COMPUTER SCIENCE 2210
Paper 2 Duration: 1:45
MOCK 2016

Candidates answer on the Question Paper.
No additional materials are required.

READ THESE INSTRUCTIONS FIRST
Write your number and name on all the work you hand in.
Write in dark blue or black pen.
You may use a soft pencil for any diagrams, graphs or rough working.
Answer **all** questions.
At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.

Section A

You are advised to spend no longer than 40 minutes answering this section.
Here is a copy of the pre-release material.
DO NOT attempt Tasks 1, 2 and 3 now.
Use the pre-release material and your experience from attempting the tasks before the examination.

Pre-release Material
TASK 1 - Check the contents and weight of a single sack
Each sack must obey the following rules to be accepted:

- contain cement, gravel or sand, with a letter on the side for easy identification
  - C - cement
  - G - gravel
  - S - sand
- sand or gravel must weigh over 49.9 and under 50.1 kilograms
- cement must weigh over 24.9 and under 25.1 kilograms

Input and store the weight and contents for one sack. The contents must be checked and an incorrect sack rejected. The weight must be validated on entry and an overweight or underweight sack rejected.

Output the contents and weight of an accepted sack. If a sack is rejected, output the reason(s).

TASK 2 - Check a customer's order for delivery

Input and store the number of sacks of each type required for the order. Use TASK 1 to check the contents and weight of each sack. Ensure that the delivery contains the correct number and type of sacks for the order.

Output the total weight of the order.

Output the number of sacks rejected from the order.

TASK 3 - Calculate the price for a customer's order

Extend TASK 2 to calculate a price for an order. Prices for the sacks are as follows:

- regular price for each sack
  - cement, $3
  - gravel, $2
  - sand, $2
- discount price for a special pack containing 1 sack of cement, 2 sacks of sand and 2 sacks of gravel, $10

Calculate and output the regular price for the order. Check how many special packs are in the order. If a discount price applies then output the new price for the order and the amount saved.

1 (a) All variables, constants and other identifiers should have meaningful names.

(i) In Task 1, you had to store the Content and Weight in variable.

Write suitable declarations for two variables in pseudocode or program code.

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..... [2]

(ii) It has been decided to record the content and weight of the whole order in an array of size 500.

Write the new array `Weight` declaration that you would use.

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..... [1]

(iii) Declare two constants that you have used in task 3 and state what you used each one for.

Constant 1 .....

Use .....

Constant 2 .....

Use ..... [4]

(b) Complete the algorithm below to complete Task 1, using pseudocode that uses only single input for content and weight..

TASK 1 – SOLUTION:

```
Input "Enter content type: ", Content
Input "Enter weight :", Weight

Case OF _______________
_______
    CASE OF Weight
      IS <= 24.9: Output "Rejected cement sack, UNDERWEIGHT", Weight
      IS >= 25.1: Output "Rejected cement sack, OVERWEIGHT", ________
      OTHERWISE: Output "Accepted Cement", Weight
      ENDCASE
'S', 'G'
    If Content = '__' Then Output "Sand "
    If Content = 'G' Then Output "Gravel "

    CASE OF Weight
      IS <= 49.9: Output "Rejected UNDERWEIGHT", Weight
      IS >= 50.1: Output "Rejected OVERWEIGHT", Weight
      OTHERWISE: Output "Accepted ", Weight
      ENDCASE
OTHERWISE:  OUTPUT "_____________________"
ENDCASE
```

[5]

(c) Task 2 uses an array `Weight` you have already declared in **1 (a) (ii)**. The array can accept any combination of cement, gravel and sand weights. Since the size of array is 500, we cannot have a sum of weights above 500. This situation requires a validation check to be applied over the input of an order for different quantities of cement, gravel and sand.

Write a validation check using pseudocode, programming code or flowchart that you would have used in solving Task 2 using an array; possibly using a condition based loop.

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..... [3]

(c) (i) Explain how you completed Task 3. You should assume that Task 2 has been completed using an array `Weight[500]`.
You can include pseudocode or programming statements as part of your explanation.

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[5]

Section B

2 Read this section of program code that should input 50 numbers and then output the average of the digits per numbers input, maximum number of digits entered as number and number of digits entered per number.

```
A. FOR Count = 1 to 500
B.    INPUT Num
C.    Digits = INT(LOG(Num))+1
D.    CASE OF Digits
E.       1: OUTPUT "One Digit"
F.       2: OUTPUT "Twenty Digits"
G.       3: OUTPUT "Three Digits"
H.       4: OUTPUT "Four Digits"
I.    END CASE
J.    OTHERWISE: OUTPUT "Too Many Digits."
K.    Total = Total + Digits
L.    IF Digits > Highest Then Highest = Highest +1
M. END FOR
N. AVG = Total/50
O. OUTPUT "Average number of digits entered per turn was ", AVG
P. OUTPUT "Biggest number entered had ", Highest, " Digits."
```

There are four errors in this code.
Locate these errors and suggest code corrections to remove each error.

1 .....

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2 .....

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3 .....

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4 .....

..... [4]

3 ZAK Autos gives discounts based on the number of visitors in a group.
The pseudo-code for an algorithm that determines group discounts is shown.

```
A. IF ((numAdults > 1) AND (numChildren > 0)) THEN
B.   OUTPUT "Family discount"
C. ELSE
D.   IF (numAdults >= 10) THEN
E.     OUTPUT "Large group discount"
F.   ELSE
G.     IF (numAdults >= 5) THEN
H.       OUTPUT "small group discount"
I.     ELSE
J.       OUTPUT "Regular pricing"
K.     ENDIF
L.   ENDIF
M. ENDIF
```

(a) Complete the table to show the output of the pseudo-code algorithm, based on the given inputs.

Input		Output displayed
numAdults	numChildren	
8	0	
2	2	
12	0	

[3]

(b) The pseudo-code algorithm needs to be tested more thoroughly.
Construct test data to meet the requirements set out in the table.

Requirements	Input	
	numAdults	numChildren
A condition generating 'regular pricing'		0
Smallest group qualifying for 'family discount'		

[3]

(c) Complete the table to give the appropriate data type of a variable to store each item.

Item	Data type
Gender of individual staff member	
Whether an individual car is still under the manufacturer's warranty	
Mean number of hours needed to recharge the battery in each car	
The number on the individual car	

[4]

(d) State a validation check that you can perform on each of these fields. Each validation check must be different.

Gender of individual staff member	
Whether an individual car is still under the manufacturer's warranty	
Mean number of hours needed to recharge the battery in each car	
The number on the individual car	

[4]

4 Complete the query-by-example grid below to select and show the StudentName, Class and Percentage of students Age above 14 in a table `StuTable`. Results must be in decreasing order of Percentage.

Field:					
Table:					
Sort:					
Show:	☐	☐	☐	☐	☐
Criteria:					
or:					

[5]

5 A routine checks the age and height of children who are allowed to enter a play area. The children must be less than 7 years of age and under 1.2 metre in height.

Provide two additional sets of test data. For each, give

- the type of each set of test data

Each type of test data and reason for use must be different.

Set 1 .....

Type .....

Set 2 .....

Type .....

[4]

6 What is an identifier and state two rules for proper identifier naming.

Identifier: .....

.....

Naming Rule 1: .....

Rule 2: .....

[3]