

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). The project paper 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 expected to answer question 16 which is compulsory and any three other questions. The practical paper consists of two questions each of 50 marks. The project paper is usually developed by the Council but supervised and assessed in the schools by the Computer Studies subject teachers. The project scores are conveyed to KNEC where they are standardized and combined with those for 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 examination.

3.9.1 Candidates' General Performance

The table below shows candidates performance in Computer Studies (451) examination in the last 5 years 2018, 2019, 2020, 2021 and 2022.

Table 18: Candidates' Performance in Computer Studies for the last five years: 2018, 2019, 2020, 2021 and 2022

Year	Paper	Candidature	Maximum Score	Mean Score	Standard Deviation
2018	1	15,162	100	51.93	17.09
	2 & 3		100	62.83	14.88
	Overall		200	114.73	30.26
2019	1	19,406	100	58.00	16.90
	2 & 3		100	64.00	13.54
	Overall		200	122.98	28.59
2020	1	25,704	100	62.5	16.89
	2 & 3		100	64.99	13.61
	Overall		200	127.41	28.45
2021	1	30,897	100	63.69	17.21
	2 & 3		100	63.95	13.65
	Overall		200	127.61	28.92
2022	1	36,513	100	65.27	17.56
	2 & 3		100	70.15	12.87
	Overall		200	135.4	28.55

From the table above, it is observed that:

(i) Candidature has continued to increase significantly.

(ii) Performance in *paper 1 (451/1)* improved slightly from a mean of **63.69** in 2021 to a mean of **65.27** in 2022, representing **2.48%** increase.

- (iii) Performance in both the *practical paper (451/2)* and the project *paper (451/3)* declined improved significantly from a mean of **63.95** in 2021 to a mean of **70.15** in 2022 representing **9.69%**. It is worth noting that this was the 4th time since KNEC introduced assessment of the project work by the subject teachers in two milestones.
- (iv) Overall performance in the subject improved from a mean of **127.41** in 2021 to **135.4** representing **6.27%** increase.
- (v) The standard deviations for paper 1 and the combined papers 2 and 3 were also near ideal SD at 17.56 and 12.87, respectively an indication that the candidates' scores were clustered on both sides of the mean the mean.

3.9.2 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.

3.9.2.1 Computer Studies Paper 1 (451/1)

Section A

Question 5

Figure 1 shows an extract from a spreadsheet program used by a shopkeeper to compute the total cost of items in stock.

	A	B	C	D
1	ITEM	UNITS	UNIT PRICE	TOTAL COST
2	Cooking fat	3	250	
3	Sugar	4	100	

Figure 1

Write a function that would be used to obtain the total cost of cooking fat. (2 marks)

Requirements

Candidates were supposed to write a function to be used to obtain the total cost of cooking fat.

Weaknesses

Most candidates could not write the function that could be used to obtain the total cost of cooking fat.

Expected responses

Total cost function

- = product (B2, C2) or
- = product (B2:C2) or
- = product (B2*C2)

Advice to teachers

Teachers should take students through excel sheet and take them through writing functions.

Question 10

- (a) Explain the term *time slice* as used in computer data processing. (2 marks)
 (b) State **two** advantages of multiprocessing mode of data processing. (2 marks)

Requirements

Candidates were required to explain the term *time slice* as used in computer data processing and give two advantages of multiprocessing mode of data processing.

Weaknesses

A good number of the candidates could not define *time slice* and had no idea of the advantages of multiprocessing mode of data processing.

Expected responses

- (a) **Explanation of the term time slice**
 Time slice refers to the period which a job is allowed to run before the next job is processed in a *time sharing system*. (2 marks)
- (b) **Advantages of multiprocessing mode of data processing**
- Enables efficient use of the process .
 - The user can run more than one task hence saving on time.
 - Increases reliability in the system.
 - Enables efficient use of process

First 2 × 1 = (2 marks)

Advice to the teachers

The teachers should take students through definitions of terms and advantages of multiprocessing mode of data processing.

Question 14

State **three** advantages of using a wireless computer keyboard. (3 marks)

Requirements

Candidates were required to state advantages of using a wireless computer keyboard.

Weaknesses

Candidates lacked knowledge on advantages of wireless computer keyboard.

Expected responses**Advantages of using a wireless computer keyboard**

- No loose cables which distract a user.
- Keying in can be done from a far distance.
- Reduces space requirement.
- Allows a user to operate a computer from safe position.
- It is portable.
- Easily be used by other devices.

First 3 x 1 = (3 marks)

Advice to teachers

Teachers should exhaustively teach advantages of using wireless computer keyboard.

SECTION B**Question 16**

- (a) State **three** advantages of machine programming languages. (3 marks)
- (b) Describe **two** types of translators as used in computer programming. (4 marks)
- (c) A financial institution would like to computerise its loaning processes. To ascertain the legibility of a borrower, the system should accept a customer's ID number and check whether the customer has previously defaulted the repayment of any loan. If the customer is reported to have defaulted, the message DEFAULTER is displayed, otherwise the amount of loan requested is granted. If the amount requested is greater than or equal to 1 million, a repayment period of 6 years is displayed. If the amount is greater than 500,000 and less than 1 million, a repayment period of 3 years is displayed. Otherwise a repayment period of 1 year is displayed.
Draw a flowchart to represent the logic of the computerised system. (8 marks)

Requirements

This question required candidates to state advantages of machine programming languages, describe types of translators as used in programming and to draw a flow hart.

Weaknesses

Majority of the candidates were unable to state advantages of machine programming languages, describe translators and draw a flowchart to represent logic o a computerized system.

Expected responses

(a) Advantages of machine programming languages

- They do not occupy a lot of memory space
- They are executed at a faster speed
- They do not require a translator
- Hardly crush / stable

First 3 × 1 = (3 marks)

(b) Types of translators in programming

Assembler

- It is used to translate programs in assembly language programs into computer understandable before execution.

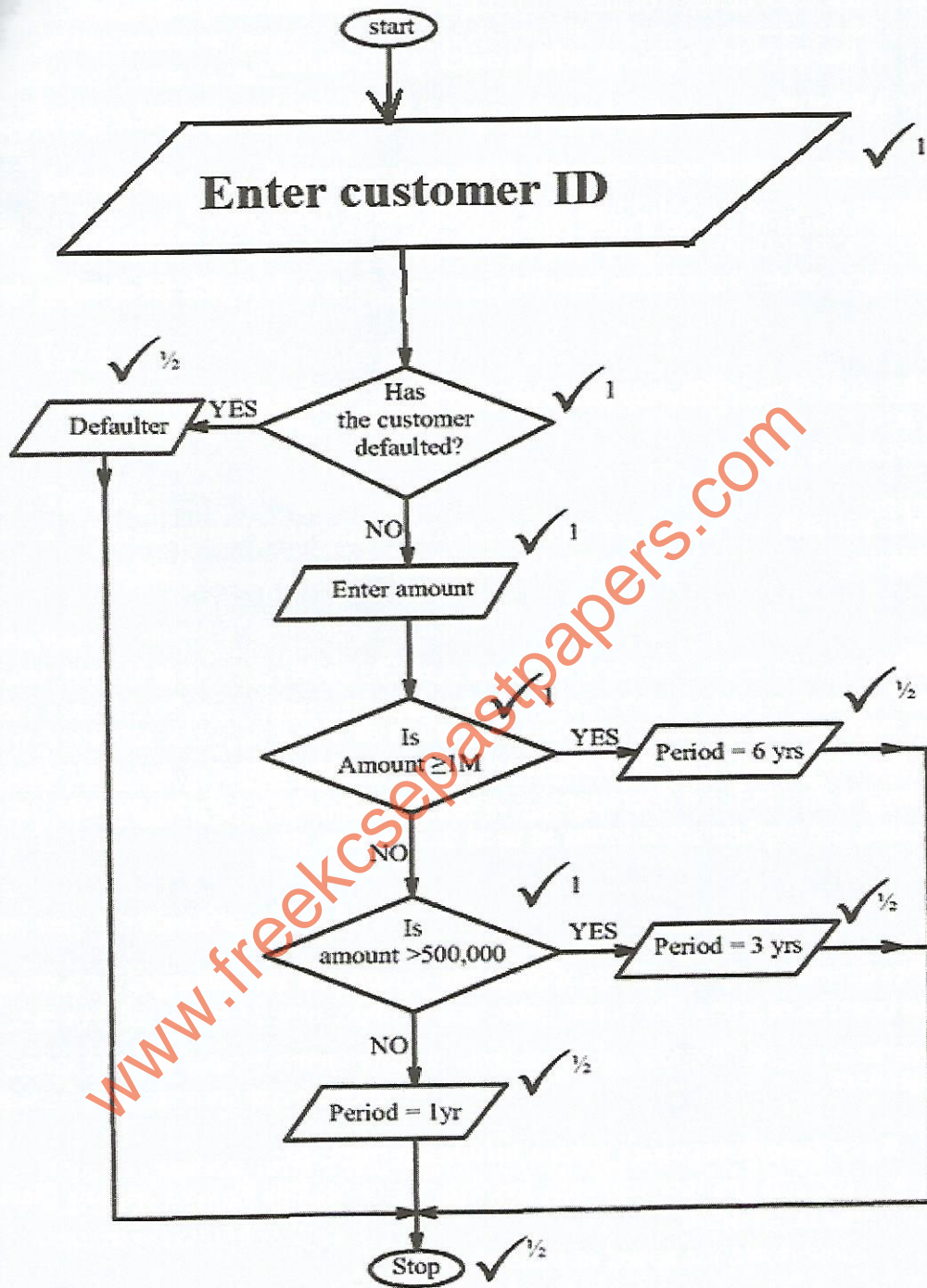
Interpreter

- It is used for translating a source code program line by line while the CPU executes the translated line before going to be next one.
- Translating high level language
- Translating high level language

Compiler

- It is used for translating the entire source code into object then the CPU executes it. The program goes through the linking process to join the program to all other files

(c)



Logic of the design ✓ ½

Total = 8 marks

Advice to the teachers

Teachers should exhaustively teach advantages of machine programming languages, types of translators in programming and drawing flowcharts to represent the logic of the computerised systems

Question 20

- (a) Explain the effect of each of the following occurrence in a computer network:
- (i) A bus network topology with a missing terminator (2 mark)
 - (ii) A uni-directional ring network topology with one computer not operational (2 marks)
 - (iii) A star network topology with a hub not operational (2 marks)
- (b) A school intends to connect their computer labs with the school administration block using a fibre optic cable. State **three** benefits that the school will realise from using the cable (3 marks)
- (c) Explain each of the following terms as used in data security:
- (i) recycle bin (2 marks)
 - (ii) patch (2 marks)
 - (iii) tapping (2 marks)

Requirements

This question required candidates to explain the effect of a bus network topology with a missing terminator, a uni-directional ring network topology with one computer not operational and a star network topology with a hub not operational. Candidates were also expected to state benefits of using a fibre optic cable and explain some terms as used in data security.

Weaknesses

Candidates were unable to explain effects of bus, a uni-directional and star topology networks. Students could not state benefits of using fibre optic cable and explain some terms as used in data security.

Expected responses

- (a) (i) **Bus network topology with a missing terminator**
- Terminators missing leads to clogging of the bus by data packets that do not reach the destination.
 - slow down the speed of transmission.
- (ii) **Uni-directional ring network**
- One adjacent computer to the failed node will not send but may receive.
 - Communication will not take place
- (iii) **Star network topology with a hub not operational**
- The whole network will be down hence no communication within the computer network.
 - Communication will not take place. 3 × 2 = (6 marks)

(b) Benefits of using fibre optic

- Would be able to transfer large file
- Less interference between the two sites
- Faster transmission speed
- Cable not prone to theft
- Difficult to tap leaves dropping

Any 3 x 1 = (3marks)

(c) (i) Recycle bin

- This is a folder which stores deleted files and folders from a computer.
- The files or folders can be restored to their original location or emptied completely from the folder.

@ 2 marks

(ii) Patch

- It is a file with a line of code used to repair a defect within a software without interrupting its proper operations.

@ 2 marks

(iii) Tapping

- This term refers to unauthorized access to information or data that is on its way from the host computer to the destination computer.

@ 2 marks

Advice to teachers

Candidates were unable to explain effects of bus, a uni-directional and star topology networks. Students could not state benefits of using fibre optic cable and explain some terms as used in data security.

Teachers should exhaustively explain the effects of the different types of topology networks, benefits of using fibre optic cable and define terms as used in data security.

3.9.2.2 Computer Studies Paper 2 (451/2)**Question 2**

The management of a car hire company intends to maintain its records using a database. You have been tasked with creating the database.

- (a) (i) Open a database program and create a database named **CarHire**. (1 mark)
- (ii) Create the tables named Customers, Drivers, Vehicles and Expenses in the database created in 2(a)(i). (21 marks)

Customers Table

Field Name	Data Type	Field Properties
Customer	Text	Field size 4
CustomerName	Text	Field size 25

Drivers Table

Field Name	Data Type	Field Properties
DriverID	Text	Field size 4
DriverName	Text	Field size 20

Vehicles Table

Field Name	Data Type	Field Properties
VehicleID	Text	Field size 6
VehicleDescription	Text	Field size 20

Expenses Table

Field Name	Data Type	Field Properties
VehicleID	Text	Field size 6
CustomerID	Text	Field size 4
DriverID	Text	Field size 4
ExpensesIncurred	Currency	Fixed
ExpenseDesc	Text	Field size 20
DateTravel	Text	Format: short Date
DistanceCovered	Number	

- (iii) Apply the appropriate primary key fields in the Customers, Drivers, and Vehicles tables. (3 marks)
- (iv) Create appropriate relationship among the tables. (1½ marks)
- (v) Create a form named **ExpensesForm** that would be used to enter data in the Expenses table and perform the following on the form.
- Modify the title as "Expense Entry"
 - Bold the title
 - Italicise the fields (3 marks)

(b) Enter the following data into their respective tables.

(9½ marks)

Customers Table	
CustomerID	CustomerName
C001	ROSE
C002	JOEL
C003	MARION
C004	JOHNSTONE

Drivers Table	
DriverID	DriverName
V001	ANTONY
V002	HURRYSON
V003	LENNY
V004	PATRICK

Vehicles Table	
VehicleID	VehicleDescription
VW67	WISH
VF92	FIAT
KM13	MAZDA
VH84	HARRIER

Expenses Table						
VehicleID	CustomerID	DriverID	Expenses Incurred	ExpenseDesc	DateTravel	Distance Covered
VW67	C001	V001	3000.00	Tyre replacement	7/14/2020	445
KM13	C004	V001	2000.00	Tyre replacement	7/21/2020	550
KM13	C001	V002	2000.00	Shocks	7/10/2020	380
VW67	C003	V002	1500.00	Shocks	7/5/2020	180
VF92	C002	V003	2000.00	Shocks	7/7/2020	600
VH84	C003	V003	3000.00	Bushes	7/24/2020	230
VF92	C001	V004	1500.00	Engine check	7/6/2020	425

(c) Given that a customer is charged Ksh 15 per kilometre for the distance covered by a vehicle. Create a query that would display the fields; Customer name, DriverName, ExpenseIncurred, DistanceCovered (in km) and a calculated field named **charges**, (Hint: $Charges = distance \times 15 + ExpenseIncurred$). Save the query as **vcharges**.

(5½ marks)

- (d) Create a report that would display the fields: CustomerName, Dr verName, ExpenseDesc, ExpensesIncurred and the accumulated amount of all the expenses incurred. Save the report as expense **vreport**. (2½ marks)
- (e) Print out later each of the following:
- (i) Four tables
 - (ii) **vcharges** query
 - (iii) **vreport** report.

Requirements

Candidates were required to create a database named **CarHire**, create tables in the database created, apply appropriate primary key fields, for some tables, create appropriate relationship among the tables, create a form named **ExpensesForm**, modify and bold the title, and italicize the fields, enter data into respective tables, create a query (**vcharges**), create a report (**vreport**), print 4 tables, **vcharges** query and **vreport** report.

Weaknesses

Candidates were unable to create a database, design tables, create correct type of relationship, create a form and use it to populate data in expenses table, modify, bold and italicise fields, create a query, create a report, print database objects, tables, queries and a report.

Expected responses

2(a) (i)	Creating database and saving - CarHire@1	1
(ii)	Tables Customers table design T_name: Customers @1, other case@ $\frac{1}{2}$ = 1 Field Names – 2 correct@ $\frac{1}{2}$ *2=1 2 correct F_datatype and properties @ $\frac{1}{2}$ =1 Data entry- 4 correct records @ $\frac{1}{2}$ *4=2	5
	Drivers table – T_name: Drivers@ 1, other case @ $\frac{1}{2}$ =1 – Field names – 2 correct@ $\frac{1}{2}$ *2 =1 – 2 correct F_ data type and properties @ $\frac{1}{2}$ *2 = 1 – Data entry 4 correct records @ $\frac{1}{2}$ *4=2	5
	Vehicles table T_name: vehicles @1, other case@ $\frac{1}{2}$ =1 Field names – 2 correct @ $\frac{1}{2}$ *2=1 2 correct fields_ datatype and properties @ $\frac{1}{2}$ *2=	3
	(b) Data entry - 4 correct records @ $\frac{1}{2}$ *4=2	2
	Expenses table T_name: Expenses@ 1, other case @ $\frac{1}{2}$ =1 Field names – 7 correct @ $\frac{1}{2}$ *7 =3 $\frac{1}{2}$ 7 Correct F_datatype and properties @ $\frac{1}{2}$ *7=3 $\frac{1}{2}$ Data entry -7 correct records @ $\frac{1}{2}$ *7=3 $\frac{1}{2}$	11.5
(iii)	Primary keys Customer ID, Driver ID, Vehicle ID-@1	3
(iv)	Relationships 3-one to many @3each @ $\frac{1}{2}$ =1 $\frac{1}{2}$ 3-enforce relationship@ $\frac{1}{2}$ = 1 $\frac{1}{2}$	3
(v)	Forms Saving – expenses form @ 1, other @ $\frac{1}{2}$ =1 Correct data source – expenses table @1 Title expense entry@1, other case @ $\frac{1}{2}$ =1 Bolded Title @1 Italics – All fields @1, less fields	5
(c)	Query Saving vcharges @1, other case@ $\frac{1}{2}$ =1 4 correct fields (C_name, D_name, F_ins, Dis)@1@ =1	2

	Expression Calc_field: charges@1, other case @ $\frac{1}{2}$ =1 Param 1-: (DistanceCovered @ $\frac{1}{2}$ Param 2- *15= @ $\frac{1}{2}$ Param 3 - +(ExpensesIncurred) @ $\frac{1}{2}$	2.5
(d)	Report Saving-vreport@1, other case@ $\frac{1}{2}$ =1 4 fields-(C_name, D_name,E_Desc,E_Inc) @ $\frac{1}{2}$ =	3
	Summaries GrandTotal = (Expenses Incurred)@1	1
(e)	Printing 4 tables @ $\frac{1}{2}$ *4=2 1 query- vcharges @ $\frac{1}{2}$ 1report - vreport @ $\frac{1}{2}$	3
	GRAND TOTAL	50

Advice to teachers

Teachers should teach database application thoroughly with regard to 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, perform some commands, creating different types of queries and their applications to retrieve desired data, the different types of reports and printing database objects, tables, queries and reports.

Conclusion

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