

EDUZEDCO
451/2 COMPUTER STUDIES
Paper 2
Form 4 End Term Examination

Time: 2 ½ Hours

Name:

Adm No:

School:

Class:

Signature:

Date:

INSTRUCTIONS TO CANDIDATES

- (a) Write your name and index number in the spaces provided at the top of this page.
- (b) Write your school name, sign and write the date of the examination in the spaces provided above.
- (c) This paper consists of **Two** sections: **Section I** and **Section II**.
- (d) Answer **ALL** questions in Section I and any **five questions** from Section II.
- (e) Marks may be given for correct working, relevant points, and clear presentation.
- (f) Non-programmable silent electronic calculators may be used where necessary.
- (h) This paper consists of **8 printed pages**.
- (i) Candidates should check the question paper to ensure that all the pages are printed as indicated and no questions are missing.
- (j) Candidates should answer the questions in English.

For Examiner's Use Only

SECTION I

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Total

SECTION II

21	22	23	24	25	26	Total	Grand Total

SECTION I (50 Marks)

*Answer **all** questions in this section in the spaces provided.*

1. Define the term computer network. State two advantages of networking computers. (2 mks)
2. Name two input devices other than a keyboard and mouse, and state one function of each. (2 mks)
3. Explain three features of a word processor that make it more efficient than a typewriter. (3 mks)
4. Explain the following data validation methods: (a) Range check (b) Type check (c) Presence check. (3 mks)
5. State three functions of an operating system. (3 mks)
6. In a spreadsheet, cells A1, A2, and A3 contain 10, 20, and 30 respectively. Write a formula to compute the sum of these three cells using: (a) relative cell reference (b) a function. (4 mks)
7. Define the terms: (a) Primary key (b) Foreign key. (3 mks)
8. Write a pseudocode algorithm that inputs three numbers and outputs the largest. (4 mks)

9. Differentiate between the Internet and an intranet. (3 mks)
10. Name two threats to data in a computer system. (2 mks)
11. (a) Convert the binary number 110101 to decimal. (b) Convert the decimal number 45 to binary. (4 mks)
12. State three applications of Artificial Intelligence (AI) in everyday life. (3 mks)
13. What is the role of the Control Unit in a CPU? (2 mks)
14. List two features of a Desktop Publishing (DTP) software that are not commonly found in a word processor. (2 mks)
15. What is ASCII code and how many bits does it use to represent a character? (3 mks)
16. Define a loop in programming and give one example of a loop construct. (2 mks)
17. Name three network topologies. (3 mks)

- 18.** Distinguish between RAM and ROM in terms of: (a) volatility (b) usage. (4 mks)
- 19.** Write HTML code to create a hyperlink to 'www.knec.ac.ke' that displays 'Visit KNEC'. (3 mks)
- 20.** Explain the three stages of the data processing cycle. (3 mks)

SECTION II (50 Marks)

*Answer any **five** questions from this section in the spaces provided.*

21. Describe the stages of the System Development Life Cycle (SDLC). In your answer, explain what happens at each stage and why it is important. (10 mks)
(a) List the stages of SDLC.
(b) Explain each stage briefly.
22. Write a program in pseudocode that prompts the user to enter the length and width of a rectangle, then computes and outputs the area. Include variable declarations and appropriate comments. (10 mks)
23. You are required to design a database for a library. The system should store information about books (title, author, ISBN, publisher) and members (member ID, name, phone). A member can borrow books. (a) Draw an Entity Relationship Diagram (ERD) showing entities and relationships. (b) Create two tables (Books and Members) showing primary keys and foreign keys. (c) Write SQL statements to create the Books table. (10 mks)
(a) ERD
(b) Tables
(c) SQL
24. Explain four network security measures that an organization can implement to protect its data. For each measure, describe how it works and its importance. (10 mks)

25. Design a spreadsheet to compute the average marks and grade for a class of 10 students. The spreadsheet should have columns for: Student Name, Math, English, Science, Total, Average, and Grade. (a) Show the formulas for Total, Average, and Grade (use IF function: A $\geq$ 70, B $\geq$ 60, C $\geq$ 50, D $\geq$ 40, E otherwise). (b) Explain how you would use relative and absolute cell references. (10 mks)

(a) Formulas

(b) Explanation

26. Discuss three ethical issues related to computer use in society. For each issue, explain the problem and propose a possible solution. (10 mks)

451/2 COMPUTER STUDIES MARKING SCHEME

Form 4 Paper 2

SECTION I (50 marks)

1. Define the term computer network. State two advantages of networking computers. (2 marks)

Definition: A computer network is a collection of interconnected computers that can share resources and communicate. (1 mark) [1]

Advantages: Any two valid advantages, e.g., resource sharing (printers, files) and improved communication (email). (1 mark each, max 1 mark) [1]

Alternative method/answer:

Definition: A system of linked computers that exchange data. Advantages: cost saving, centralized data management.

2. Name two input devices other than a keyboard and mouse, and state one function of each. (2 marks)

First input device: Scanner (1 mark) - Function: converts hard copy documents into digital images. (1 mark) [1]

Second input device: Microphone (1 mark) - Function: captures audio input. (1 mark) [1]

Alternative method/answer:

Other valid devices: barcode reader, webcam, joystick, touchscreen. Functions must match device.

3. Explain three features of a word processor that make it more efficient than a typewriter. (3 marks)

Feature 1: Cut/copy/paste allows editing without retyping. (1 mark) [1]

Feature 2: Spell check corrects errors automatically. (1 mark) [1]

Feature 3: Formatting options (e.g., bold, italics) improve appearance. (1 mark) [1]

Alternative method/answer:

Other features: mail merge, tables, headers/footers, find/replace, word count.

4. Explain the following data validation methods: (a) Range check (b) Type check (c) Presence check. (3 marks)

(a) Range check: ensures data falls within a specified range (e.g., age between 0-120). (1 mark) [1]

(b) Type check: ensures data is of correct data type (e.g., numeric). (1 mark) [1]

(c) Presence check: ensures a field is not left blank. (1 mark) [1]

Alternative method/answer:

Other validation methods: length check, format check, uniqueness check.

5. State three functions of an operating system. (3 marks)

Function 1: Memory management (1 mark) [1]

Function 2: Process management (1 mark) [1]

Function 3: File management (1 mark) [1]

Alternative method/answer:

Other functions: device management, security, user interface, job scheduling.

6. In a spreadsheet, cells A1, A2, and A3 contain 10, 20, and 30 respectively. Write a formula to compute the sum of these three cells using: (a) relative cell reference (b) a function. (4 marks)

(a) Formula using relative cell reference: =A1+A2+A3 (2 marks) [2]

(b) Formula using a function: =SUM(A1:A3) (2 marks) [2]

Alternative method/answer:

Accept =A1+A2+A3 for (a) and =SUM(A1:A3) for (b). Also accept =SUM(A1,A2,A3).

7. Define the terms: (a) Primary key (b) Foreign key. (3 marks)

(a) Primary key: a field that uniquely identifies each record in a table. (1.5 marks) [1.5]

(b) Foreign key: a field in one table that refers to the primary key in another table, used to link tables. (1.5 marks) [1.5]

Alternative method/answer:

Primary key: unique identifier for a row. Foreign key: field that matches a primary key in another table.

8. Write a pseudocode algorithm that inputs three numbers and outputs the largest. (4 marks)

START (0.5 mark) [0.5]

INPUT num1, num2, num3 (1 mark) [1]

largest = num1 (0.5 mark) [0.5]

IF num2 > largest THEN largest = num2 (0.5 mark) [0.5]

IF num3 > largest THEN largest = num3 (0.5 mark) [0.5]

OUTPUT largest (0.5 mark) [0.5]

END (0.5 mark) [0.5]

Alternative method/answer:

Accept any correct pseudocode that finds the largest of three numbers. Alternative: use nested IFs or a loop.

9. Differentiate between the Internet and an intranet. (3 marks)

Internet: a global public network accessible to anyone. (1 mark) [1]

Intranet: a private network restricted to an organization. (1 mark) [1]

Difference: Internet is public and worldwide; intranet is private and internal. (1 mark) [1]

Alternative method/answer:

Internet uses public infrastructure; intranet uses internal infrastructure. Both use internet technologies.

10. Name two threats to data in a computer system. (2 marks)

Threat 1: Computer viruses (1 mark) [1]

Threat 2: Hacking/unauthorized access (1 mark) [1]

Alternative method/answer:

Other threats: malware, phishing, hardware theft, natural disasters, power surges.

11. (a) Convert the binary number 110101 to decimal. (b) Convert the decimal number 45 to binary. (4 marks)

(a) Binary to decimal: $1 \times 32 + 1 \times 16 + 0 \times 8 + 1 \times 4 + 0 \times 2 + 1 \times 1 = 32 + 16 + 4 + 1 = 53$ (2 marks: 1 for method, 1 for correct answer) [2]

(b) Decimal to binary: $45 \div 2 = 22$ remainder 1, $22 \div 2 = 11$ rem 0, $11 \div 2 = 5$ rem 1, $5 \div 2 = 2$ rem 1, $2 \div 2 = 1$ rem 0, $1 \div 2 = 0$ rem 1 $\rightarrow 101101$ (2 marks: 1 for method, 1 for correct answer) [2]

Alternative method/answer:

Accept other methods like repeated subtraction or using powers of 2.

12. State three applications of Artificial Intelligence (AI) in everyday life. (3 marks)

Application 1: Virtual assistants like Siri (1 mark) [1]

Application 2: Recommendation systems on Netflix (1 mark) [1]

Application 3: Autonomous vehicles (1 mark) [1]

Alternative method/answer:

Other applications: facial recognition, chatbots, medical diagnosis, game playing.

13. What is the role of the Control Unit in a CPU? (2 marks)

The Control Unit directs the operation of the processor by fetching instructions from memory, decoding them, and coordinating execution. (2 marks) [2]

Alternative method/answer:

It controls the flow of data and instructions within the CPU.

14. List two features of a Desktop Publishing (DTP) software that are not commonly found in a word processor. (2 marks)

Feature 1: Master pages (1 mark) [1]

Feature 2: Precise control over object placement and layering (1 mark) [1]

Alternative method/answer:

Other features: templates, frames, text wrapping, color separation.

15. What is ASCII code and how many bits does it use to represent a character? (3 marks)

ASCII: American Standard Code for Information Interchange, a character encoding standard. (1 mark) [1]

Standard ASCII uses 7 bits (128 characters). (1 mark) [1]

Extended ASCII uses 8 bits (256 characters). (1 mark) [1]

Alternative method/answer:

Accept: ASCII is a code that represents characters as numbers. 7 bits for standard, 8 for extended.

16. Define a loop in programming and give one example of a loop construct. (2 marks)

Definition: A loop is a control structure that repeats a block of code as long as a condition is true. (1 mark) [1]

Example: FOR loop (1 mark) [1]

Alternative method/answer:

Other examples: WHILE loop, DO...WHILE loop.

17. Name three network topologies. (3 marks)

Topology 1: Bus (1 mark) [1]

Topology 2: Star (1 mark) [1]

Topology 3: Ring (1 mark) [1]

Alternative method/answer:

Other topologies: mesh, tree, hybrid.

18. Distinguish between RAM and ROM in terms of: (a) volatility (b) usage. (4 marks)

(a) Volatility: RAM is volatile (data lost when power off), ROM is non-volatile. (2 marks: 1 for each) [2]

(b) Usage: RAM is used for temporary storage of running programs and data; ROM holds permanent instructions for booting. (2 marks: 1 for each) [2]

Alternative method/answer:

RAM: read/write, fast; ROM: read-only, slower. Both are primary memory.

19. Write HTML code to create a hyperlink to 'www.knec.ac.ke' that displays 'Visit KNEC'. (3 marks)

Correct anchor tag with href attribute: (1 mark) [1]

Correct link text: Visit KNEC (1 mark) [1]

Closing tag: (1 mark) [1]

Alternative method/answer:

Accept double quotes: Visit KNEC

20. Explain the three stages of the data processing cycle. (3 marks)

Stage 1: Input - data collection and entry. (1 mark) [1]

Stage 2: Processing - manipulation of data into information. (1 mark) [1]

Stage 3: Output - presentation of results. (1 mark) [1]

Alternative method/answer:

Some sources include storage as a stage. Accept if explained.

SECTION II (50 marks)

21. Describe the stages of the System Development Life Cycle (SDLC). In your answer, explain what happens at each stage and why it is important. (10 marks)

(a) List stages: Planning, Analysis, Design, Implementation, Testing, Deployment, Maintenance. (3 marks: 1 mark for any 3 stages, 2 marks for 5, 3 marks for all 7) [3]

(b) Explanation of each stage (7 marks: 1 mark per stage for correct explanation): Planning: define scope and feasibility. Analysis: gather requirements. Design: create architecture. Implementation: coding. Testing: check for errors. Deployment: release. Maintenance: updates. [7]

Alternative method/answer:

Accept variations like: Planning, Analysis, Design, Development, Testing, Implementation, Maintenance. Or Waterfall model stages.

22. Write a program in pseudocode that prompts the user to enter the length and width of a rectangle, then computes and outputs the area. Include variable declarations and appropriate comments. (10 marks)

START (1 mark) [1]

DECLARE length, width, area AS REAL (2 marks: 1 for declaration, 1 for data type) [2]

OUTPUT "Enter length: " (1 mark) [1]

INPUT length (1 mark) [1]

OUTPUT "Enter width: " (1 mark) [1]

INPUT width (1 mark) [1]

area = length * width (1 mark) [1]

OUTPUT "Area is: ", area (1 mark) [1]

END (1 mark) [1]

Alternative method/answer:

Accept any correct pseudocode with appropriate prompts and variable names. Use of comments is optional.

23. You are required to design a database for a library. The system should store information about books (title, author, ISBN, publisher) and members (member ID, name, phone). A member can borrow books. (a) Draw an Entity Relationship Diagram (ERD) showing entities and relationships. (b) Create two tables (Books and Members) showing primary keys and foreign keys. (c) Write SQL statements to create the Books table. (10 marks)

(a) ERD: Entities: Book, Member, Borrow (or Loan). Relationships: Member borrows Book (many-to-many). (4 marks: 2 for entities, 2 for relationships) [4]

(b) Tables: Books(ISBN PK, Title, Author, Publisher); Members(MemberID PK, Name, Phone); Borrow(BookISBN FK, MemberID FK, Date). (3 marks: 1 per table with correct keys) [3]

(c) SQL: CREATE TABLE Books (ISBN VARCHAR(20) PRIMARY KEY, Title VARCHAR(100), Author VARCHAR(50), Publisher VARCHAR(50)); (3 marks: 1 for CREATE TABLE, 1 for columns, 1 for PRIMARY KEY) [3]

Alternative method/answer:

Accept different attribute names. For ERD, accept crow's foot notation or simple rectangles. SQL may include NOT NULL, etc.

24. Explain four network security measures that an organization can implement to protect its data. For each measure, describe how it works and its importance. (10 marks)

Measure 1: Firewall - blocks unauthorized access. (2.5 marks: 1 for name, 1.5 for explanation) [2.5]

Measure 2: Encryption - converts data into code to prevent eavesdropping. (2.5 marks) [2.5]

Measure 3: Authentication - verifies user identity (e.g., passwords). (2.5 marks) [2.5]

Measure 4: Antivirus - detects and removes malware. (2.5 marks) [2.5]

Alternative method/answer:

Other measures: intrusion detection systems, access control lists, biometrics, VPNs, regular backups.

25. Design a spreadsheet to compute the average marks and grade for a class of 10 students. The spreadsheet should have columns for: Student Name, Math, English, Science, Total, Average, and Grade. (a) Show the formulas for Total, Average, and Grade (use IF function: A $\geq$ 70, B $\geq$ 60, C $\geq$ 50, D $\geq$ 40, E otherwise). (b) Explain how you would use relative and absolute cell references. (10 marks)

(a) Formulas: Total = B2+C2+D2 (or =SUM(B2:D2)) (2 marks), Average = E2/3 (or =AVERAGE(B2:D2)) (2 marks), Grade = IF(F2 $\geq$ 70,"A",IF(F2 $\geq$ 60,"B",IF(F2 $\geq$ 50,"C",IF(F2 $\geq$ 40,"D","E")))) (3 marks: 1 for IF structure, 1 for conditions, 1 for correct grades) [7]

(b) Explanation: Relative references change when copied (e.g., B2 becomes B3); absolute references (e.g., B2) remain constant. (3 marks: 1 for relative, 1 for absolute, 1 for example) [3]

Alternative method/answer:

Accept use of nested IFs or IFS function. Grade thresholds may vary slightly.

26. Discuss three ethical issues related to computer use in society. For each issue, explain the problem and propose a possible solution. (10 marks)

Issue 1: Privacy - unauthorized access to personal data; solution: strong encryption and laws. (3.33 marks: 1 for issue, 1 for explanation, 1.33 for solution) [3.33]

Issue 2: Intellectual property - software piracy; solution: licensing and education. (3.33 marks) [3.33]

Issue 3: Cybercrime - hacking; solution: cybersecurity measures and legal penalties. (3.34 marks) [3.34]

Alternative method/answer:

Other issues: digital divide, job displacement, cyberbullying, data manipulation. Accept any valid ethical issue with reasonable solution.