

# **KASSU JOINT EXAMINATION**

Kenya Certificate of Secondary Education

**451/1 - COMPUTER STUDIES – Paper 1**

**FORM 4 (THEORY)**

**September. 2021 – 2½hrs**

## **MARKING SCHEME**

**SECTION A (40 Marks)**

*Answer all questions in this section*

1. Today, many companies are re-engineering their products to implement the USB connection to the computer, state any two reasons for the drift
- i. *Faster data transfer over short distances*
  - ii. *To avoid having a large number of ports serving the same purpose on the computer*
  - iii. *To avoid the worry of their product not being bought due to lack of an appropriate port on the computer*

Or any other correct response

Reason @ 1 Mark

Total = 2 X 1 Mark

= 2 Marks

2. Bochongo high school managed to construct a computer laboratory but did not have funds for equipping it with computers. A British company offered to donate some computers to the school
- a. After an assessment, it was identified that the supplied computers were the third generation of computers, state any two characteristics of third-generation computers

(1 Mark)

- i. *Used the transistor technology*

Characteristic @ 1 Mark

3. (a.) It was noted that after every lesson, the students complained of itchy eyes and mild headache. State any two reasons for this problem

- i. *Poor lighting conditions*
- ii. *Using over bright monitors*
- iii. *Glare or radiation from the screen*
- iv. *Bright reflective paint on the wall*

Or any other correct response

Reason @ 1 Mark

Total = 2 X 1 Mark

= 2 Marks

(b.) State any one solution of the problem mentioned in (3) above

- i. *Repainting the computer lab walls with a non-reflective paint*
- ii. *Adjust the brightness and contrast of the screen*
- iii. *Use anti-glare and anti-radiation screens*
- iv. *Taking breaks*

Solution @ 1 Mark

4. State any two methods of input available for the operation of a smartphone

- i. *Keying devices*
- ii. *Pointing devices*
- iii. *Scanning devices*
- iv. *Touch*
- v. *Voice input devices*

Or any other correct response

Input @ 1 Mark

Total = 2 X 1 Mark

= 2 Marks

5. Define the term relationship as used in database management systems

*This is a database feature that links records in two or more tables using a common field to enable combination of the records while creating other database objects*

Definition @ 1 Mark

6. State any two importance of referential integrity with reference to database tables

- i. *Every record in a table must have a corresponding record in the primary table*
- ii. *Deleting a record in the primary table deletes all related records in the relating tables*
- iii. *Records in the secondary table cannot be deleted*

Or any other correct response

Importance @ 1 Mark

Total = 2 X 1 Mark

= 2 Marks

7. State the function of an append query

*An append query is used to add specified records to a specified table*

Function @ 1 Mark

8. Computers are known to create employment for many people in different computing fields. List any two duties of the IT professionals listed below

a. System analyst

- i. *Maintaining and upgrading existing systems as required*
- ii. *Designing new computer systems and frameworks*
- iii. *Troubleshooting technical issues*
- iv. *Risk mitigation planning*
- v. *Collaborating with Business Analysts, Project Leads and IT team to resolve issues and ensuring solutions are viable and consistent*
- vi. *Creating system guidelines and manuals for the organisation*
- vii. *Running training sessions and workshops on system processes*
- viii. *Conducting regular reviews of systems and generating reports on efficiencies and improvement areas*
- ix. *Structuring and prioritising business requirements and communicating plans with stakeholders for review and approval*

b. Network engineer

- i. *Maintain and control computer networks and associated computing environments like software for systems, software applications, equipment, and configurations.*
- ii. *Running operations for disaster recovery and backups of data where possible.*
- iii. *Data, applications, and hardware are protected by organizing, preparing, and enforcing network security measures.*
- iv. *Troubleshooting, diagnosing and solving hardware, software, and other issues affecting the network and device.*
- v. *Replacing defective hardware components of the network where possible.*
- vi. *Maintain, customize, and track the device and email applications for virus protection.*
- vii. *Network performance monitoring to decide whether any changes are required.*
- viii. *Conferring with network users on solving issues with current networks.*
- ix. *Use master consoles to control network and computer system output.*
- x. *Coordinating access to the use of computer networks.*
- xi. *Plan, install and test networking devices, hardware for computers, and devices for operating systems.*

Or any other correct response

Duty @ 1 Mark  
Total = 4 X 1 Mark  
= 4 Marks

9. Interfaces enable computer users to interact with the operating system.

a. State four advantages for using a graphical user interface in loading programs and files

- *User friendly*
- *No need to know command language as commands are executed by clicking on icons*
- *Allows multitasking as several programs open at the same time therefore easier to switch between applications*
- *Selecting an item using a mouse is easier and faster than entering commands*

Or any other correct response

Advantage @ 1 Mark  
Total = 4 X 1 Mark  
= 4 Marks

b. A vehicle assembly company has introduced robots to replace the human workforce. State two effects this would have on the work force

- *Unemployment*
- *Need to retrain*
- *No longer need to do hazardous or tedious jobs*
- *Employment of skilled staff who will manipulate the robots*

Or any other correct response

Effect @ 1 Mark  
Total = 2 X 1 Mark  
= 2 Marks

10. A system analyst is employing a programmer to write a software for a new computer-based system. State the benefits of this method of obtaining appropriate software

- *Can be tailor made to meet the exact requirements of the user*
- *The client is in contact with the actual programmers in case there is a problem*
- *The software will not contain unwanted features*

Or any other correct response

Benefit @ 1 Mark  
Total = 3 X 1 Mark  
= 3 Marks

11. Give any two advantages of OLED monitors over the LED monitors

- *The plastic, organic layers of an OLED are thinner, lighter and more flexible than the crystalline layers in an LED or LCD.*
- *OLEDs do not require glass making the display bright. LEDs and LCDs require glass for support, and glass absorbs some light.*

Or any other correct response

Advantage @ 1 Mark

Total = 2 X 1 Mark

= 2 Marks

12. Distinguish between margins and borders as used in word processing

- *Margins: blank spaces that surround the text on a page*
- *Borders: frame meant for decorative purposes that surrounds the content of a page*

Difference @ 2 Marks

13. In recent times, computer scientists and engineers have managed to come up with smarter computers, which can almost simulate human thinking and learning often referred to as artificial intelligence (AI), instead of relying on conventional program instructions. List any two application areas of artificial intelligence.

- ✓ *Expert systems*
- ✓ *Natural language processing*
- ✓ *Artificial neural networks*
- ✓ *Robotics/perception systems*

Or any other correct response

Application @ 1 Mark

Total = 2 X 1 Mark

= 2 Marks

14. DTP is known to be sophisticated software well suited for desktop publishing.

(a) Explain the following terms as used in desktop publishing.

- Pasteboard

*An area outside/surrounding the workspace area used for hosting or placing DTP objects.*

- Text overflow

*This is where a piece of text fills up a textbox, the text doesn't fit within the inserted textbox handle.*

Explanation @ 1 Mark

Total = 2 X 1 Mark

= 2 Marks

(b) The figure below shows a formatting tool used in DTP. Identify its name.



*Crop tool – Used for trimming unwanted sides or edges of a graphic.*

Tool @ Mark

15. Spreadsheet is the dream software for accountants due to their ability to handle numeric oriented data

(a) Identify the type of cell referencing used in the expressions below:

=RANK(\$C\$3:\$A\$10, 0)

*Absolute cell reference*

=SUM(A\$3:A12)

*Mixed cell reference*

Cell referencing @ 1 Mark

Total = 2 X 1 Mark

= 2 Marks

(b) State the importance of forms in a spreadsheet during data entry.

*To enable fast and easy way to key in data.*

Importance @ 1 Mark

(c) Differentiate between sorting and filtering as used in worksheet data management.

*Sorting – Arrangement of data in a predefined sequence, ascending or descending.*

*Filtering – Extracting a subset of data from an overall list, using a specific criterion.*

Difference @ 2 Marks

SECTION B (60 Marks)

Answer question 16 and any other three questions

16. When writing a computer program using a high-level programming language, it needs to be translated into object code for it to be understood and executed by the computer

a. State any two advantages of an interpreter

- *You can run the program to test its operation, make a few changes, and run it again directly. There is no need to recompile because no new machine code is ever produced. This can enormously speed up the development and testing process.*
- *It translates one instruction at a time; therefore, it uses a minimum amount of the computer's memory.*
- *It is also helpful in the debugging process, as the interpreter can relate error messages to the instruction being executed.*

Or any other correct response

Advantage @ 1 Mark

Total = 2 X 1 Mark

= 2 Marks

b. State any three characteristics of the third-generation programming languages

(3 Marks)

- i. It uses English words and symbols, and is therefore even easier to write*
- ii. It is machine independent*
- iii. It is structured*

Or any other correct response

Characteristic @ 1 Mark

Total = 2 X 1 Mark

= 2 Marks

The pseudocode below was written by a learner. Use it to answer the questions that follows

```
Start
Sum=0
For count=0 - 4 do
Print "enter a number (N)"
Input N
If P>10 then
Number out of range
Else
Sum=sum + N
Print sum
End if
End for
stop
```

c. Identify the errors in the above pseudocode and re-write it correctly (3 Marks)

```
Start
Sum=0
For count=0 to 4 do
Print "enter a number (N)"
```

Input N  
 If N > 10 then  
 Print "Number out of range"  
 Else  
 Sum = sum + N  
 Print sum  
 End if  
 End for  
 stop

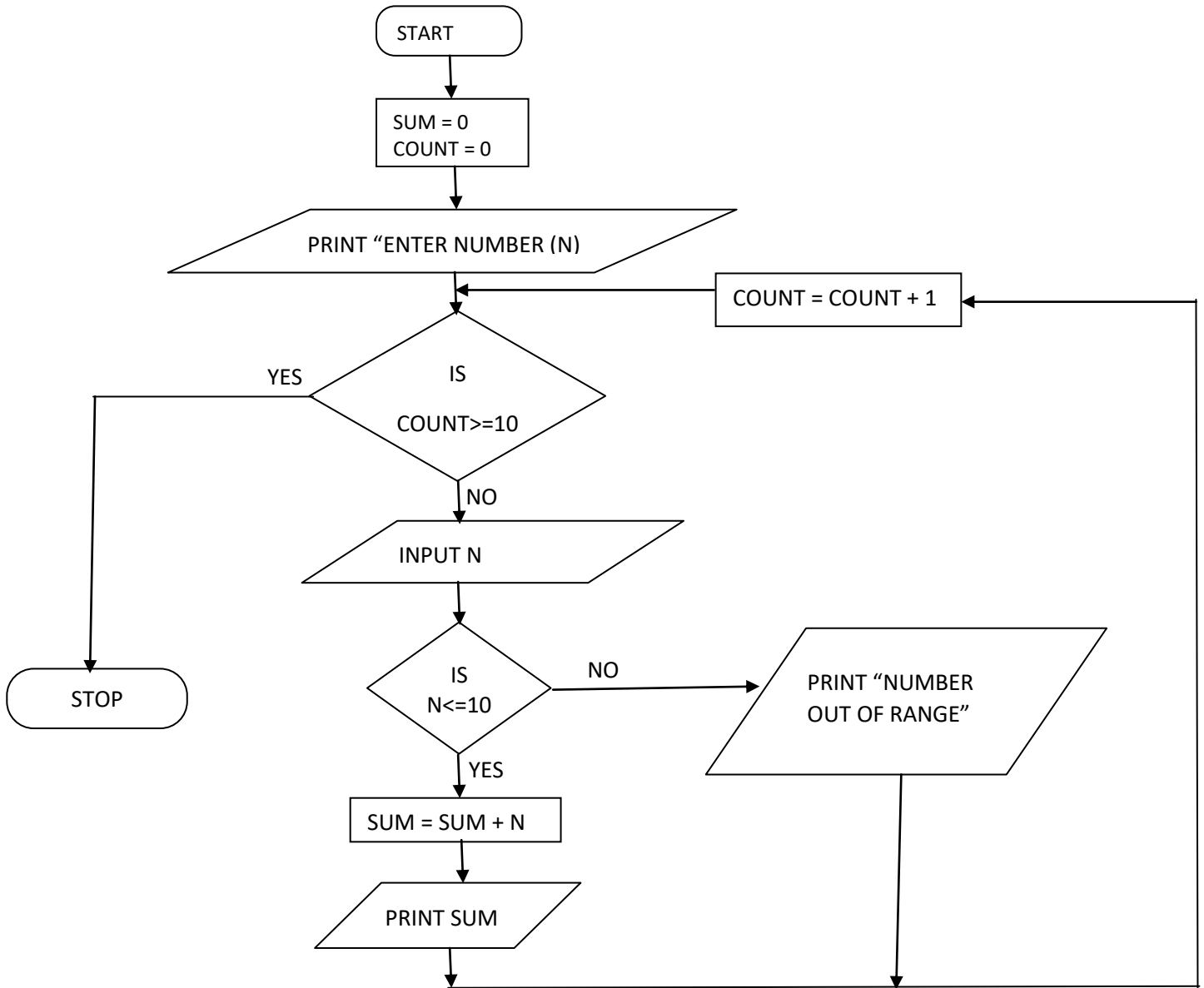
d. State the function of the above flow chart

The pseudocode is used to prompt for four numbers, add numbers greater than 10 while rejecting those less than 10 then displaying the four numbers and the sum of numbers greater than 10 out of the four numbers

Function @ 1 Mark

e. Draw a flow chart for the corrected pseudocode

(6 Marks)



17. a) state one application of computing where real-time processing is more appropriate than batch processing and give a reason why

- *reservation system*
- *online booking system*
- *Transaction processing e.g in banking -immediate updates/processing*

Or any other correct response

Application @ 1 Mark

Total = 2 X 1 Mark

= 2 Marks

(b) i) State three reasons why hospitals have changed from a manual system to a computer-based system for storing patient records

- *Manual had huge amounts of paper files while computerised use less space*
- *Retrieving files in the manual system was slow as compared to computerised*
- *Computerised systems reduce errors*

Or any other correct response

Reason @ 1 Mark

Total = 3 X 1 Mark

= 3 Marks

ii) State any three data access methods that can be used to retrieve a patients record in a computerized system

- *Random access*
- *Direct access*
- *Online access*

Or any other correct response

Access Method @ 1 Mark

Total = 3 X 1 Mark

= 3 Marks

iii) Other than storing patient records, state any other three ways the computers can be used in a hospital

- *Process the payroll*
- *Staff training through virtual reality*
- *Stock control of drugs in the pharmacy e.t.c*

Or any other correct response

Computer usage @ 1 Mark

Total = 3 X 1 Mark

= 3 Marks

c) Data protection rules give legal rights to individuals and state that personal data stored on computer systems must be kept secure.

i) Give one legal right for personal data.

- *Right to view/check/change/correct data*

Legal right @ 1 Mark

ii) Give three software methods of protecting data

- *Use of passwords*
- *Biometric systems*
- *Data encryption*
- *Firewalls*

Or any other correct response

Software method @ 1 Mark

Total = 3 X 1 Mark

= 3 Marks

18. Information systems are known to be the driving force for any organization. The success of an organization depends on the design and implementation of its information system

a. Define any four components of an information system

i. People Resources

*People are required for the operation of all information systems. The people resource includes end users and IS specialists.*

ii. Hardware Resources

*The concept of Hardware resources includes all physical devices and materials used in information processing. Specially, it includes not only machines, such as computers and other equipment, but also all data media, that is, all tangible objects on which data is recorded, from sheets of paper to magnetic disks. Example of hardware in computer-based information systems are:*

iii. Software Resources

*The concept of Software Resources includes all sets of information processing instructions. This generic concept of software includes not only the sets of operating instructions called programs, which direct and control computer hardware, but also the sets of information processing instructions needed by people, called procedures.*

iv. Data Resources

*Data is more than the raw material of information systems. The concept of data resources has been broadened by managers and information systems professionals.*

v. Network Resources

*The concept of Network resources emphasizes that communications networks are a fundamental resource component of all information systems.*

Or any other correct response

Advantage @ 1 Mark

Total = 4 X 1 Mark

= 4 Marks

b. State the stage in systems development when the activities listed below are performed

i. The system analyst presents a report recommending for a change in the system

*Problem definition*

ii. The system analyst creates a logical design of the system

*System design*

- iii. The project stakeholders invite users to have a feel of the system before implementation

*Testing and debugging*

- iv. The system analyst monitors and evaluates the system performance

*System implementation, maintenance and review*

Or any other correct response

Stage @ ½ Mark

Total = 4 X ½ Mark

= 2 Marks

- c. Distinguish between the direct and phased changeover strategies

*In this type of conversion, the old system is completely and immediately replaced by the new system while in phased conversion only a few departments, branch offices, or plant locations at a time are converted.*

Difference @ 2 Marks

- d. Describe the system characteristics listed below

- i. Systems have a life cycle

*every system has birth, life and death. Whatever the system, the life cycle includes evolution, wear, obsolescence, aging, replacement, repair and finally an end to the existence of the system.*

- ii. The interdependency between subsystems

*subsystems of a system are dependent on one another as they should work together to achieve the objective of the organization as well as share information during processing by providing output for input in another subsystem*

Characteristic @ 2 Marks

Total = 2 X 2 Marks

= 4 Marks

- e. State any three reasons that may lead to information system change in an organization

- *High failure rate of the existing system.*
- *Slow in processing.*
- *Complaints from customers.*
- *Decline in profits.*
- *Errors in the system.*
- *High cost of maintenance.*
- *Lack of security.*

Or any other correct response

Reason @ 1 Mark

Total = 3 X 1 Mark

= 3 Marks

19. After data is processed, it is important to keep it somewhere either permanently or semi -permanently for future use.

- a. Briefly describe how data is stored/ represented on a solid-state storage device  
*Data is stored electronically as charge/voltage in the microchips whereby a charged cell may represent a 1 while an uncharged cell may represent a 0*

Description @ 2 Marks

- b. State any two advantages of solid-state storage devices
- i. *It is long lasting due to lack of movable parts that undergoes wear and tear*
  - ii. *It is affected by dust*
  - iii. *It has a high density*

Or any other correct response

Advantage @ 1 Mark

Total = 2 X 1 Mark

= 2 Marks

- c. Distinguish between BCD and EBCDIC coding schemes (2 Marks)

*In BCD representation each digit of a number is represented as its four-bit binary code while EBCDIC uses eight bits to represent each character and is therefore able to represent 256 different characters*

Difference @ 2 Marks

- d. Using 8 bits and twos complement subtract  $43_{10}$  from  $30_{10}$ , giving your answer in decimal notation (5 Marks)

$$43_{10} = 101011_2 - 00101011_2$$

$$30_{10} = 11110_2 - 00011110_2$$

$$1c - 11010100_2$$

$$+ \quad 1$$

$$2c \quad \underline{11010101}_2$$

$$11010101_2$$

$$+00011110_2$$

$$\underline{11110011}_2$$

$$-(1*128) + (1*64) + (1*32) + (1*16) + (1*2) + (1*1)$$

$$-128+64+32+16+2+1 = -13_{10}$$

- e. Convert  $11011011111.1111_2$  to its equivalent Hexadecimal number (1 Mark)

$$\underbrace{01101101}_{6} \underbrace{1111}_{D} \underbrace{1111}_{F} . \underbrace{1111}_{1}_2 = 6DF.1_{16}$$

- f. Determine the value of x in the equation;  $1001101_2 - X_{10} = 11010_2$  (3 Marks)

$$1001101_2 - 11010_2 = X_{10}$$

$$11010_2 = X_{10}$$

$$(1*32) + (1*16) + (1*2) + (1*1) = X_{10}$$

$$32+16+2+1=X_{10}$$

$$51_{10}=X_{10}$$

20. Networking is said to be important in facilitation of data transfer.

(a) Dr. Jabari, a networking expert trained his students on various data communication aspects. After a lesson, he asked them to state and explain three modes of data transmission. As a student, what answers would you provide?

- *Simplex*
- *Half duplex*
- *Full duplex*

Or any other correct response

Transmission Mode @ 1 Mark

Total = 3 X 1 Mark

= 3 Marks

(b) Differentiate between LAN and WAN as used in computer networks.

*LAN- A network that spans a small geographical area such as home, office, school or a building. Usually administered by an individual or a department. It is limited to 10metres – 10km.*

*MAN- A network infrastructure that covers a larger area than LAN, but smaller than WAN typically within a city or an entire town. Consists of many LANS put together.*

Difference @ 2 Marks

(c) State two advantages of fiber-optic transmission media.

- *Immune to EMI and eavesdropping.*
- *Carries data very fast*
- *Supports high bandwidth*
- *Has low attenuation*
- *Covers very long distances*
  - *Because it does not generate electric signals, it can used in highly flammable places.*

Or any other correct response

Advantage @ 1 Mark

Total = 2 X 1 Mark

= 2 Marks

(d) In a computer network, a server computer must be installed with a network operating system in order to operationalize a number of network functions. State three functions performed by a network operating system (NOS).

- *Provides access to network resources*
- *Maintains security of devices in the network*
- *Supports network devices and services*
- *Organize shared data storage among users*
- *Produces logs, records of programs running in the network*
- *Receive requests from application programs.*
- *Enables nodes to communicate efficiently*

- *Allocate resources for each program*

Or any other correct response

Function @ 1 Mark

Total = 3 X 1 Mark

= 3 Marks

(e) (i) Define the following terms as used in the internet.

- Browser

*Application program used to surf/access webpages in websites*

Definition @ 1 Mark

- Spam

*Unsolicited or unwanted emails that are sent to an email address by unknown people, not in your contact list.*

Definition @ 1 Mark

(ii) Many organizations own and manage websites for various uses. One use of website by a business is conducting their business activities through e-commerce. Mention three advantages of e-commerce.

- *Wide coverage for reaching customers*
- *Less transport costs*
- *Variety of goods and services to pick from.*
- *Affordable prices*

Or any other correct response

Advantage @ 1 Mark

Total = 3 X 1 Mark

= 3 Marks

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