

**ST MARY'S SCHOOL –RUNDA**  
**FORM THREE**  
**COMPUTER STUDIES**

**WEEK 1**

**DATA SECURITY & CONTROL**

1. (a) Differentiate between Data Security and Data Integrity. (2 marks)  
(b) Give the three types of data that should be protected in a computer. (3 marks)
2. State any three threats to data and information. (3 marks)
3. State five possible ways of preventing data loss from a computer. (5 marks)
4. (a) Define the term Computer crime. (2 marks)  
(b) Explain the meaning of each of the following with reference to computer crimes.
  - i) Tapping
  - ii) Piracy.
  - iii) Trespass.
  - iv) Industrial espionage
  - v) Data alteration
  - vi) Fraud
  - vii) Firewalls
5. Give two reasons that may lead to computer fraud. (2 marks)
6. Outline four ways of preventing piracy with regard to data and information. (4 marks)
7. (a) Differentiate between Hacking and Cracking with reference to computer crimes. (2 marks)  
(b) Describe the following terms with respect to computer security: (6 marks)
  - (i) Audit trail.
  - (ii) Data Encryption.
  - (iii) Log files.
  - (iv) Firewalls.
  - (v) Physical security
  - (vi) Logic bombs.
8. (a) What is a Computer virus? (2 marks)  
(b) Outline four symptoms of a virus infection in a computer system. (4 marks)  
(b) State two damages which a computer virus may cause to a computer. (2 marks)  
(c) Explain three control measures you would take to protect your computers from virus attacks. (3 marks)
9. List three functions of an antivirus software. (3 marks)

10. Computer systems need maximum security to prevent an unauthorized access. State six precautions that you would expect an organization to take to prevent illegal access to its computer-based systems. (6 marks)
11. (i) Explain what is meant by the term “computer security” (2 marks)  
(ii) State two environmental factors that can affect operations of a computer. (2 marks)  
(iii) State two control techniques or measures that can be implemented to prevent the effect in (i) above. (2 marks)
12. Explain why the following controls should be implemented for computer based systems.
- i) Backups (2 marks)
  - ii) Air conditioning (2 marks)
  - iii) Uninterruptible power supply (UPS) (2 marks)
  - iv) Segregation of duties (2 marks)
  - v) Passwords (2 marks)
13. Give four rules that must be observed in order to keep within the law when working with data and information. (4 marks)
14. (a) Define the term Computer ethics. (1 marks)  
(b) Give two examples to show how a person who has committed a computer crime can help to improve a computer system. (2 marks)

## **WEEK 2-3**

### **FORM THREE - DATA REPRESENTATION IN COMPUTERS**

1. Data in a computer is represented in one major form. Define the term ‘Data representation’ in a computer. (1 mark)
2. (a) Differentiate between Analogue data and Digital data. (2 marks)  
(b) Draw a sketch of:
  - (i). Analogue data signal. (1 mark)
  - (ii). Digital data signal. (1 mark)
3. Give two reasons for the popularity of binary number representation. (2 marks)
4. Explain the role of a Modem in communication. (2 marks)
5. Distinguish between the following terms as used in data representation in computers:
  - (i). A Byte and a Nibble. (2 marks)
  - (ii). Word and Word length. (2 marks)
6. Arrange the following data units in ascending order of size.  
BYTE, FILE, BIT, NIBBLE. (2 marks)
7. Write out what A, B, C and D represent in the table below. (4 marks)

Number System	Values
A	0, 1
B	0, 1, 2, 3, 4, 5, 6, 7
C	0, 1, 2, 3, 4, 5, 6, 7, 8, 9
D	0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, F

8. Perform the following computer arithmetic. In each case, show how you arrive at your answer.
- (a) Convert the following Decimal numbers to their Binary equivalent.
- i) 11 (1 mark)  
ii) 001 (1 mark)  
iii) 457
- (b) Convert the following Octal numbers to their Binary equivalent.
- i) 77 (2 marks)  
ii) 0000001 (2 marks)
- (c) Use Binary addition to solve the following decimal summations.
- i)  $4_{10} + 3_{10}$  (2 marks)  
ii)  $13_{10} + 2_{10}$  (2 marks)
- (d) Convert the following Hexadecimal numbers to their Binary equivalent.
- i) C3 (3 marks)  
ii) 13 (3 marks)
- (e) Convert the following Binary numbers to their Hexadecimal equivalent.
- i) 110111.11 (2 marks)  
ii) 1.1110101 (2 marks)  
iii) 1100001111111111 (2 marks)
9. (a) State one use of hexadecimal notation in a computer. (1 mark)  
(b) Convert  $767_8$  to hexadecimal. (2 marks)
10. Use One's complement to solve the following sums:
- i)  $9 - 6$  (3 marks)  
ii)  $17 - 15$  (3 marks)  
iii)  $1110 - 1011$  (2 marks)  
iv)  $111010 - 110011$  (2 marks)
11. Perform the following conversions:
- i)  $20.2_{16}$  to decimal. (3 marks)  
ii)  $11101_2$  to Decimal. (3 marks)
12. (a) Perform the following Binary arithmetic:  $75 + 45$  (2 marks)  
(b). Use Two's complement to perform the following Binary subtraction:
- i)  $10111 - 10001$  (2 marks)

- ii)  $11000 - 10011$  (2 marks)
13. Use Two's complement to solve the following SUMS (the numbers are in decimal notation)
- i)  $23 - 20$  (3 marks)
- ii)  $17 - 14$  (3 marks)
14. Perform the following binary arithmetic:
- (i).  $11100111 + 00101110$  (1 mark)
- (ii).  $1000 - 101$  (using 2's complement) (2 marks)
15. Convert the decimal number  $4 \frac{3}{4}$  into binary form. (4 marks)
16. Convert the binary coded decimal number given into its hexadecimal equivalent.  
 $10001001_2$  (show your work clearly) (2 marks)
17. Work out the 8-bit binary two's complement of the number  $-2_{10}$  (3 marks)
18. Convert the hexadecimal number FC1 to its binary equivalent. (6 marks)
19. Convert  $7AE_{16}$  to a decimal number. (2 marks)
20. State three methods of representing data in binary number system. (3 marks)
21. (a) Explain Binary Coded Decimal code of data representation. (1 mark)
- (b) Write the number  $451_{10}$  in BCD notation. (1 mark)
22. (a) Subtract  $0111_2$  from  $1001_2$  (1 mark)
- (b) Using two's complement, subtract 7 from 4 and give the answer in decimal notation. (4 marks)
- (c) Convert:
- (i)  $91B_{16}$  to octal (3 marks)
- (ii)  $376_8$  to hexadecimal (3 marks)
- (iii)  $9.625_{10}$  to binary (4 marks)

## **DATA PROCESSING**

1. Distinguish between Data and Information. (2 marks)
2. Using an illustration, describe the four primary stages of the data processing cycle. (6 marks)
3. Clearly differentiate between the following processing terms:
- i) Data collection and Data capture. (2 marks)
- ii) Verification and Validation. (2 marks)
4. (a) Give four methods of data collection. (4 marks)
- (b) Outline the stages of data collection. (3 marks)
5. (a) Explain the relevance of the term Garbage in Garbage out (GIGO) in reference to errors in data processing. (1 mark)
- (b) Explain two main types of errors in data processing. (2 marks)

6. (a) Name and explain the two types of transcription errors. (3 marks)  
 (b) State three types of computational errors. (3 marks)
7. (a) Define the term *Data integrity* (1 mark)  
 (b) State three ways of minimizing threats to data integrity. (3 marks)
8. (a) Briefly explain the following data processing modes:
- i) Online processing. (2 marks)
  - ii) Real-time processing. (2 marks)
  - iii) Batch processing. (2 marks)
  - iv) Distributed processing. (2 marks)
  - v) Multi-programming (multi-tasking). (2 marks)
  - vi) Multi-processing. (2 marks)
  - vii) Interactive processing. (2 marks)
  - viii) Remote job entry. (2 marks)
- (b) Differentiate between:
- (i). CPU bound jobs and I/O bound jobs. (4 marks)
  - (ii). Command files and Text files. (2 marks)
9. (a) Mention five features of a Real-time system. (5 marks)  
 (b) Name two industries that extensively use Real-time processing. (2 marks)  
 (c) Give three advantages and two disadvantages of a Real-time system. (5 marks)  
 (d) In Real-time systems, Front-End Processors are quite useful. State any three reasons why you think they are important. (3 marks)  
 (e) State why an online data processor should be a real-time processor in a multi-access plant. (2 marks)
10. Most companies are now shifting from the use of centralized mainframe computers to the use of geographically distributed personal computers. This method of data processing is known as Distributed Data Processing (DDP).
- i) Name any three computing resources that can be distributed. (3 marks)
  - ii) Explain three ways in which microcomputers/personal computers can be networked to form a distributed data processing system. (6 marks)
  - iii) Name four examples of industries and business organizations that extensively use distributed processing systems. (4 marks)
  - iv) List down two benefits and three risks that might be associated with the distributed data processing system. (5 marks)
11. Explain time sharing data processing mode, giving two advantages and two disadvantages of its application. (6 marks)
12. (a) Give two benefits that are derived from Multi-programming. (2 marks)  
 (b) In a Multiprogramming environment, how does the Operating system ensure that users' input and output do not get jumbled (cluttered) up? (1 mark)
13. List three factors to be considered when deciding on the choice of an electronic data processing method. (3 marks)
14. (a) What is a Computer file? (2 marks)

- (b) Name the three constituent parts of a computer file. (3 marks)
- (b) State and explain five different types of data processing files. (5 marks)
15. Distinguish between Logical and Physical computer files. (2 marks)
16. Arrange the following components of the information system data hierarchy in ascending order of complexity:  
Field, Database, Byte, Record, Bit, and File (4 marks)
- Provide a brief description for each component. (4 marks)
17. (a) State *three* advantages of storing data in computer files over the manual filing system. (3 marks)
- (b) List four problems faced when using standard files for data processing systems. (4 marks)
18. (a) What is File organization? (2 marks)
- (b) Describe what is meant by each of the following filing systems: (4 marks)
- i) Serial.
  - ii) Sequential.
  - iii) Indexed sequential.
  - iv) Random.
- (c) State three advantages of random file organization. (3 marks)
19. State four file processing methods in a computer. (4 marks)
20. State why it is important to have the following computer file components: Beginning-of-file marker and End-of-file marker. (1 mark)
21. Differentiate between “Serial access” and “Direct access”. Give an example of a storage media in each case. (4 marks)
22. A serial file comprises of records placed in positions 1 to 10. State the position of the end of file marker.
23. (1 mark)

## **WEEK 4**

### **PROGRAMMING**

#### **SECTION A:**

1. Define the following terms: (6 marks)
- i) Computer Program
  - ii) Programming.
  - iii) Programming language.
  - iv) Program portability.
  - v) Algorithm

- vi) Pseudocode.
2. (a) What are low-level languages? Give their features. (4 marks)  
 (b) State 2 advantages and disadvantages of low-level languages. (4 marks)  
 (c) Identify two types of Low-level languages. (2 marks)
  3. Distinguish between Machine language and Assembly language. (2 marks)
  4. Most computer programming is carried out using High-level languages.  
 (a) What are High-level languages? (2 marks)  
 (b) Give three features of high-level programming languages. (3 marks)  
 (c) Give three advantages of High-level languages as opposed to Low-level languages. (3 marks)
  5. List three considerations which are present in Assembly language programming but not in high-level programming. (3 marks)
  6. (a) Examine two features of fourth generation languages (4GLS) (2 marks)  
 (b) Highlight four advantages of fourth generation languages (4GLS) (4 marks)  
 (c) List three examples of fourth generation programming languages. (3 marks)
  7. Describe the main feature of fifth generation languages. (1 mark)
  8. (a) Define the term Object-Oriented programming. (2 marks)  
 (b) List two examples of:
    - (i) third generation languages (2 marks)
    - (ii) object oriented languages. (2 marks)
 (c) Give an advantage of using an object-oriented programming language. (1 mark)
  9. Explain the meaning of the following as used in computer programming. (2 marks)
    - (i). Syntax
    - (ii). Semantic
  10. Describe 5 factors to be considered while choosing a programming language. (5 marks)
  11. Differentiate between the following as used in programming:
    - (a) Source program and object code. (1 mark)
    - (b) Flowchart and Pseudocode. (2 marks)
  12. What does the following abbreviations stand for: (2 marks)
    - i) FORTRAN
    - ii) COBOL
    - iii) OOP
  13. (a) Define a Language translator. (1 mark)  
 (b) What is the purpose of the following translator programs?
    - i) Assembler. (1 mark)
    - ii) Compiler. (1 mark)

- iii) Interpreter. (1 mark)
- (c) For each of the following programming languages, give their respective translators. (2 marks)
14. Give *two* advantages of compiling a program rather than interpreting it. (2 marks)
15. Outline the seven stages in program development cycle in their logical sequence. (7 marks)
16. In program development cycle, what takes place in:
- (a) Problem definition. (1 mark)
- (b) Program documentation. (1 mark)
17. Give two reasons why it is necessary to have a program design. (2 marks)
18. Using illustrations, explain at least six symbols used in flowchart design. (6 marks)
19. (a) Identify and briefly describe two types of flowcharts. (4 marks)
- (b) State any four rules you would follow when: (8 marks)
- i) Writing a pseudocode.
- ii) Drawing a flowchart
- (c). Give *two* advantages of pseudocodes over flowcharts. (2 marks)
20. Define the following types of computer program errors:
- (a) Syntax error. (2 marks)
- (b) Logical error. (2 marks)
- (c) Run-time (Execution) error. (2 marks)
- (d) Semantic error. (2 marks)
21. What do you understand by the following terms:
- (a) Dry running. (1 mark)
- (b) Structured walkthrough. (1 mark)
- (c) Test data. (1 mark)
- (d) User Defined Function/ Procedure (UDF) (1 mark)
22. (a) What is Program Documentation? (2 marks)
- (b) In what stage of the development does program documentation take place? (1 mark)
- (c) State two reasons for documenting all the stages of program development. (2 marks)
- (d) Describe three types of program documentation in reference to programming. (6 marks)
23. Briefly explain the purpose of the following types of program documents. (3 marks)
- (i). User manual/guide
- (ii). Reference guide
- (iii). Quick reference guide.
24. (a) Explain the meaning of Program control structures. (2 marks)
- (b) State the three basic types of program control structures. (3 marks)
- (c) Draw simple flowcharts to illustrate the following program control structure:
- i). The Nested IF selection
- ii). The FOR loop
- iii). REPEAT...UNTIL loop. (3 marks)



25. Name the control structure depicted by the flowchart below. (1 mark)

26. Highlight *two* disadvantages of monolithic programs. (2 marks)

27. (a) Define the term Structured programming. (2 marks)

(b) List any two characteristics of Structured programming. (2 marks)

(c) Give two benefits of Structured programming. (2 marks)

28. Structured programming language and Object-oriented programming language are the two main forms of high-level languages. State the difference between the two? (4 marks)

29. (a) Define the term *Selection* in relation to program control structures. (1 mark)

(b). List four selection control structures used in writing a program. (4 marks)

30. State four features of a user-friendly program. (4 marks)

### **SECTION B:**

1. Draw a flowchart for a program that would enable the user to enter student marks. The program should then determine whether the mark entered is a pass or fail given that the pass mark is 50. (5 marks)

2. Write a pseudocode that reads temperature for each day in a week, in degree celcius, converts the celcius into Fahrenheit and then calculate the average weekly temperatures. The program should output the calculated average in degrees Fahrenheit. (5 marks)

3. Draw a flowchart to be used to develop a program to calculate the Area and Perimeter of a Rectangle. The user is required to input the Length and Width of the rectangle after which she then chooses either to calculate area or perimeter using the input data. The program then outputs the results of the chosen calculation. (8 marks)

4. (a). Develop a Pseudocode which will simulate the processing of Student's report. The simulation should be such that the user repeatedly inputs marks per subject for six subjects using a looping control structure. The computer processes the total marks and mean score of the student.

Note. 1. It is assumed that the student does six subjects.

2. The outputs required are; Average score and Total marks. (5 marks)

(b). Draw a fitting flowchart for question 1 (a) above. (5 marks)

5. Mwalimu Savings Society (MSS) pays 5% interest on shares exceeding 100,000 shillings and 3% on shares that do not meet this target. However, no interest is paid on deposits in the member's MSS bank account.

(a) Design a pseudocode for a program that would:

- i). Prompt the user for shares and deposit of a particular member.
- ii). Calculate the interest and total savings.
- iii). Display the interest and total savings on the screen for a particular member of the society. (7 marks)

(b) Draw a flowchart for the above pseudocode. (8 marks)

6. The following is a Pseudocode developed for processing employees' payslips. Read through the Pseudocode carefully, then draw a fitting flowchart. (5 marks)

Start

```
Initialize employee count to 0
Open employee file
Repeat
    Read employee record
    Compute gross pay
    Compute deduction amount
    Compute net pay
    Output employee ID, gross pay, deduction, and net pay
    Add 1 to count
Until end of employee file
Close employee file
```

Stop

7. A man deposits 1,000 in a bank at an interest rate of 10% per year. At the end of each year, the interest earned is added to the amount on deposit and this becomes the new deposit for the next year.

Develop a pseudocode to determine the year in which the amount accumulated first exceeds 2,000. Also for each year, print the year (starting from 1), the deposit, the Interest earned, and the total accumulated at the end of the year.

8. Classify the following examples in any of the three program control structures. (3 marks)

- i) Statement 1  
Statement 2  
.  
.  
Statement n

.....  
ii) IF YourMarks > Mean THEN

```

    PRINT Universal Donor
ELSE
    PRINT UniversalReceiver

```

.....

```

iii) WHILE ExamTime Is Not Over
        Read question carefully
        Understand question
        Think clearly
        Answer appropriately
    ENDWHILE

```

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9. Show exactly what is printed (output) by the following program: (3 marks)

```

PROGRAM MockExam (Input, Output);
CONST
    Adjustment = 5;
VAR A, B, C: Integer;
Begin
    Readln (A, B, C);
    A: = A*B+A+Adjustment;
    B: = B+Adjustment;
    Writeln ('The Answers are', B, C, A, Adjustment);
END. (*PreExam*)

```

Use these data items: 1 2 3 as test for a, b, and c respectively.

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10. A program is required for reading in a students' name and the scores obtained in two subjects. The output of the program will consist of the student's name, the two scores, the average of the two scores and a comment. The comment is based on the average as follows:

Average	Comment
$\geq 70$	Good
$< 70$	Poor

Write a program to solve the problem using a high-level language. (10 marks)

11. Draw a flowchart that will read a number N and then output the sum of squares from 1 to N. (10 marks)
12. (a) Draw a flowchart that can be used to write a program for displaying the first 1000 integers in the series of 2, 4, 6.... (7 marks)
- (b) Modify the flowchart to sum up the numbers in (b) i above. (3 marks)
13. The gross salary of employees of Mutson Chemist is based on the Basic salary and additional benefits. Employees with more than 10 year's experience get an additional pay of 10% of their basic salary. Bonuses are given as per employees sales of the month as:
- |                   |     |
|-------------------|-----|
| >200,000          | 15% |
| 100,000 – 200,000 | 10% |
| Below 100,000     | 5%  |
- Draw a flowchart for the program that will calculate Gross salary and output each employees Basic salary, Gross salary and all benefits. (15 marks)
16. Bidii wholesalers has two categories of customers for order processing. Category 'A' obtains 10% discount on all orders up to Ksh. 10,000 otherwise the discount is 20% on the entire order. Category 'B' obtains 30% discount on all orders if the debt repayment is 'good' otherwise the discount is 15%. Draw a flowchart for the order processing. (15 marks)
17. Draw a flowchart to compare three non-equal numeric values A, B, C and print the largest of the three. (11 marks)

## **WEEK 5-6**

### **SYSTEMS DEVELOPMENT**

#### **INSTRUCTION**

Copy the Link Below on a Browser, Watch and Answer The Questions Below On System Development

[https://www.youtube.com/watch?v=HQhkrqPQ\\_yY&t=2230s&ab\\_channel=DON](https://www.youtube.com/watch?v=HQhkrqPQ_yY&t=2230s&ab_channel=DON)

[GICHAJ-TheComputerguy](#)

1. (a) What is a System? (2 marks)
- (b) Differentiate between soft systems and hard systems. (2 marks)
- (c) Explain five characteristics of a system. (5 marks)
2. (a) Define the term *Information system*. (2 marks)
- (b) State and explain three purposes of information systems in organizations. (3 marks)
- (c) Highlight three circumstances that necessitate the development of new information systems. (3 marks)

3. State four roles played by an Information system analyst. (4 marks)
4. Define the following terms:
  - i) System control.
  - ii) System boundary.
  - iii) Online analytical processing.
5. Explain three system development theories and methods. (6 marks)
6. (a) State one disadvantage of the Traditional approach in system development.(1 mark)  
(b) State one advantage and one disadvantage of Rapid Application Development method. (2 marks)
7. (a) Define the term *System development lifecycle*. (2 marks)  
(b) Outline seven stages followed when creating an information system. (7 marks)
8. (a) Define the term Feasibility study as used in system development. (2 marks)  
(b) List four contents of a feasibility study report. (4 marks)
9. Your school has a plan to acquire and install computers.
  - (a) List six criteria considered when deciding between the various computer suppliers who have submitted their tenders. (6 marks)
  - (b) The school's Board of Governors has employed an independent expert to carry out the feasibility study of the project. List four essential components of this study. (4 marks)
  - (c) State any five in-depth fact findings about the existing school system. (5 marks)
10. (a) State the importance of information gathering (fact-finding) in system development. (2 marks)  
(b) State four methods that can be used to gather information during system development. (4 marks)
11. (a) Identify two advantages and two disadvantages of Observation method used in fact-finding. (4 marks)  
(b) State two advantages and two disadvantages of the Interview method when used for information gathering. (4 marks)
12. Explain the concept of *Proxemics* in interviews. (1 mark)
13. (a) State three merits and three demerits of using a questionnaire in information gathering. (6 marks)  
(b) Name *three* circumstances in which it is better to use a Questionnaire than an Interview for gathering information. (3 marks)
14. (a) Explain the importance of using Automated methods in fact finding. (1 mark)  
(b) Give one example of Automated information gathering technique. (1 mark)
15. Mention the four areas that are considered during the requirements specification stage. (4 marks)
16. Explain three factors that should be considered during output design. (6 marks)
17. (a) State four factors that may be considered in order to design a good file. (4 marks)

- (b) Explain why it is important to consider file backup and recovery strategies during file design. (1 mark)
18. Define the term “Attribute” (1 mark)
19. Outline three factors that should be considered when sourcing for hardware and software resources required for a new system. (3 marks)
20. State two methods/tools that a system Analyst may use to design a system. (2 marks)
21. (a) Differentiate between a System flowchart and a Program flowchart. (2 marks)  
(b) Draw four system flowchart symbols and explain their functions. (4 marks)
22. Explain three tasks that are carried out during system implementation. (3 marks)
23. (a). What is systems documentation. (2 marks)  
(b) In the context of information systems development, illustrate the significance of systems documentation. (8 marks)  
(c) List any four tools that systems analysts may use to document their findings or design options during Systems analysis and design. (4 marks)  
(d) Outline four contents of a User manual. (4 marks)
24. Most information systems are reviewed or critically examined 3 – 6 months after they have been implemented or put into operation.  
i) State the purpose or objective of this review. (4 marks)  
ii) List four areas of systems operation on which the review focuses. (4 marks)
25. The company you work for has decided to replace its inventory control system. The current system was implemented ten years ago but has restricted reporting facilities and has a text-based interface. As the project manager, you are now considering details of implementation. You have been advised that you should consider both ‘Parallel running’ and “direct changeover/conversion”.
- (a) Explain the following terms as used in program implementation: (2 marks)  
i) Parallel running.  
ii) Direct changeover
- (b) Give one advantage of Direct changeover over Parallel running. (1 mark)
- (c) Identify two main risks of direct changeover, and suggest how these risks might be reduced for the inventory control system implementation. (6 marks)
26. Your school wishes to replace the original filing system with an Information and Communication Technology (ICT) system.  
(a) Name two things the school must be sure of before replacing the old system. (2 marks)  
(b) Mention four problems that may arise incase the manual system is phased out completely and replaced with the ICT system. (4 marks)  
(c) Give two advantages of running both the manual system and the ICT system simultaneously. (2 marks)  
(d) Mention any two disadvantages of running the two systems simultaneously. (2 marks)

- (e) Outline five basic qualifications of the IT manager should the school need to employ one. (5 marks)