

G12 ECZ COMPUTER STUDIES P1 2016 SOLUTIONS

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

2 hours 30 minutes | 13 Qs (12 Section A + 1 Section B), 70 marks

The full question paper appears first — worked answers follow.

EXAMINATIONS COUNCIL OF ZAMBIA

Examination for School Certificate Ordinary Level

Computer Studies

Paper 1

7010/1

Wednesday

9 NOVEMBER 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

www.zedpastpapers.com

Section A

- 1 (a) Explain the meaning of the term data.

.....
..... [1]

- (b) (i) State **two** input devices which automatically capture data.

Device 1: [1]

Device 2: [1]

- (ii) Give an application which uses device 1 and another which uses device 2 in (b) (i) above.

Device 1: Application: [1]

Device 2: Application: [1]

- (iii) Give **one** advantage of using device 1 in the application you have named.

.....
..... [1]

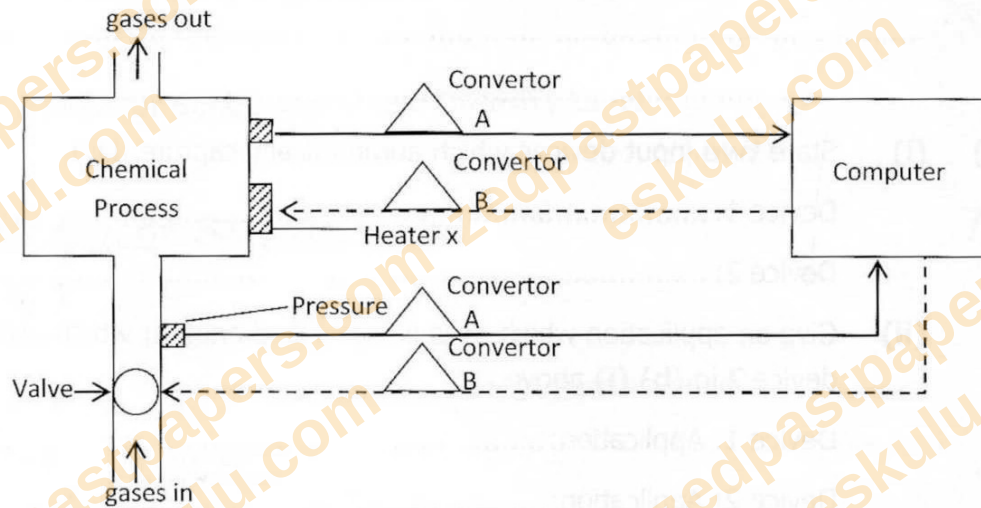
- 2 (a) What is the number 8 in binary?

.....
..... [1]

- (b) Change the hexadecimal 4AFB to binary equivalent. Show your working.

.....
.....
.....
..... [2]

- 3 A computer system is using sensors to monitor and control a chemical process as shown in the diagram below.



- (a) Name **one** sensor on heater **X**.

[1]

- (b) What is the difference in the function of converter **A** and Converter **B**?

[2]

- (c) Describe the processing that takes place in the computer for this control system.

[2]

- 4 A digital alarm clock is controlled by a microprocessor. It uses the 24 hour clock system, (ie 6pm is 18:00). Each digit in a typical display is represented by a 4 digit binary code.

For example

0	8	3	5
---	---	---	---

Is represented by

8	4	2	1	
0	0	0	0	1 st digit (0)
1	0	0	0	2 nd digit (8)
0	0	1	1	3 rd digit (3)
0	1	0	1	4 th digit (5)

- (a) What time is shown on the clock displayed, if the 4 – digit binary codes are:

8	4	2	1	
0	0	0	1	
0	1	1	1	
0	0	1	1	
0	0	0	0	

--	--	--	--

[1]

- (b) What would be stored in the 4-digit binary codes if the clock display time was

2	2	5	9
---	---	---	---

?

8	4	2	1	
				1 st digit
				2 nd digit
				3 rd digit
				4 th digit

[2]

- (c) The clock alarm has been set at 08:00. Describe the actions of the microprocessor which enable the alarm to sound at 08:00 hours.

.....

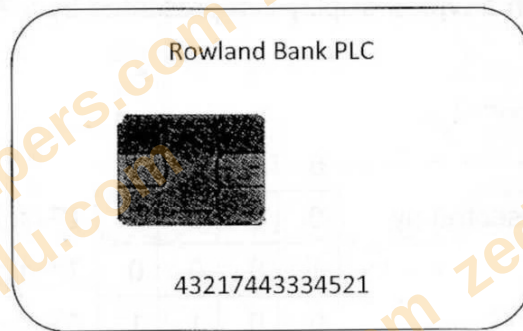
.....

.....

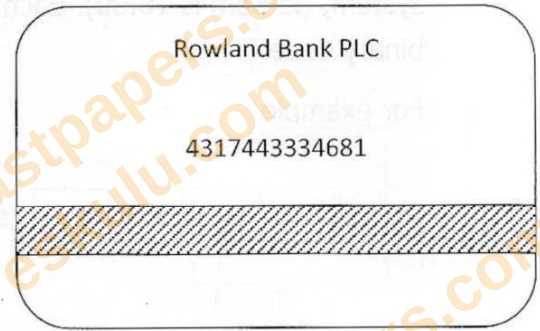
[2]

www.zedpastpapers.com

- 5 The figures below show two types of cards used by customers of Rowland bank.



Card A



Card B

- (a) Identify Card **A** and Card **B**.

Card **A**: [1]

Card **B**: [1]

- (b) Give **one** example of information stored on both cards.

..... [1]

- (c) Give **two** advantages of card **A** over Card **B**.

Advantage 1: [1]

Advantage 2: [1]

- 6 The screenshot below shows a user interface of an operating system. Use it to answer the questions that follow.



- (a) Name this type of operating system interface.

..... [1]

- (b) Give **two** functions of this operating system.

Function **1**:

..... [1]

Function **2**:

..... [1]

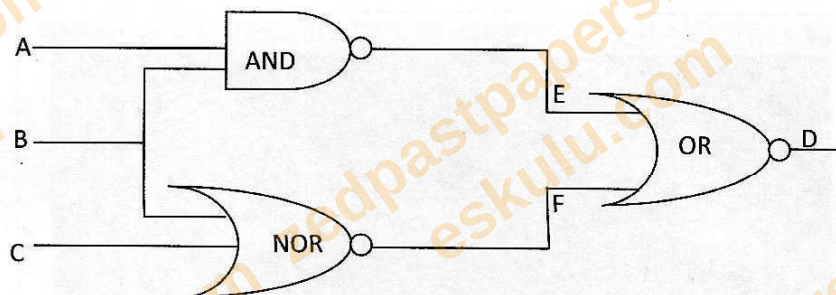
- (c) State **one** advantage of this type of operating system.

..... [1]

- (d) Smart phones use an operating system that responds to touching, tapping or pinching. Name the input device suitable for such a system.

..... [1]

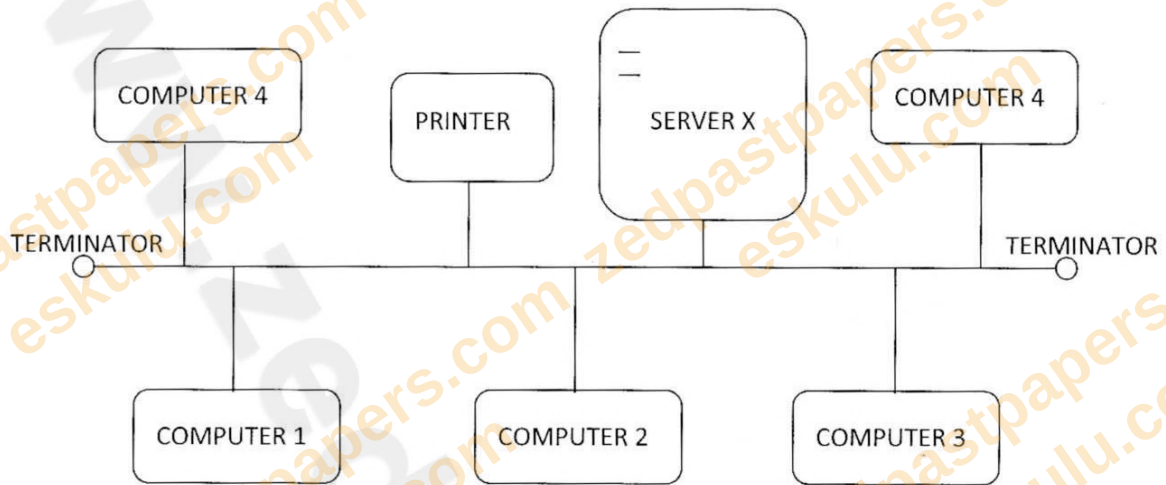
- 7 Complete the truth table for the following logic circuit.



	INPUT A	INPUT B	INPUT C	OUTPUT E	OUTPUT F	OUTPUT D
0	0	0	0	0	1	
1	0	0	1	0	0	0
2	0	1	0	0		0
3	0	1	1	0	0	0
4	1	0	0	0	1	1
5	1	0	1	0	0	0
6	1	1	0	1	0	
7	1	1	1		0	1

[4]

- 8 The diagram below shows a local Area Network (LAN). Use it to answer questions that follow.



- (a) Give **one** advantage of this type of topology?

[1]

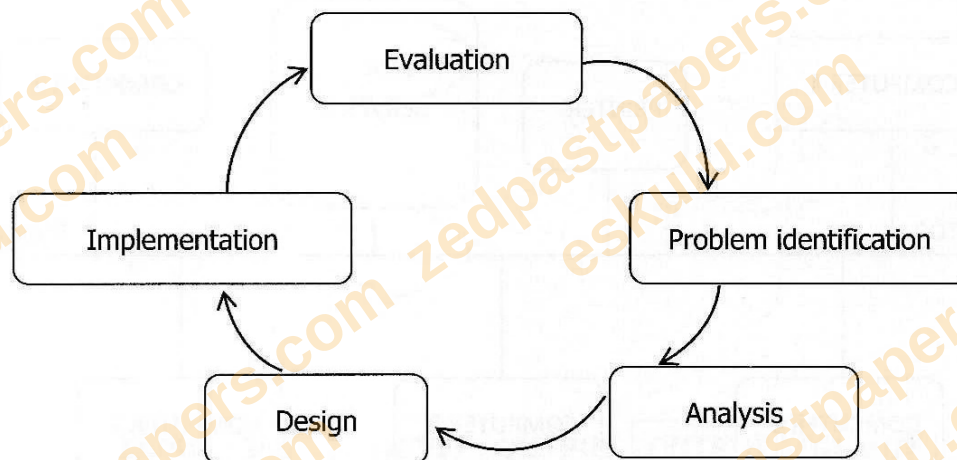
- (b) Explain **one** function of the server **X**.

[1]

- (c) State **one** difference between an intranet and an extranet.

[1]

- 9 The diagram shows the stages of the system development life cycle used when developing a new system.



- (a) (i) At what stage should the Action plan be worked out?

[1]

- (ii) Give **one** reason why implementation and documentation happen at the same time.

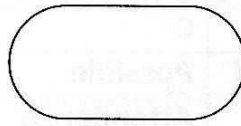
[1]

- (b) Complete the table below which shows different methods of implementation.

Method	Cost	Advantage
Parallel	High	When the trial system fails, the old one can be used.
Pilot	Medium	If new system fails only one department is affected.
Phased	Medium	If the trial sub-system fails the rest of the system will still run
Direct		

[2]

- 10 Study the flowchart below and answer the question that follows.



Error! Not a valid link.

Rewrite the algorithm using pseudocode.

START

.....

.....

.....

.....

.....

.....

.....

STOP

[3]

www.zedpastpapers.com

- 11** The figure below shows part of a spreadsheet used to keep attendance records at Sukulu Secondary School.

	A	B	C	D	E
1	Name	Learner Id	Possible Attendance	Actual Attendance	Percentage of Attendance
2					
3	Mweemba Chanda	G12R164576	66	60	
4	Clive Patel	G12R164579	66	55	

- (a) Describe **one** method that can be used by grade teachers to verify learner ID.

..... [1]

- (b) Write the formula that would be used in Cell E3 to calculate the percentage of attendance.

..... [1]

- 12** A database below was created to show statistics for some provinces in a country.

REF	NAME OF PROVINCE	POPULATION IN MILLIONS	NUMBER OF HOUSES IN MILLIONS
MT	MOUNTAIN	0.4	0.2
FS	FOREST	0.8	0.35
VY	VALLEY	4.8	1.5
ML	MINERAL	2.9	1.1
WR	WATER	1.2	0.81
WD	WOOD	5.1	3.1

- (a) Explain what Primary key means.

..... [1]

- (b) How many records are shown in the database above?

..... [1]

- (c) The following search condition was entered:
population (million) <1.3) AND number of house > 0.3 million.
 Using REF only, write down the records found.

..... [2]

- (d) Name **one** validation method for number houses field. www.zedpastpapers.com

..... [1]

Section B

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

The owner of a small general shop wants to install a computerised stock control system. All stock control has been done manually until now. The owner is the only person who works in the shop.

- (a) Give **one** example of a problem statement and an objective statement from this kind of a system.

Problem: [1]

Objective: [1]

- (b) During the analysis stage, the systems Analyst will gather information to study the current system. Describe **two** fact finding methods the analyst would use to study this situation and give reasons for your choice.

Method 1: [2]

Method 2: [2]

- (c) (i) State **three** questions that the analyst would pose to the shop owner during the feasibility study and the responses.

..... [6]

(ii) State **two** effects of the proposed system on the user.

.....

.....

.....

.....

.....

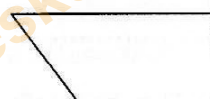
[2]

(d) In the analysis stage, the analyst will make use of the following system flow chart symbols and statements.

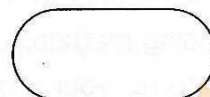
Symbols



Manual
input



Manual
operation



Start/Stop



Storage

Statements

- 1 Owner enters the numbers of the current stock.
- 2 Store of current stock balances
- 3 Calculation of stock balances using calculators and check if re-order levels have been reached

Use the symbols and the statements provided to outline the data flow in the current system.

.....

.....

.....

.....

.....

.....

.....

[6]



**DOWNLOAD ECZ
PAST PAPERS
FROM YOUR
PHONE OR PC**

www.zedpastpapers.com

Question Q1. (a) Explain the meaning of the term data. [1] (b)(i) State two input devices which automatically capture data. [2] (ii) Give an application which uses device 1 and another which uses device 2 in (b)(i). [2] (iii) Give one advantage of using device 1 in the application you have named. [1]

(a) Data is raw, unprocessed facts and figures (numbers, letters, symbols) that have not yet been given meaning — it becomes useful INFORMATION only after it has been processed.

(b)(i) Two input devices that automatically capture data: a BARCODE READER; and a MAGNETIC INK CHARACTER READER (MICR) (also acceptable: OMR reader, sensor).

(ii) Barcode reader application: reading product prices at a supermarket checkout point-of-sale till.
MICR application: reading the special characters printed on bank cheques.

Answer: (iii) Advantage of the barcode reader at a supermarket till: it captures the product code quickly and accurately without a cashier having to type it in manually, reducing data-entry errors and speeding up checkout.

Question Q2. (a) What is the number 8 in binary? [1] (b) Change the hexadecimal 4AFB to binary equivalent. Show your working. [2]

(a) 8 in binary = 1000 (since $8 = 1 \times 8 + 0 \times 4 + 0 \times 2 + 0 \times 1$).

Answer: (b) Convert each hex digit to 4 binary bits: 4 = 0100, A(=10) = 1010, F(=15) = 1111, B(=11) = 1011. Joining them: 4AFB(hex) = 0100 1010 1111 1011 (binary).

Question Q3. A computer system uses sensors to monitor and control a chemical process: gases and pressure feed into the Chemical Process, through converters A and B to/from a Computer, with Heater X controlled via converter B. (a) Name one sensor on heater X. [1] (b) What is the difference in the function of converter A and Converter B? [2] (c) Describe the processing that takes place in the computer for this control system. [2]

(a) The sensor on heater X is a TEMPERATURE sensor (thermistor/thermocouple), used to monitor the heat of the chemical process.

Answer: (b) Converter A takes the ANALOGUE signal coming FROM the sensors in the chemical process and converts it into a DIGITAL signal that the computer can understand (an Analogue-to-Digital Converter, ADC). Converter B does the opposite: it takes the DIGITAL control signal FROM the computer and converts it back into an ANALOGUE signal to operate the heater/valve (a Digital-to-Analogue Converter, DAC).

(c) In the computer, the incoming (now digital) sensor readings are COMPARED against pre-set target values stored in the program; if a reading is too high or too low, the computer calculates the correction needed and sends a new digital control signal back out (via converter B) to adjust the heater/valve accordingly.

Question Q4. A digital alarm clock is controlled by a microprocessor (24-hour clock, each display digit is a 4-digit binary code, columns 8 4 2 1). (a) What time is shown on the clock if the 4-digit binary codes are 0001, 0111, 0011, 0000? [1] (b) What would be stored in the 4-digit binary codes if the clock display time was 22:59? [2] (c) The clock alarm has been set at 08:00. Describe the actions of the microprocessor which enable the alarm to sound at 08:00 hours. [2]

Answer: (a) Reading each row: 0001 = 1, 0111 = 7, 0011 = 3, 0000 = 0. So the digits are 1, 7, 3, 0 — the clock shows 17:30.

Answer: (b) For display 22:59 — 1st digit (2) = 0010; 2nd digit (2) = 0010; 3rd digit (5) = 0101; 4th digit (9) = 1001.

(c) The microprocessor continuously reads the current time from its internal clock/timer and compares it to the stored alarm time (08:00); once the two match exactly, the microprocessor sends a signal to activate/switch on the buzzer (output device) so the alarm sounds.

Question Q5. The figures show two types of cards used by customers of Rowland bank: Card A has a black magnetic stripe with account number 43217443334521; Card B has a striped/hatched band with account number 4317443334681. (a) Identify Card A and Card B. [2] (b) Give one example of information stored on both cards. [1] (c) Give two advantages of card A over Card B. [2]

(a) Card A is a MAGNETIC STRIPE card. Card B is a SMART card (chip card).

(b) One example of information stored on both cards: the customer's account number (also acceptable: the bank's name, the customer's PIN).

Answer: (c) Two advantages of card A (smart/chip card) over Card B (magnetic stripe card): a smart card can store much MORE data, since it has a microchip rather than just a magnetic stripe; and it is MORE SECURE / harder to clone or forge than a magnetic stripe card, since the data on the chip can be encrypted.

Question Q6. The screenshot shows a black screen user interface with a C:\> prompt (an operating system interface). (a) Name this type of operating system interface. [1] (b) Give two functions of this operating system. [2] (c) State one advantage of this type of operating system. [1] (d) Smart phones use an operating system that responds to touching, tapping or pinching. Name the input device suitable for such a system. [1]

(a) This is a COMMAND LINE INTERFACE (CLI) — the user types text commands at a prompt (e.g. C:\>) rather than using icons/windows.

(b) Two functions of this operating system: it manages/allocates the computer's hardware resources (memory, processor, storage); and it allows the user to run application programs and manage files by typing commands.

Answer: (c) Advantage of a command line interface: it uses very LITTLE memory/processing power compared to a graphical interface, so it runs efficiently even on older or less powerful

computers (also acceptable: gives the experienced user more direct, faster control over the system).

(d) The input device suitable for a touch-based smartphone operating system is a TOUCH SCREEN (touch-sensitive screen).

Question Q7. Complete the truth table for the logic circuit: inputs A and B feed a 2-input gate labelled AND producing E; inputs B and C feed a 2-input gate labelled NOR producing F; E and F feed a final 2-input gate labelled OR producing D.

Answer: Tracing the circuit against the given rows confirms $E = A \text{ AND } B$, and $F = \text{NOT}(B \text{ OR } C)$ i.e. $\text{NOR}(B, C)$, and $D = E \text{ OR } F$ (a plain OR combining E and F). Completed truth table (INPUT A, B, C -> OUTPUT E, F, D): 000->0,1,1 | 001->0,0,0 | 010->0,0,0 | 011->0,0,0 | 100->0,1,1 | 101->0,0,0 | 110->1,0,1 | 111->1,0,1. So the missing values are: row 0 (A=0,B=0,C=0) Output D = 1; row 2 (A=0,B=1,C=0) Output F = 0; row 6 (A=1,B=1,C=0) Output D = 1; row 7 (A=1,B=1,C=1) Output E = 1.

Question Q8. The diagram shows a Local Area Network (LAN): Computer 4, Printer, Server X and another Computer 4 branch off a single main cable with a terminator at each end, and Computer 1, Computer 2, Computer 3 also branch off the same main cable (a BUS topology). (a) Give one advantage of this type of topology. [1] (b) Explain one function of the server X. [1] (c) State one difference between an intranet and an extranet. [1]

(a) Advantage of a BUS topology: it requires the LEAST amount of cabling compared to other topologies (e.g. star or ring), making it cheap and easy to install.

(b) Function of server X: it stores files/data CENTRALLY and controls/manages access to these shared resources (and to the shared printer) for all the computers on the network.

Answer: (c) Difference: an INTRANET is a private network restricted to use only within a single organisation, whereas an EXTRANET is a private network that also allows CONTROLLED, authorised access to selected external users outside the organisation (e.g. business partners or suppliers).

Question Q9. The diagram shows the stages of the system development life cycle in a cycle: Evaluation -> Problem identification -> Analysis -> Design -> Implementation -> back to Evaluation. (a)(i) At what stage should the Action plan be worked out? [1] (ii) Give one reason why implementation and documentation happen at the same time. [1] (b) Complete the table of implementation methods (Parallel/High/old system fallback; Pilot/Medium/one department affected; Phased/Medium/rest of system still runs; Direct/?/?). [2]

(a)(i) The Action plan should be worked out at the ANALYSIS stage (once the problems and requirements of the current system are understood, before the new system is designed).

(ii) Implementation and documentation happen together because the documentation (user/technical manuals) must describe exactly how the new system was actually built and set up as it is being installed, so it accurately reflects the live, working system rather than an earlier or later version of it.

Answer: (b) DIRECT method: Cost = LOW. Advantage = it is the FASTEST and CHEAPEST method, since the old system is switched off and the new system starts immediately, with no need to run two systems side-by-side (though it is also the riskiest, since there is no fallback if the new system fails).

Question Q10. Study the flowchart which begins with a Start/Stop oval, followed by processing steps that print in this scanned copy only as 'Error! Not a valid link.' (the diagram failed to embed when the original paper was produced/scanned), then ends at a Start/Stop 'STOP' oval. Rewrite the algorithm using pseudocode (START ... STOP). [3]

NOTE: the actual flowchart symbols/steps for this question are MISSING from the source paper itself — the scanned PDF shows the literal placeholder text 'Error! Not a valid link.' where the flowchart image should be, meaning the diagram failed to embed when the original exam document was produced. This is a defect in the exam paper as distributed, not a rendering issue on our side, so the exact steps of THIS particular flowchart cannot be recovered from the source.

Answer: General method for this type of question: to rewrite ANY flowchart as pseudocode, follow its symbols in order — write START; for each INPUT/PROCESS box write the matching pseudocode instruction (e.g. 'ENTER ...', 'CALCULATE ...'); for each DECISION (diamond) box write an 'IF ... THEN ... ELSE ...' statement, or a 'WHILE/REPEAT ... UNTIL ...' loop if the diamond feeds back to an earlier box; for each OUTPUT box write 'PRINT ...' or 'DISPLAY ...'; and finish with STOP once the flowchart reaches its end oval. Apply this same step-by-step translation to whichever flowchart is shown when a legible copy of this paper is available.

Question Q11. The figure shows part of a spreadsheet used to keep attendance records at Sukulu Secondary School: A=Name, B=Learner Id, C=Possible Attendance, D=Actual Attendance, E=Percentage of Attendance. Row 3: Mweemba Chanda, G12R164576, 66, 60. Row 4: Clive Patel, G12R164579, 66, 55. (a) Describe one method that can be used by grade teachers to verify learner ID. [1] (b) Write the formula that would be used in Cell E3 to calculate the percentage of attendance. [1]

(a) Method to verify learner ID: the grade teacher can check the learner's ID number against the official class/school register (or against the learner's ID card) to confirm it is correctly recorded and belongs to that learner.

Answer: (b) Percentage of Attendance = (Actual Attendance / Possible Attendance) x 100, so the formula for cell E3 is: =D3/C3*100

Question Q12. A database shows statistics for provinces:

REF/Name/Population(millions)/Number of houses(millions) — MT Mountain

0.4/0.2, FS Forest 0.8/0.35, VY Valley 4.8/1.5, ML Mineral 2.9/1.1, WR Water

1.2/0.81, WD Wood 5.1/3.1. (a) Explain what Primary key means. [1] (b) How

many records are shown in the database above? [1] (c) Search condition:

population(million)<1.3 AND number of house>0.3 million. Using REF only,

write down the records found. [2] (d) Name one validation method for number houses field. [1]

(a) A Primary key is a field (or combination of fields) in a database table whose value is UNIQUE for every record, used to identify each record without ambiguity (e.g. the REF field here).

(b) There are 6 records shown in the database (Mountain, Forest, Valley, Mineral, Water, Wood).

Answer: (c) Checking each province against BOTH conditions (population<1.3 million AND houses>0.3 million): MT (pop 0.4, houses 0.2) fails (houses not >0.3); FS (pop 0.8, houses 0.35) passes both; VY (pop 4.8) fails; ML (pop 2.9) fails; WR (pop 1.2, houses 0.81) passes both; WD (pop 5.1) fails. So the records found are: FS and WR.

(d) A validation method for the number of houses field: a RANGE CHECK (to ensure the value entered falls within a sensible minimum/maximum range, e.g. not negative and not unrealistically large).

Question Q13 (Section B). The owner of a small general shop wants to install a computerised stock control system. All stock control has been done manually until now. The owner is the only person who works in the shop. (a) Give one

example of a problem statement and an objective statement from this kind of a system. [2] (b) Describe two fact finding methods the analyst would use to

study this situation and give reasons for your choice. [4] (c)(i) State three questions the analyst would pose to the shop owner during the feasibility

study and the responses. [6] (ii) State two effects of the proposed system on the user. [2] (d) Use the given flowchart symbols (Manual input, Manual

operation, Start/Stop, Storage) and statements (1: Owner enters the numbers of current stock; 2: Store of current stock balances; 3: Calculation of stock

balances using calculators and check if re-order levels have been reached) to outline the data flow in the current system. [6]

(a) Problem statement: 'Stock control is currently done completely manually, which is slow and prone to calculation errors, so the owner often does not know the exact stock levels at any given time.'

Objective statement: 'To computerise the stock control system so that stock balances can be calculated quickly and accurately, and re-order levels can be checked automatically.'

Answer: (b) Method 1: INTERVIEW — since the owner is the only person working in the shop, interviewing him directly is the most practical way to gather all the information needed about how stock is currently controlled, straight from the one person who knows the system. **Method 2: OBSERVATION** — watching the owner as he actually carries out the stock-counting and calculations in person lets the analyst see exactly how the manual process really works, rather than relying only on what the owner describes.

(c)(i) Three feasibility-study questions and responses: 1. 'How many different types of stock items do you keep?' — Response: 'About 50 different items.' 2. 'How do you currently calculate your stock balances?' — Response: 'I count the stock myself and calculate the balances using a calculator.' 3. 'How much money can you afford to spend on a new computerised system?' — Response: 'I can afford around K5,000.'

(ii) Two effects of the proposed system on the user (the owner): he will need to learn new computer/keyboard skills to be able to operate the new system (requires training); and his workload/time spent manually calculating stock balances will be greatly reduced, since the computer now performs these calculations automatically.

Answer: (d) Data flow of the current (manual) system, following the given statements in their logical order: START (Start/Stop symbol) -> using a MANUAL INPUT symbol, the owner enters the numbers of the current stock (Statement 1) -> using a MANUAL OPERATION symbol, the stock balances are calculated using a calculator and checked against the re-order levels (Statement 3) -> using a STORAGE symbol, the current stock balances are stored (Statement 2) -> STOP (Start/Stop symbol).

Disclaimer

Created by eskulu Past Papers Tutor

These solutions were created using artificial intelligence and checked against ECZ marking guidelines. If you find an error, report it at eskulu.com/feedback.

eskulu.com | zedpastpapers.com