is automated programmable machine. robots used as a human being in industries.
- 2) Robots work rapidly as a car.
- 3) Robots are used in Showrooms to spray-painting cars.
- 4) Robots speed Fast and it is expensive.
- 5) Robots are easy way for the peoples.  
= they can do anything.  
Robots helped for paralyze people. in Industries.

**Question 7a:**

Describe any FIVE benefits of using blogs for teaching and learning.

*Better responses* accurately described benefits of blogs for teaching and learning and wrote such as easy access to information/ time saving/ cost saving because no printed books are required/ students can discuss topics through comments section/ students can view their progress etc.

**Example:**

1. A student can learn at his own pace.
2. It is cost-effective.
3. We can learn anywhere at any time.
4. Students are not bounded by time.
5. It <sup>is</sup> can be an effective way to educate a large number of people.
6. A student can learn more and repeat the same thing as much times as needed.
7. It is an attractive and interactive way of learning.

*Weaker responses* wrote irrelevant and general responses of using blogs in teaching and learning such as learning is easy with blogs/ blogs provide helpful information/ blogs explain with examples/ more information is given on the blogs/ blogs will help to focus more/ blogs will make teaching and learning more understandable etc.

**Example:**

- 1) using blogs it easy to learn and teach it provide you shorts discription.
- 2) blogs provide you word to word learning things
- 3) blogs provide you information thats help you.
- 4) blogs explain every thing with a examples.
- 5) blogs contain small thing but good learning.

**Question 8:**

- i. Define the term 'search engine'.
- ii. Zain wants to search for latest books on Computer Science (not older than one month) over the internet. The steps to carry out this search are given below. Arrange these steps in the correct sequence.

Step Number	Steps to Search a Book Using Internet	Correct Sequence Number
1	Type relevant keywords or phrases that best describe the book to be searched.	
2	Go through the list of fetched web pages to find the required content.	
3	Open any famous search engine in a web browser.	
4	Select book option and click the Search button to search the required book on the Internet.	

*Better responses* wrote the correct definition of 'search engine' such as a program that searches and identifies items in a database that correspond to keywords or characters specified by the user, finding particular web sites on the World Wide Web. Moreover, these responses demonstrated a good conceptual understanding of searching via search engine as shown in the example.

**Example (i):**

Search engine is a website that helps the user to find any website/information from the internet.

**Example (ii):**

Step Number	Steps to Search a Book Using Internet	Correct Sequence Number
1	Type relevant keywords or phrases that best describe the book to be searched.	2
2	Go through the list of fetched webpages to find the required content.	4
3	Open any famous search engine in web browser.	1
4	Select book option and click Search button to search the required book on Internet.	3

Weaker responses wrote irrelevant or incorrect definition of search engine such as it is an engine which is used to find things we need/ it is a box where we can search anything using the internet/ it is the information which we have searched/ it is very important and people use it for search/ it is a program used to search any term/ it is an online server which connects us with another online server etc.

Moreover, most of these responses demonstrated a lack of understanding of searching over search engine and did the common mistake of marking sequence number 1 instead of 4 and vice versa.

**Example (i):**

Search engine is a online server which connects our computer with other server available online

**Example (ii):**

Step Number	Steps to Search a Book Using Internet	Correct Sequence Number
1	Type relevant keywords or phrases that best describe the book to be searched.	3
2	Go through the list of fetched webpages to find the required content.	1
3	Open any famous search engine in web browser.	4
4	Select book option and click Search button to search the required book on Internet.	2

**Question 9:**

Consider the MS Excel table shown below.

	A	B	C	D	E	F	G
1	<b>Student Exam Performance</b>						
2	<b>Name of Student</b>	<b>Physics</b>	<b>Math</b>	<b>Computer Science</b>	<b>Maximum Marks</b>	<b>Obtained Marks</b>	<b>Percentage</b>
3	Kashif Ahmed	91	92	97	300	280	93.333333
4	Abdullah Tayab	76	62	55	300	193	64.333333
5	Sana Fatima	85	74	79	300	238	79.333333
6	Farah Khan	90	79	81	300	250	83.333333
7	Syed Jamal	51	59	61	300	171	57

By using the above-given table, write the MS Excel formula to

- calculate Obtained Marks of Sana Fatima.
- calculate the average of obtained marks.  
(Note: Do not use SUM or Average functions.)
- calculate the Percentage of Abdullah Tayab.  
Mathematical formula of Percentage = (Obtained Marks ÷ Total Marks) × 100
- count the number of students who have obtained more than 70 marks in Math.

The performance of candidates in this type of question has improved slightly as compared to last year. There was no single candidate who obtained full marks last year but this year very few students have obtained full marks in this question. Approximately 55% of the students obtained 0 or 1 mark in this question. Most of such responses showed a good understanding of calculating the sum, average and percentage values in MS Excel using formulae and functions. However, these responses were not able to use IF and Count to complete the task given in part iv of this question.

**Example (i):**

$$= B5 + C5 + D5$$

**Example (ii):**

$$= (F3 + F4 + F5 + F6 + F7) / 5$$

**Example (iii):**

$$= (F4 / E4) * 100$$

**Example (iv):**

$= \text{COUNTIF}(C3:C7, ">70")$

*Weaker responses* demonstrated lack of MS Excel practice due to which they were not able to write the correct answers of the given tasks. Such responses added the obtained marks rather than writing the formula in task i; used mathematical symbols instead of MS Excel formulae; wrote the name of functions only rather than writing the function along with proper cell range; described the conditions and values in part iv rather than writing the proper IF and Count statement.

**Example (i):**

$= \text{SUM}(5B:5D)$

**Example (ii):**

$= ((3F + 4F + 5F + 6F + 7F) / 5)$

**Example (iii):**

$= ((F4 - E4) \times 100)$

**Example (iv):**

$= (C3 : C7 > 70)$

### Extended Response Questions (ERQs)

The following questions offered a choice between part a and b.

#### Question 10a:

- i. What is meant by 'computer viruses' and 'computer safety'?
- ii. Name any THREE anti-virus software.
- iii. Describe FIVE measures through which we can ensure computer security.

(Note: Approximately 57% of the candidates opted to part (a) of this question. However, they performed almost equally well in both parts of this question.)

*Better responses* correctly defined computer viruses and computer safety. Similarly, these responses wrote correct names of anti-viruses and described relevant measures to ensure the security of computer system such as do not download from any unknown or untrusted website/ use anti-virus software for regular scans/ do not use pirated software/ do not open email attachments coming from unknown sender/ avoid connecting a flash which is frequently used by a number of users etc.

#### Example:

(a)
i. computer viruses are programs designed to replicate themselves and harm <del>other</del> files
ii. (1) Norton Antivirus (2) McAfee antivirus (3) Avira antivirus
iii. (1) Do not download any files off of unknown or untrusted websites
(2) use an antivirus and run daily scans of your system
(3) do not use pirated software as they may contain viruses or be an old and easy unpatched version susceptible to hacks
(4) do not open email attachments from unknown senders
(5) run an antivirus scan on any new portable storage devices

Weaker responses were mostly able to define the computer viruses but these responses did not write the correct names of anti-virus software. Likewise, these responses failed to write the relevant measures to ensure the security of computer system such as delete data which is not required/ any type of virus cannot destroy files easily/ bank account information can be protected/ no one can see our personal data/ computer security is very important for the privacy of our computer.

**Example:**

~~Q10a: Computer security (A)~~  
It is a program that attached with the computer.  
Computer safety from virus for our personal data.  
ii) i) 'Avast' (ii) Cleaner. (iii) Fire wall.  
iii) 1) computer security is very important for privacy of our computer.  
2) Computer security is use in personal computers our personal data can save there.  
3) No anyone can see our personal data for the computer security.  
4) our Bank account numbers, images, videos and other information can be protected.  
5) Any type of virus cannot destroy our files easily.

**Question 10b:**

List FIVE different registers of a CPU. Describe the tasks performed by EACH to improve the performance of the CPU.

Better responses demonstrated a good understanding of the architecture of CPU and listed the five correct names of different registers of CPU along with appropriate tasks performed by each register. Most of these responses listed the register names such as Program Counter (PC), Instruction Register (IR), Memory Address Register (MAR), Memory Buffer Register (MBR) and Accumulator Register.

Example:

### CPU REGISTERS:

1. Program Counter
2. Instruction Register
3. Memory Address Register
4. Memory Buffer Register
5. Stack Pointer Register.

• **PROGRAM COUNTER:** It stores the address of next instruction that is to be fetched. After the instruction is fetched its value is incremented.

• **INSTRUCTION REGISTER:** It is used to store fetched instruction. The instructions are also decoded in this register.

• **MEMORY ADDRESS REGISTER:** It is used to store the address of memory that is used by CPU. When ever CPU wants to write and read data from memory it stores the address location of that memory in this register.

• **MEMORY BUFFER REGISTER:** It stores the data coming from the memory going to the memory.

• **STACK POINTER REGISTER:** Stack is a set of memory locations in which data is stored and retrieved in an order that is LIFO (Last in First Out).

Weaker responses mostly failed to write the names of registers and tasks performed by them. A few of these responses managed to write only names of registers correctly. These responses mixed up the tasks performed by registers or wrote irrelevant tasks for registers due to which their marks are deducted.

**Example:**

(b) CPU stand for cont Processing unit.

- It is brain of the computer
- It is very fast of the computer
- It cannot work without CPU
- It can perform any task without CPU

It is most important part of CPU

• There are different Registers

(i) Counter Program:

- (1) Instruction Register
- (2) Memory Address Register.
- (3) Memory Buffer Register.
- (4) A stack Register