

G12 ECZ COMPUTER STUDIES P1 2016 SPECIMEN SOLUTIONS

Grade 12 ECZ Computer Studies Paper 1, 2016 Specimen (7010/1)

2 hours 30 minutes | 13 questions, 12 in Section A + 1 in Section B, 70 marks

The full question paper appears first, followed by full worked answers to every question.

Preamble for Computer Studies (7010)

The Examinations Council of Zambia has made adjustments to the assessment of **Computer Studies** at Grade 12 level so as to be in line with the revised **Computer Studies** Senior Secondary School Syllabus of 2013 developed by Curriculum Development Centre (CDC) of the Ministry of General Education.

Purpose

The purpose of the Grade 12 Computer Studies examination is to measure a candidate's achievements against the set competencies as outlined in the Grade 10–12 Syllabus. The examination will also be used for certification and for progression to tertiary education.

Assessment Objectives

Candidates will be tested against the following assessment objectives:

Knowledge and Comprehension

1. Recall and understanding of computer terminologies and the general theory of the basic computer system
2. Recall of facts on computer hardware and devices in everyday life
3. Understanding of generic application software available for computers and other microprocessor-controlled devices
4. Recall of facts on operating systems, networks and security
5. Understanding of the social, economic and environmental impact of computers

Application

1. Use a computer for intermediate to advanced practical purposes in word processing, spreadsheet, and database design and systems implementation
2. Apply an understanding and use of emails, the internet and social networks.
3. Determine an appropriate software solution to solve a given problem, e.g. of social, economic and environmental nature
4. Perform basic skills in algorithm design and problem analysis and solving
5. Apply project and research skills to develop programs or software using appropriate programming languages from a predefined set of algorithms

Analysis

1. Determine appropriate system tools (flowcharts, dataflow diagrams, entity relationship diagrams) and algorithms to solve problems
2. Plan, test and evaluate a solution
3. Choose an appropriate implementation method
4. Apply logical thinking and make connections between topics in Computer Studies and other learning areas

Synthesis

1. Code in a suitable programming language from a given set of algorithms
2. Identify and correct errors such as syntax, runtime and logical errors
3. Use appropriate logic gate routes used in systems (NAND, OR, AND gates, etc.)

Evaluation

1. Demonstrate practical skills to evaluate and appraise chosen solutions against the initial objectives, plans and designs
2. Assess and recommend computer systems for different sectors of society such as finance, education, health and government

Test Design

The examination will consist of two papers, Computer Studies Paper 1 (Theory) and Computer Studies Paper 2 (Practical), as shown below.

Paper Name	Code	Paper Type	No. of Questions	Total Marks	Duration	Weighting
Computer Studies Paper 1	7010/1	Theory	15	70	2 hours 30 minutes	70%
Computer Studies Paper 2	7010/2	Practical	2	30	1 hour 30 minutes	30%
Total				100		100%

EXAMINATIONS COUNCIL OF ZAMBIA

Examination for School Certificate Ordinary Level

Computer Studies

7010/1

Paper 1

2016

Candidates answer on the question paper
No additional materials are required

Time: 2 hours 30 minutes

Instructions to Candidates

Write your name, centre number and candidate number in the spaces at the top of this page.

There are 13 questions in this paper, 12 in Section A and 1 in Section B.

Answer **all** Questions.

Write your answers in the spaces on the question paper.

Information for Candidates

The number of marks is given in brackets [] at the end of each question or part question.

The total number of marks for this paper is 70.

Cell phones are not allowed in the Examination Room.

For Examiner's Use

Section A

- 1 (a) Explain the meaning of the term Data-capture.

.....
 [1]

- (b) Fill in the output devices for the applications given in the table.

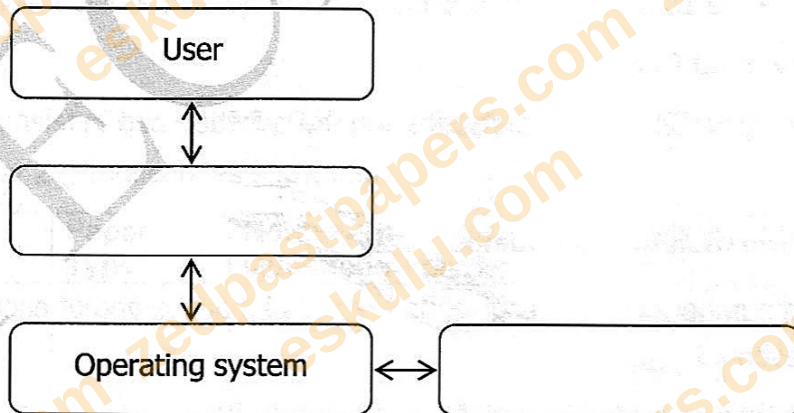
	Application	Output Device
(i)	Alerting user of an error by a beep	
(ii)	Producing a large plan of a house	

[2]

- (c) Give **one** advantage of using a touch screen as an input device by the general public at a train station when buying tickets rather than using keyboard and mouse.

.....
 [1]

- 2 (a) The diagram below shows how a user interacts with the computer when creating a document. Fill in the missing parts to complete the sequence.



[2]

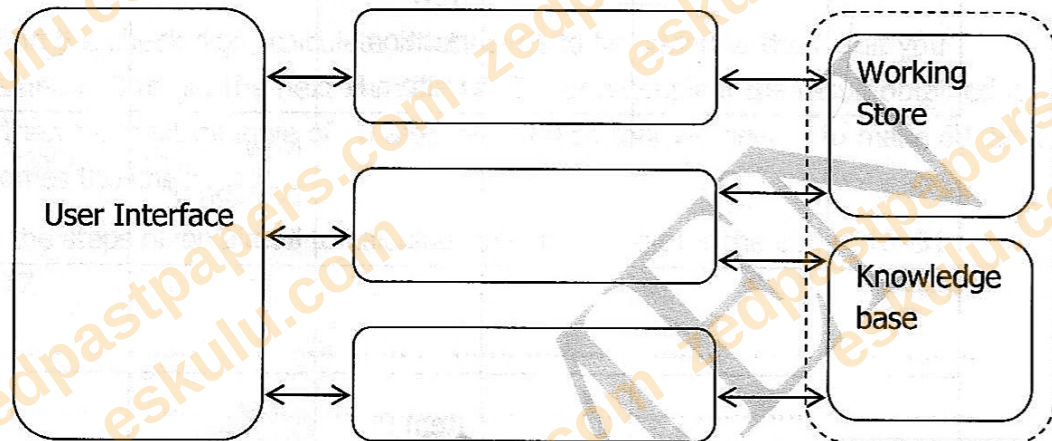
- (b) Give **one** advantage of using graphical user interface as opposed to the command line interface.

.....
 [1]

3 (a) What is an Expert system?

.....
 [1]

(b) The diagram below shows the outline of an expert system used in diagnosing diseases. Complete the diagram below by filling in the blanks.



[3]

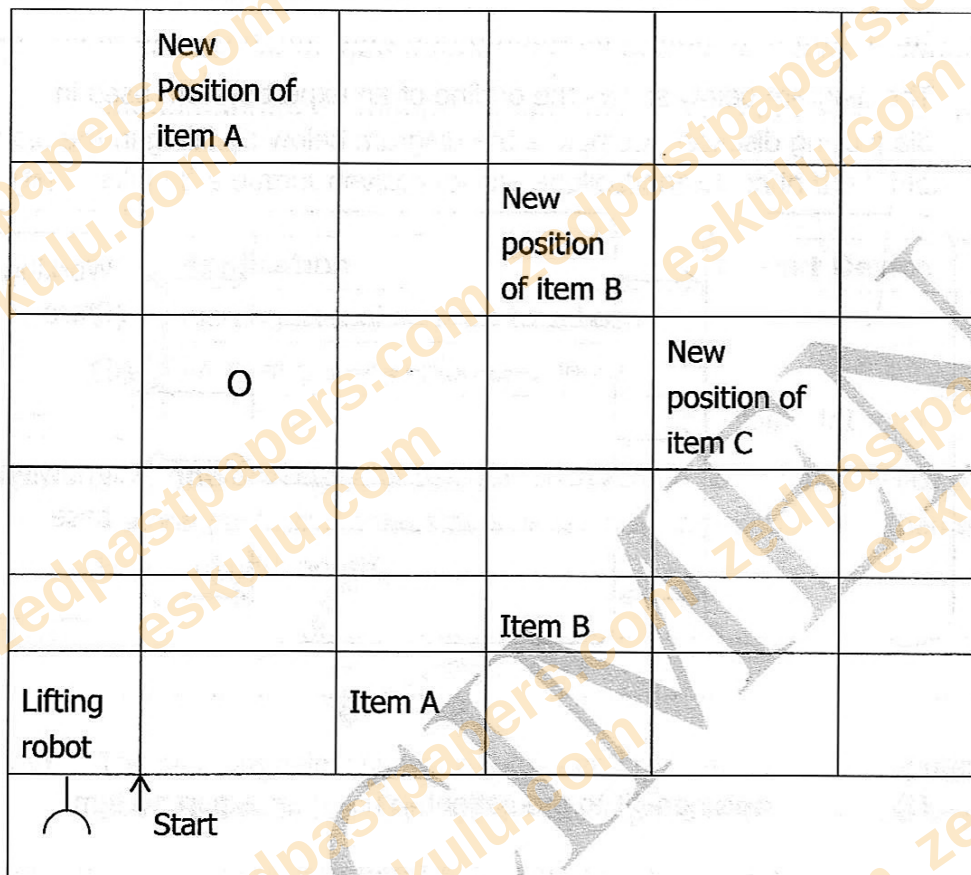
(c) (i) Give **one** benefit to the patient in using an expert system.

..... [1]

(ii) Give **one** other field where an expert system is used apart from diagnosing diseases.

..... [1]

- 4 Pupils of Chilundu School JETS Club have written a control program for a homemade robot. The job of the robot is to lift items in a store room and place them in correct positions.



The following are the commands used:

H – Home – robot moves items to the original position

L – left, robot move item to the left

R – Right, robot move item to the right

U – Up, move grab item

D – Down, move grab item

O – Open and grab item

C – Open and drop item

S – Start

For example to move item A to position O, the commands are S L F1 O F3 L C.

- (a) Write the instruction to move item A to its new position.

..... [1]

- (b) Write instructions to move item B to its new position with Robot returning to its start position.

..... [1]

- 5** Barcodes are widely used on most products sold in shops. A barcode has a check digit used for validation when scanning. It is calculated using the following instructions.

Step 1. Add together the digits in the odd positions and multiply them by 3.

Step 2. Add together the digits in the even positions.

Step 3. Add the two results (from 1 and 2) together.

To find the check digit, calculate what needs to be added to the result you obtained in 3 to get the next multiple of 10. For example if the result obtained is 58, then the next multiple of 10 after 58 is 60 so that we need 2 to make 60. So 2 becomes the check digit.

Use the steps given above to calculate the check digit for the code 51043112017

.....

.....

.....

.....

..... [5]

- 6** Cell phones are now commonly used as a means of communication.

(a) Give **one** feature found on a cell phone apart from voice calling and texting.

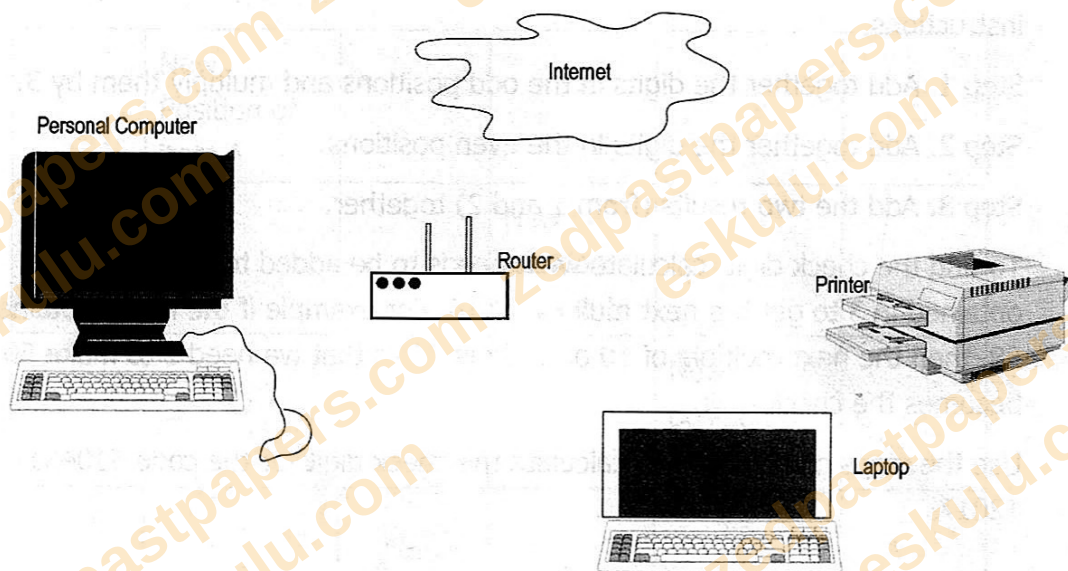
..... [1]

(b) Give **one** reason why you may sometimes be diverted to your friends voice mail when you make a call.

.....

..... [1]

- 7 The diagram shows an example of a network that does not use cables to transmit data for communication.



- (a) The network shown uses radio waves to transmit data. What term refers to this type of Local Area Network?

..... [1]

- (b) Give **one** advantage and **one** disadvantage of this type of network.

Advantage:

..... [1]

Disadvantage:

..... [1]

- (c) Give **one** example of a type of Local Area Network (LAN) that can be formed using cell phones.

..... [2]

8 An organisation has decided to create a flyer using Desktop Publishing software to advertise its products.

(a) Give **one** feature of Desktop Publishing software that could be used to improve the presentation of the flyer.

..... [1]

(b) Give **one** other document apart from a flyer which you can create using Desktop Publishing software.

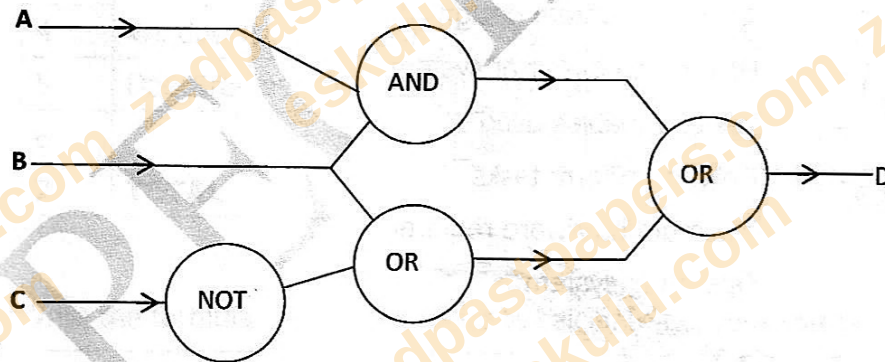
..... [1]

(c) If the flyer is to contain some pictures, describe how you would include pictures.

.....

 [2]

9 Construct the truth table for the logic network shown. The first one has been done for you.



A	B	C	D (output)
1	0	0	1
0	1	0	
0	1	1	
1	1	1	

[3]

- 10** In order to change from one system to another, a systems analyst at a company was given four types of changeover methods. Name the changeover method using the guides given. One method has been done for you.

(a)	Guide	Method
(i)	Old system New system	----- [1]
(ii)	Old system New system	Parallel [1]
(iii)	Old system New system	----- [1]
(iv)	Old New ➤ Old New ➤ Old New Branch A Branch B Rest of Branch	----- [1]

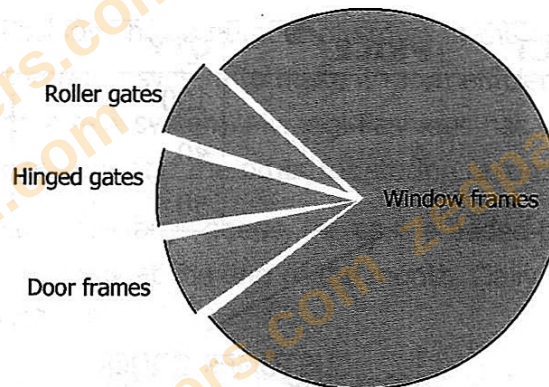
- (b)** The following contents of the technical and user documentation are in mixed order. List them under the correct column.

- A copy of system design
- How to log in/out of system
- List of variables used
- How to perform tasks
- Minimum hardware requirement
- Operating system

User Documentation	Technical Documentation

[3]

- 11** Mr Banda uses a spreadsheet to keep track of his small welding business. He used a spreadsheet to generate a pie chart of the stock value of the 4 types of merchandise he deals in.



- (a)** On the spreadsheet below, shade the cells that must be used to create the pie chart.

	A	B	C	D	E	F
1		Stock	Amount Sold	Stock left	Price(ZMW)	Total price (ZMW)
2	Roler gates	25	20	05	150.00	750.00
3	Hinged gates	10	03	07	100.00	700.00
4	Window frames	70	28	42	90.00	3,780.00
5	Door frames	15	02	13	100.00	1,300.00
6						
7	TOTAL					6,530.00

[2]

- (b)** Write the formula in F7 that is used to calculate the total "stock value".

..... [1]

- (c)** Explain how Mr Banda can sort column A in ascending order.

..... [1]

- 12 The diagram below shows a query called ORDER created from two tables called PRODUCT DETAILS and CUSTOMER ORDERS.

ORDER QUERY

CUSTOMER	PRODUCT	PRICE	QTY	AMOUNT
TEMBO	X		100	C
MWALA	Y	A	40	2400
NAMWINGA			50	

PRODUCT DETAILS

PRODUCT	PRICE
SUGAR	300
C-OIL	150
MAIZE	60

CUSTOMER ORDER

CUSTOMER	PRODUCT	QTY
INONGE	MAIZE	40
NAMWINGA	SUGAR	50
TEMBO	C-OIL	100

- (a) State the field that facilitates this table relationship.

..... [1]

- (b) Give the result obtained from the letters marked.

A [1]

X [1]

Y [1]

- (c) State **one** major reason why table relationship usage is encouraged in databases.

..... [1]

- (d) Give the formula for field Amount in **C**.

..... [1]

Section B

- 13 Read the following scenario and use it to answer the questions that follow.**

Mwangi Fashions has a number of stores in the capital city. It is converting its existing computer system to make it more efficient. A systems analyst will analyse and design a new system. Mwangi Fashions has two separate files one for storing customer records and the other for storing record of sales.

When a customer buys goods, the cost is added to their account in a cumulative fashion. They pay at the end of the month. Daily transaction files are generated and added.

The analyst has decided that sales records and customer records be combined into a relational Database.

- (a)** Draw the file updating that takes place at the end of the month.

.....

.....

.....

.....

.....

[4]

- (b)** Fixed magnetic hard disks are used to store the transaction and master files in the current system. Evaluate the current system of storage of Mwangi Fashion on **three** points.

.....

.....

.....

.....

[6]

- (c)** Write an outline of the structure of the relational database that would need to be created to store the sales records and customer records.

.....

.....

.....

.....

[7]

(d) Give **three** reasons why the systems analyst would recommend a relational database for Mwangi fashions.

Reason 1:

[1]

Reason 2:

[1]

Reason 3:

[1]

Question Q1. (a) Explain the meaning of the term Data-capture. [1] (b) Fill in the output devices for: (i) alerting the user of an error by a beep; (ii) producing a large plan of a house. [2] (c) Give one advantage of using a touch screen as an input device at a train station over keyboard and mouse. [1]

Answer: (a) Data-capture is the process of collecting/gathering raw data at its source (often automatically, e.g. by a sensor or scanning device) so that it can be entered into a computer system for processing.

Answer: (b) (i) Alerting the user of an error by a beep: a speaker. (ii) Producing a large plan of a house: a plotter (used for large-format technical/architectural drawings).

Answer: (c) Advantage of a touch screen at a train station: it is faster and easier for members of the public (who may be unfamiliar with computers) to use, since they simply touch on-screen options instead of learning how to operate a keyboard and mouse.

Question Q2. (a) The diagram shows how a user interacts with the computer creating a document: User <-> [blank box] <-> Operating system <-> [blank box]. Fill in the missing parts. [2] (b) Give one advantage of using a graphical user interface as opposed to the command line interface. [1]

Answer: (a) The missing boxes are: Application software (e.g. a word processor) — the box between User and Operating system, since the user directly interacts with the application, which in turn communicates with the operating system; and Hardware — the box linked to the Operating system, since the operating system controls the physical computer hardware that carries out the document-creation tasks.

Answer: (b) Advantage of a GUI over a command line interface: it is easier and faster for a user to learn and operate, since they select options using icons/menus and a mouse instead of having to memorise and correctly type exact text commands.

Question Q3. (a) What is an Expert system? [1] (b) The diagram shows the outline of an expert system used in diagnosing diseases: User Interface <-> [blank] <-> Working Store; User Interface <-> [blank] <-> Knowledge base; User Interface <-> [blank] <-> (dotted box linking Working Store & Knowledge base). Complete the diagram by filling in the blanks. [3] (c)(i) Give one benefit to the patient in using an expert system. [1] (ii) Give one other field where an expert system is used apart from diagnosing diseases. [1]

Answer: (a) An expert system is a computer program that uses a knowledge base of facts and rules, together with an inference engine, to imitate the decision-making/reasoning ability of a human expert in a specific field (e.g. medicine).

Answer: (b) The three blank boxes (between User Interface and the Working Store/Knowledge base pair) are all Inference Engine — the inference engine is the component that sits between the user interface and the knowledge base/working store, applying the stored rules to the facts entered by the user (via the working store) to reach a diagnosis/conclusion.

Answer: (c)(i) Benefit to the patient: a faster and more consistent/accurate diagnosis, available even where (or when) a specialist human doctor is not immediately present.

Answer: (ii) Another field using expert systems: e.g. car-fault diagnosis (or financial/loan-approval systems, geological mineral-prospecting, tax-advice systems).

Question Q4. Pupils of Chilundu School JETS Club wrote a control program for a homemade lifting robot working on a 5-column x 6-row grid store room. Robot commands: H(Home - return to start), L(left), R(right), U(up), D(down), O(open and grab item), C(open and drop item), S(Start). Given grid positions: Lifting robot/Start at (row6,col1); Item A at (row6,col3), its new position at (row1,col2); Item B at (row5,col4), its new position at (row2,col4). (a) Write the instruction to move item A to its new position. [1] (b) Write instructions to move item B to its new position with the robot returning to its start position. [1]

*** NOTE ON THIS DIAGRAM: the scanned specimen paper's worked example ('S L F1 O F3 L C') uses a command letter 'F' that is not in the paper's own defined command list (H, L, R, U, D, O, C, S) — this appears to be an inconsistency/typo in the source specimen. The answers below use only the commands the paper actually defines, reading the grid as: the robot travels along the floor row using L/R, and lifts/lowers between shelf rows using U/D. ***

Answer: (a) Item A is on the same floor row as the robot's start (row 6), 2 columns to the right; its new position is 5 rows up and 1 column to the left of where it currently sits. Instructions: S R2 O U5 L1 C (Start; move right 2 to reach item A; open and grab it; move up 5 rows; move left 1 column; open and drop it).

Answer: (b) Item B sits 3 columns to the right of the start and 1 row up; its new position is directly above it (same column), 3 rows further up. Instructions: S R3 U1 O U3 C H (Start; right 3, up 1 to reach item B; open and grab it; up 3 to its new position; open and drop it; Home to return the robot to its start position).

Question Q5. Barcodes have a check digit calculated by: Step 1 - add the digits in odd positions and multiply by 3; Step 2 - add the digits in even positions; Step 3 - add the two results; the check digit is what must be added to reach the next multiple of 10 (e.g. 58 -> next multiple of 10 is 60, so check digit = 2). Calculate the check digit for the code 510431 12017. [5]

Answer: The 11 digits (reading left to right, positions 1-11) are: 5,1,0,4,3,1,1,2,0,1,7. Odd positions (1,3,5,7,9,11): 5, 0, 3, 1, 0, 7 -> sum = 16 -> multiplied by 3 = 48. Even positions (2,4,6,8,10): 1, 4, 1, 2, 1 -> sum = 9. Step 3: 48 + 9 = 57. The next multiple of 10 after 57 is 60; 60 - 57 = 3. Check digit = 3.

Question Q6. Cell phones are commonly used as a means of communication.
(a) Give one feature found on a cell phone apart from voice calling and texting. [1]
(b) Give one reason why you may sometimes be diverted to your friend's voice mail when you make a call. [1]

Answer: (a) Another feature: a camera (for taking photos/videos) — other valid answers: internet browsing, GPS navigation, or music playback.

Answer: (b) You may be diverted to voice mail if your friend's phone is switched off, out of network coverage, has no battery power, or they are already busy on another call.

Question Q7. The diagram shows a network (Personal Computer, Router, Printer, Laptop, connected to the Internet) that does not use cables to transmit data. (a) What term refers to this type of Local Area Network, which uses radio waves? [1] (b) Give one advantage and one disadvantage of this type of network. [2] (c) Give one example of a type of LAN that can be formed using cell phones. [2]

Answer: (a) This is a Wireless Local Area Network (WLAN), commonly known as Wi-Fi.

Answer: (b) Advantage: devices can connect and be used from anywhere within signal range without being physically wired to the network, giving greater mobility/convenience.

Disadvantage: the signal can be weaker or blocked by walls/distance, and wireless networks are generally less secure (easier for outsiders to intercept or hack) than a cabled network.

Answer: (c) Example: a Bluetooth network (a short-range wireless Personal Area Network/'piconet' formed directly between two or more cell phones without a router).

Question Q8. An organisation has decided to create a flyer using Desktop Publishing software. (a) Give one feature of DTP software that could be used to improve the presentation of the flyer. [1] (b) Give one other document, apart from a flyer, which you can create using DTP software. [1] (c) If the flyer is to contain some pictures, describe how you would include pictures. [2]

Answer: (a) A feature to improve presentation: the ability to arrange text and images into multiple columns/text frames (or add WordArt/styled headings, borders, and templates).

Answer: (b) Another document: a business card (other valid answers: a newsletter, poster, brochure, or calendar).

Answer: (c) To include pictures: use the Insert -> Picture/Image command to import an existing image file (e.g. a photo taken with a digital camera, or clip art), then place it into a picture frame/text box on the page and resize/position it as needed.

Question Q9. Construct the truth table for the logic network shown (A, B feed an AND gate; B also feeds, together with NOT(C), a second OR gate; the AND-gate output and the second OR-gate output feed a final OR gate producing D). The first row (A=1,B=0,C=0 → D=1) has been done for you. Complete rows: A=0,B=1,C=0; A=0,B=1,C=1; A=1,B=1,C=1. [3]

Answer: Working through the network as: $D = (A \text{ AND } B) \text{ OR } (B \text{ OR NOT}(C))$: Row 1 (given): A=1,B=0,C=0 → AND(1,0)=0; NOT(0)=1; OR(0,1)=1; D = OR(0,1) = 1. (matches the given answer)
 Row 2: A=0,B=1,C=0 → AND(0,1)=0; NOT(0)=1; OR(1,1)=1; D = OR(0,1) = 1. Row 3: A=0,B=1,C=1 → AND(0,1)=0; NOT(1)=0; OR(1,0)=1; D = OR(0,1) = 1. Row 4: A=1,B=1,C=1 → AND(1,1)=1; NOT(1)=0; OR(1,0)=1; D = OR(1,1) = 1. So D (output) = 1 for all four given rows (since B=1 or NOT(C)=1 in every row shown, the lower OR branch is always 1, which is enough on its own to make the final OR output 1).

Question Q10. (a) Name the changeover method shown by each guide: (i) Old system stops, New system starts immediately after (direct handover); (ii) Old and New systems run together for a time (given: Parallel); (iii) Old system tapers off while New system phases in (diagonal overlap); (iv) Old/New alternate across separate branches (Branch A, Branch B, Rest of Branch). [3]
 (b) Sort the following documentation items into the correct column (User Documentation vs Technical Documentation): a copy of system design; how to log in/out of system; list of variables used; how to perform tasks; minimum hardware requirement; operating system. [3]

Answer: (a) (i) Direct changeover (the old system is stopped and the new system started immediately in its place). (ii) Parallel changeover (given). (iii) Phased changeover (the new system is introduced gradually, part by part, while the old system is progressively withdrawn). (iv) Pilot changeover (the new system is introduced to one branch/site first, then rolled out to the rest).

Answer: (b) User Documentation: how to log in/out of system; how to perform tasks; minimum hardware requirement. Technical Documentation: a copy of system design; list of variables used; operating system.

Question Q11. Mr Banda uses a spreadsheet to track his welding business (Roller gates, Hinged gates, Window frames, Door frames), with columns Stock, Amount Sold, Stock left, Price(ZMW), Total price(ZMW). He generated a pie chart of stock value from this data. (a) Shade the cells that must be used to create the pie chart. [2] (b) Write the formula in F7 (TOTAL) that calculates the total 'stock value'. [1] (c) Explain how Mr Banda can sort column A in ascending order. [1]

Answer: (a) The cells needed for the pie chart are the category labels in column A (A2:A5: Roller gates, Hinged gates, Window frames, Door frames) together with their corresponding values in column F (F2:F5: 750.00, 700.00, 3780.00, 1300.00) — these two non-adjacent ranges (A2:A5 and F2:F5) should be selected together (using Ctrl) and shaded.

Answer: (b) Formula for F7: =SUM(F2:F5) -> result 6 530.00.

Answer: (c) Select the whole data range A2:F5 (not just column A alone, so that every row's other values move together with its label), then use Data -> Sort, choosing Column A and Ascending order.

Question Q12. The diagram shows a query called ORDER created from two tables, PRODUCT DETAILS (Product/Price: SUGAR/300, C-OIL/150, MAIZE/60) and CUSTOMER ORDER (Customer/Product/Qty: INONGE/MAIZE/40, NAMWINGA/SUGAR/50, TEMBO/C-OIL/100). The ORDER QUERY result table shows: TEMBO/X/blank price/100/C(amount); MWALA/Y/A(price)/40/2400; NAMWINGA/blank/blank/50/blank. (a) State the field that facilitates this table relationship. [1] (b) Give the result obtained from the letters marked: A, X, Y. [3] (c) State one major reason why table relationship usage is encouraged in databases. [1] (d) Give the formula for field Amount in C. [1]

Answer: *** NOTE: the ORDER QUERY's second row names the customer 'MWALA', but the CUSTOMER ORDER table only lists INONGE, NAMWINGA and TEMBO — this looks like an inconsistency/typo in the source specimen, since the row's Product/Qty (40) exactly matches INONGE's MAIZE/40 record. The answer below follows that data match. ***

Answer: (a) The field that facilitates (links) the relationship between the two tables is PRODUCT — it is the common field present in both PRODUCT DETAILS and CUSTOMER ORDER.

Answer: (b) X = C-OIL (TEMBO's product, from the CUSTOMER ORDER table). Y = MAIZE (the product ordered with quantity 40, matching INONGE's MAIZE/40 record). A = 60 (the PRICE of MAIZE from PRODUCT DETAILS) — this checks out since Amount = Price x Qty = 60 x 40 = 2400, matching the given amount for that row.

Answer: (c) Major reason: it reduces data redundancy (duplication) — data such as a product's price only needs to be stored once (in PRODUCT DETAILS) and can be looked up by every order that references it, instead of being re-typed into every order record.

Answer: (d) Formula for Amount: Amount = [PRICE] * [QTY]. For TEMBO's row: C = 150 (C-OIL's price) x 100 (qty) = 15 000.

Question Q13 (Section B). Mwangi Fashions has stores in the capital city and is converting its computer system. It keeps two separate files: customer records and sales records. When a customer buys goods, the cost is added to their account cumulatively; they pay at the end of the month, and daily transaction files are generated and added. The analyst has decided sales records and customer records should be combined into a relational database. (a) Draw the file updating that takes place at the end of the month. [4] (b) Fixed magnetic hard disks are used to store the transaction and master files in the current system. Evaluate the current system of storage on three points. [6] (c) Write an outline of the structure of the relational database needed to store the sales records and customer records. [7] (d) Give three reasons why the systems analyst would recommend a relational database for Mwangi Fashions. [3]

Answer: (a) File-updating process (described in sequence, since a diagram cannot be hand-drawn here): the accumulated daily Transaction file (each day's sales, sorted into the same customer-account order) is read together with the existing (Old) Customer Master file by the update program; each customer's account balance in the master file is increased by the value of their transactions for the month; the result is written out as a New (updated) Customer Master file, which then becomes the master file used for the following month, ready for customers to be billed.

Answer: (b) Evaluation of the current fixed-hard-disk storage, on three points: (1) Capacity — hard disks offer large storage capacity, easily able to hold all of Mwangi Fashions' customer and sales records. (2) Access speed — hard disks provide direct (random) access, so any single customer's record can be found and updated quickly, without having to read through every record in order (unlike magnetic tape). (3) Portability limitation — because the disks are FIXED (not removable), data cannot easily be physically transported or exchanged between Mwangi Fashions' different stores in the capital city, which could make sharing/consolidating records across branches harder than with removable storage or a proper network link.

Answer: (c) Outline of the relational database structure: a CUSTOMER table (Customer_ID as primary key, Name, Address, Account Balance, ...) and a SALES/TRANSACTION table (Transaction_ID as primary key, Customer_ID as a foreign key linking back to the CUSTOMER table, Date, Item purchased, Amount, ...). The two tables are linked through the shared Customer_ID field in a one-to-many relationship (one customer can have many sales transactions), allowing a customer's monthly statement to be produced by combining their record from the CUSTOMER table with all of their matching records from the SALES table.

Answer: (d) Three reasons for recommending a relational database: (1) it reduces data redundancy, since each customer's details are stored only once (in the CUSTOMER table) instead of being repeated on every sales transaction; (2) it improves data consistency/integrity, since updating a customer's details in one place automatically keeps every linked sales record correct; (3) it makes it easy to combine and query related data across both tables (e.g. producing each customer's monthly bill from their linked sales transactions) without manually merging separate files.

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