

3.9 COMPUTER STUDIES (451)

The subject was tested using a theory paper (451/1), a practical paper (451/2) and a project paper (451/3) which is school based. Paper 1 consists of two sections: section A (40 marks), fifteen compulsory short answer questions of not more than four marks each and section B (60 marks), five questions of 20 marks each. The candidates are supposed to answer question 16 which is compulsory and any three other questions. The practical paper consists of two questions of 50 marks each. The project paper is usually developed by the Council but supervised and assessed in the schools by the subject teachers. The project scores are uploaded to the KNEC Assessment portal where they are standardized and combined with those from the practical paper to make to 100%.

This report is based on the analysis of performance of candidates who sat the year 2021 KCSE Computer Studies.

3.9.1 Candidates' General Performance

The table below shows candidates performance in Computer Studies (451) examination in the last 5 years 2017, 2018, 2019, 2020 and 2021.

Table 15: Candidates' Performance in Computer Studies for the last five years: 2017, 2018, 2019, 2020 and 2021

Year	Paper	Candidature	Maximum Score	Mean Score	Standard Deviation
2017	1		100	58.81	16.76
	2 & 3		100	62.07	14.16
	Overall	13,475	200	120.83	29.17
2018	1		100	51.93	17.09
	2 & 3		100	62.83	14.88
	Overall	15,162	200	114.73	30.26
2019	1		100	58.00	16.90
	2 & 3		100	64.00	13.54
	Overall	19,406	200	122.98	28.59
2020	1		100	62.5	16.89
	2 & 3		100	64.99	13.61
	Overall	25,704	200	127.41	28.45
2021	1		100	63.69	17.21
	2 & 3		100	63.95	13.65
	Overall	30,897	200	127.61	28.92

From the table above, it is observable that:

- (i) Candidature has continued to increase significantly.
- (ii) Candidature increased from **25,704** in **2020** to **30,897** in **2021** representing **20.20%** increment.
- (iii) Performance in *paper 1 (451/1)* improved minimally from a mean of **62.5** in **2020** to **63.69** in **2021**, representing **1.90%** increase.

- (iv) Performance in both the *practical paper (451/2)* and the project *paper (451/3)* declined slightly from a mean of **64.99** in 2020 to in **63.95** in 2021 representing **1.60%**. It is worth noting that this was the fourth time since KNEC introduced assessment of the project work in two milestones.
- (v) Overall performance in the subject improved from a mean of **127.61** (63.81%) in 2020 to **127.41** (63.71%) representing **0.1%** increase.
- (vi) The standard deviations for paper 1 and the combined papers 2 and 3 were also near ideal SD an indication that the candidates' scores were clustered efficiently in the normal curve.

3.9.3 ANALYSIS OF QUESTIONS PERFORMED POORLY

Questions which were performed poorly are analyzed and briefly discussed below. The discussion is based on the comments from the chief examiners reports and analysis of the candidates' responses from the sampled answer scripts. The discussion aims at pointing out candidates' weaknesses and proposed suggestions on the measures which if put in place the performance would improve.

3.9.3.1 Computer Studies Paper 1 (451/1)

Section A

Question 2

State four operations that may be performed on a file by an operating system. (2 marks)

Requirements

Candidates were expected to state operations performed on a file by an operating system.

Weaknesses

Most of the candidates could not state the operations performed by an operating system on a file.

Expected responses

- | | | |
|----------------------|-------------------|------------------------------------|
| - Renaming | - Saving | - Editing |
| - Creating | - Backing/Archive | - Updating |
| - Moving | - Matching | - Namming |
| - Copying | - Merging | - Recycle bin/Emptying |
| - Find/Searching | - Replacing | - Selection |
| - Compressing/Zip | - Opening | - Decompress/Unzip |
| - Creating Shortcuts | - Security | - Encrypting |
| - Hiding | - Printing | - Allocating storage space/Address |
| - Restore/Recovery | - Closing | |
| - Sorting | - Viewing | |

Advice to teachers

Teachers to exhaustively teach on operations performed on a file.

Question 6

When an image inserted in a desktop publishing document is selected, handles on its place holder appears. State **three** uses of these handles. (3 marks)

Requirements

Candidates were required to state uses of place holder handles on a DTP image.

Weaknesses

Candidates lacked understanding of the term handle as used in the desktop publishing image.

Expected responses

- Resizing the image
- Increase the image
- Decreasing the image
- Rotating the image
- Tilting the Image
- Stretching the image
- Changing shape
- Moving the image
- Flipping over the image

Advice to the teachers

Teachers should teach exhaustively on desktop publishing image editing.

Question 12

Describe each of the following features of a graphical user interface operating system:

- (a) Pointer (2 marks)
- (b) Desktop (2 marks)

Requirements

Candidates were required to describe pointer and desktop features as used in graphical user interface.

Weaknesses

Candidates lacked knowledge to describe pointer and desktop features of graphical user interface.

Expected responses**(a) Pointer**

It is a symbol that appears on the display screen which is moved using pointing devices to select an object or a command.

NB. Accept device name/definition of pointing device

(2 marks)

(b) Desktop

It is the area on the display screen where icons representing different programs are placed.

Advice to teachers

Teachers should exhaustively describe the features of a GUI.

Question 14

State the characteristics of an impact printer.

(3 marks)

Requirements

This question required candidates to state the characteristics of impact printers

Weaknesses

Candidates were unable to state in particular the characteristics of impact printers.

Expected responses

- Produces noise while printing
- There is physical contact with papers/striking
- Has low consumable costs
- Useful for bulk printing
- Can print **multipart** copies
- Has few colours
- Has poor graphics
- Low quality printouts/monochrome
- Is a character printer
- Has slow printing speed
- Has low resolution
- Has few fonts/limited fonts
- Has one size of font size
- Has one type of font style

Advice to the teachers

Teachers should thoroughly teach the characteristics of printers specifically impact printers and non-impact printers.

SECTION B

Question 16

(a) The following are segments of programming languages A and B respectively:

A 00100
00111

B SELECT name, class
FROM studentsDetails
WHERE House= "Athi Boys"

(i) Identify the generation of programming language used in each respective segment.

(2 marks)

(ii) State **two** advantages of each of the generation of programming language labelled A and B.

(4 marks)

- (b) An organisation intends to increase salaries of employees using the following rates:

Current Salary	Percentage Increment
Greater than or equal to 70 000	5%
Greater than 50 000 and less than 70 000	8%
Less than or equal to 50 000	10%

Write a pseudocode that reads the total population of employees in the organisation and then performs the following for each employee:

- Reads the current salary
- Compute the increment
- Display current salary, increment and the new salary.

Hint: increment 5 current salary 3 percentage increment rate

(9 marks)

Requirements

This question required candidates to identify the generation of programming language, state the advantages of each programming languages and write a pseudocode.

Weaknesses

Candidates lacked knowledge of programming languages and sufficient knowledge on the different control structures as used in algorithms.

Expected responses

- (a) (i) A – First Generation (1 GL)/Machine level/low level **1 mark**
 B – Fourth Generation (4 GL)/High level/SQL **1 mark**

(ii) **A – Advantages of First Generation (1 GL)**

- They are translation free
- Can be directly executed by a computer
- Programs written are executed very first
- Programs written are executed efficiently by the CPU
- The program written utilize the memory in an efficient manner because it is possible to keep track of each bit of data.
- Stable/Hardly crashes

First 2 × 1

(iii) **B – Advantages of Fourth Generation (4 GL)**

- The programs are machine independent/Portable
- The programs are easy to learn
- Easy to understand
- The languages provides better communication

First 2 × 1

(b) **Pseudocode**

Start

Input TotalEmployee

Count= 0

While count \leq TotalEmployee

Input Employee salary

If salary \geq 70,000 thenIncrement = $5/100 \times$ Employee salaryElse if Employee salary $>$ 50,000 ThenIncrement = $8/100 \times$ Salary

Else

Increment = $10/100 \times$ Salary

End if

New salary = Salary + Increment

Count = Count +1

Print Employee salary

Print Increment

Print New Salary

End while

Stop

Marks award guide

Start/Stop 1

Input No of Employee 1 2

Decision (accept any two correct decision 1

Computing new salary (Salary+Increment) – any one increment 1

Looping – any evidence of looping 1

Output 1

Calculating New increment 1

Logic 1

Advice to teachers

Teachers should exhaustively teach programming languages, control structures and algorithms.

Question 18

- (a) Explain **three** benefits of e-commerce to a company that deals with importation and selling of cars. (6 marks)
- (b) A systems analyst intends to study an existing system. State **five** reasons for this study. (5 marks)
- (c) Distinguish between *usability testing* and *functional testing* as used in system development. (4 marks)

Requirements

This question required candidates to explain benefits of e-commerce to importation of cars company, give reasons why a system analyst would study an existing system and to distinguish between usability testing and functional testing as used in system development.

Weaknesses

Candidates were unable to give reasons for studying an existing system and give a distinction between usability testing and functionality testing.

Expected responses

(a) Benefits a car selling company gains from e-commerce

- Accessibility: the clients would be able to access the services from any part of the world.
- Compliance with health requirement of social distancing hence reducing the risks of infections within the company.
- The business would be conducted 24/7 from any parts of the world.
- Analysis of customer preference can easily made hence tailoring the business to customer needs.
- Analysis of customer behaviour so as to be able to easily predict the outcome of any event.
- Use the internet media to easily communicate with the customers.
- Sales campaigns can easily be run on the platform to attract more clients.

First 3 × 2

NB. Look for enhancement to the company (Accuracy, Speed, Security, Ease, Accessibility, Reliability)

(b) Reasons why a system analyst would consider studying an existing system

- In order to understand the organizational structure.
- To determine the sources of data in the organization.
- To establish the flow of data within the organization.
- Accuracy and timelines aspect of the data handling process.
- To establish the data storage mechanism.
- To identify the type of data processing used.
- To identify the reports being generated at various stages.
- To establish user requirements.

NB. Check for challenges/problems and user requirements

First 5 × 1

(c) Usability testing is mainly concerned with the ease in which a user could use the application.

NB. User friendly

(2 marks)

Functional Testing is concerned with establishing whether the system is meeting its objectives.

(2 marks)

Overall award 0, 2 or 4

Advice to teachers

Teachers to exhaustively teach the different stages of system development.

3.9.3.2 Computer Studies Paper 2 (451/2)

Question 2

A group of youths decided to invest together. They intend to use a database management system to manage their shares.

- (a) Open a database program and create a database named **Pamoja**. (1 mark)
- (b) (i) Create a table named **Membership** in the database created in 2(a).
The table should have the following fields and respective specifications. (8 marks)

Field Name	Data Type	Properties
MemNum	Text	Size 4 (primary key)
FirstName	Text	Size 10
LastName	Text	Size 10
DateofBirth	Date/Time	Short date
Gender	Text	Look up from a listbox with values "Male", "Female"

- (ii) Create a second table named **Contributions** having the following fields and respective specifications. (10 marks)

Field Name	Data Type	Properties
RefNumber	Text	Size 4 (primary key)
MemNum	Text	Lookup from membership table
AmountPaid	Currency	
DatePaid	Date/Time	Short date
PaymentMode	Text	Lookup from a list box with values "Cash", "Cheque", "Mobile Money"

- (iii) Create a relationship between the tables and enforce referential integrity constraints to the relationship. (2 marks)
- (c) (i) Create a form for each of the table created. Save the forms as **MForm** and **ContriForm** respectively. (2 marks)
- (ii) Enter the following data into their respective tables. (8 marks)

Membership Table

MemNum	FirstName	LastName	DateofBirth	Gender
SH1	Maureen	Antonio	31/12/2001	Female
SH2	Jacob	Andela	24/09/2001	Male
SH3	Charles	Zablon	01/09/2001	Male
SH4	Judy	Alexander	14/02/2002	Female
SH5	Isaac	Marion	04/08/2001	Male

Contributions Table

RefNumber	MemNum	AmountPaid	DatePaid	PaymentMode
1	SH1	10,000	27/04/2018	CASH
2	SH2	8,000	28/04/2018	MOBILE
3	SH3	9,000	30/04/2018	CASH
4	SH4	12,000	27/04/2018	CASH
5	SH5	11,000	28/04/2018	MOBILE
6	SH1	15,000	28/05/2018	CHEQUE
7	SH2	11,000	29/05/2018	MOBILE
8	SH3	9,500	30/05/2018	CHEQUE
9	SH4	7,500	28/05/2018	CASH
10	SH5	11,000	27/05/2018	CHEQUE
11	SH1	7,000	29/06/2018	CASH

(d) Create a query that would display the following fields:

- (i) *MemNum, FirstName, LastName, Gender* and a calculated field named *Umri* to display the age of each member. Save the query as **AgeQ**. (4 marks)
- (ii) *MemNum, LastName, AmountPaid* and a calculated field named *Dividends* which would display 14% for each AmountPaid. Save the query as **DividendsQ**. (4 marks)

(e) (i) Create a report based on the query **DividendsQ** showing all the fields in the query and the following:

- I. Total AmountPaid by each member.
- II. Total Dividends payable to each member.
- III. Grand Totals of AmountPaid and dividends payable. (6½ marks)

- (ii) Modify the report to appear as follows:
- I. To have a report title “**DIVIDENDS FOR THE YEAR ENDED 31 DECEMBER 2018**”. (1 mark)
 - II. Underline the report title. ($\frac{1}{2}$ mark)
 - III. Save the report as “**YearEndRPT**” ($\frac{1}{2}$ mark)
- (f) Print out later each of the following:
- (i) The two tables (1 mark)
 - (ii) The two queries (1 mark)
 - (iii) The report. ($\frac{1}{2}$ mark)

Requirements

Candidates were required to create a database, create a database table, create a second table, create relationship, create a form, enter data, create a query, create a report, modify the report and print.

Weaknesses

Candidates were unable to create a database, design tables, create the correct type of relationship, create a form and populate with records, create queries, create grouped reports, group data in a report and print database objects, tables, queries and a report.

Expected responses

2 (a)	Creating a database file Pamoja @1, other case @0.5 other @0	1
(b)	<p>(i) Membership table Table creation Table name: Membership@1, Other case @ 0.5 Field names 5 fields @ $\frac{1}{2} = 2\frac{1}{2}$ Field Data types & properties @ $\frac{1}{2} = 2\frac{1}{2}$ Lookup @1 constraints Values (Male/Female as a list) @ 1 <i>All should be as seen on stem</i></p>	8
	<p>(ii) Contributions table Table creation Table name: Contributions @1, Other case @0.5 5 Fields names created each @ $\frac{1}{2} = 2\frac{1}{2}$ Field Data types & properties $5 \times \frac{1}{2} = 2\frac{1}{2}$ Lookup 1 @1 constraints Look up source - (MemNum from membership table) @1 Lookup 2 @1 constraints Look up values (Cheque, Cash, Mobile Money -as a list) @1 <i>All should be as seen on stem</i></p>	10
	<p>(iii) Relationship One to Many (MemNum - MemNum) @ 1 Enforcing referential integrity @1</p>	2

(c)	(i) Forms MForm (the name) @0.5, correct data source (Membership table) @1 ContriForm (the name) @0.5, correct data source (Contributions table) @1	3
	(ii) Data entry Membership table 5 records (correct all fields) @ $\frac{1}{2}$ =2 $\frac{1}{2}$ Contributions table 11 records (correct all fields) @ $\frac{1}{2}$ =5 $\frac{1}{2}$	8
(d)	(i) AgeQ query Fields selection (MemNum, First name, Last name, Gender) @1 Calculated field Expression (to get Umri): Parameter 1 @1, Parameter 2 @1=2 Calculated field name (Umri) @ $\frac{1}{2}$ Saving AgeQ @ $\frac{1}{2}$	4
	(ii) DividendsQ Query Saving DividendsQ @0.5mks Fields selection- 3 fields (Memnum, Lastname, AmounttPaid) @1 extra or less fields @0.5mk Calculated Field Dividends @ $\frac{1}{2}$ Calculated field name -parameter 1 0.14 @1 *, parameter 2 [AmountPaid] @ 1	4
(e)	(i) The report Saving YearEndRPT @0.5mk Correct query- correct source of DividendsQ @ 0.5mk Fields selection- all fields from DividendsQ @ 1 Total amount paid by each member @1 Total dividends paid to each member @1 Grand totals (for Total Amount @1 and Dividends Amount @1) =2mks	6
	(ii) Modifying the report I. Inserting report title (DIVIDENDS FOR THE YEAR ENDED 31 DECEMBER 2018) @1, completeness, other case 0.5mk II. underline the title (DIVIDENDS FOR THE YEAR ENDED 31 DECEMBER 2018) @ $\frac{1}{2}$	1 $\frac{1}{2}$
(f)	Printing (i) 2 Tables (Membership @0.5, Contributions @0.5) =1 (ii) 2 Queries (AgeQ @0.5, DividendsQ @0.5) = 1 (iii)1 Report (YearEndRPT)@ $\frac{1}{2}$	2 $\frac{1}{2}$
	TOTAL	50

Advice to teachers

Teachers should teach database application thoroughly regarding naming of files, designing correct field names, types and their properties and setting them up, the different types of relationships and their associated attributes, designing forms and how to use them in entering data, the different types of queries and their applications to retrieve desired data, the different types of reports and printing database objects, tables, queries and a report.

Conclusion

Computer Studies is a skill-based and practical subject therefore teachers should embrace inquiry-based approach to teaching and expose the learners to hands on activities.

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