TEST CODE **01229020**

**FORM TP 2006097**

MAY/JUNE 2006

**CARIBBEAN EXAMINATIONS COUNCIL**

**SECONDARY EDUCATION CERTIFICATE EXAMINATION**

# INFORMATION TECHNOLOGY

**Paper 02 – General Proficiency**

**INFORMATION PROCESSING PROGRAMMING**

*2 hours*

**18 MAY 2006 (a.m.)**

## INSTRUCTIONS TO CANDIDATES

1. **Number EACH answer correctly in your answer booklet.**
2. **Begin EACH answer on a new page.**
3. **This paper consists of TWO sections, Section I and Section II.**
4. **Candidates must attempt the first question in EACH section and choose TWO other questions from EACH section.**

**DO NOT TURN THIS PAGE UNTIL YOU ARE TOLD TO DO SO.**

Copyright © 2005 Caribbean Examinations Council®.
All rights reserved.

## SECTION I

## INFORMATION PROCESSING

**Answer Question 1 and any TWO other questions from this section.**

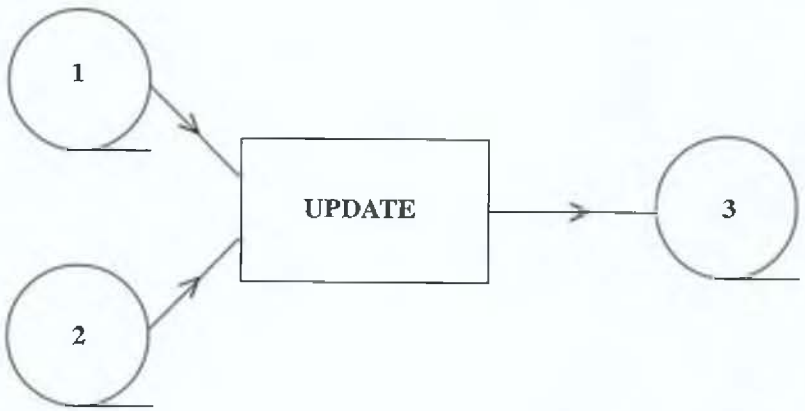
1. The Caribbean Sports Council keeps a master file of information on its 1800 athletes. Each record contains fields such as last and first name, gender, track or field, best record, and number of medals.

   (a) List THREE fields other than those listed above which should be included in the athlete's record. **( 3 marks)**

   (b) Explain, giving an example, how you would choose an appropriate primary key. **( 2 marks)**

   (c) This data needs to be updated yearly. Using examples, explain which type of fields should be contained in the master file and which should be contained in the transaction file. **( 4 marks)**

   (d) Using the diagram below as an illustration, write the names of the files corresponding to 1, 2 and 3 below, which are used to update the athletes' data.




**( 3 marks)**

   (e) Give ONE advantage of storing the master file on tape and ONE advantage of storing the master file on disk. **( 2 marks)**

   (f) Describe ONE test which can be used to validate a transaction record. **( 1 mark )**

   (g) Explain the results of updating a master file with each of the following possibilities:

   (i) The transaction record key is LESS THAN the master file record key

   (ii) The transaction record key is EQUAL to the master file record key

   (iii) The transaction record key is GREATER THAN the master file record key. **( 3 marks)**

   (h) Write pseudocode or an algorithm to update the records in a master file, printing the names and number of medals of all athletes who compete in field events. **( 9 marks)**

**Total 27 marks**

GO ON TO THE NEXT PAGE

**2.** Information processing can be illustrated using a machine or processor to receive input directly from its environment.

(a) For EACH of the following, state ONE reason whether it can be considered an advantage or disadvantage of information processing:

(i) Efficiency and productivity increases

(ii) Staff may need to be re-trained

(iii) Tasks are completed faster

(iv) Less human intervention **( 8 marks)**

(b) Using ONE example, describe the source of input, processing required and output for EACH of the following:

(i) Electronic library

(ii) Monitoring patient's vital signs

(iii) Pedestrian crossing with traffic lights **( 9 marks)**

(c) Explain whether EACH of the information processing examples in (b) above would best be used in a batch, interactive, on-line or real-time environment. **( 3 marks)**

(d) (i) Explain what is meant by data logging system.

(ii) Describe the method that would be suitable in the situation in 2 (b) (ii) above. **( 4 marks)**

**Total 24 marks**

**3.** (a) State the term which describes EACH of the following activities in system development and then place them in the correct order:

(i) Checks that the system is working and doing the job it was designed for

(ii) A detailed study to find out if and how improvements can be made and the cost

(iii) Updating or correcting any errors in software or hardware

(iv) Determining what can be done to improve the present system

(v) In-depth study of final system **( 7 marks)**

(b) For EACH of the following, sketch a diagram to illustrate the conversion from an old to a new system:

(i) Direct

(ii) Parallel

(iii) Phased conversion **( 6 marks)**

(c) Give a disadvantage of EACH of the conversions in 3 (b). **( 3 marks)**

(d) The management of a school consisting of 2500 students has asked you to oversee the implementation of their computerized student attendance register for the new academic year. For ANY TWO of the conversions identified in 3 (b) above, explain why EACH would be most suitable or unsuitable for the school. **( 4 marks)**

(e) Discuss TWO appropriate data collection methods if you were to gather information before designing the electronic attendance register, identified in 3 (d). **( 4 marks)**

**Total 24 marks**

**4.** (a) Consider the following method of calculating a discount on purchases:

Customers will be given a 5% discount on all purchases up to the first $100.00 spent at the store with a membership card. Without a membership card, the discount is 2%. A discount of 8% is given if the amount is greater than $100.00 and they have a membership card, otherwise the discount is 5%.

Illustrate the above using

(i) a decision table **( 9 marks)**

(ii) a decision tree. **( 4 marks)**

(b) You are given 200 questionnaires completed by drivers who pass a major intersection.

(i) Explain why it is best to code responses of the questionnaire before data entry. **( 1 mark )**

(ii) State TWO typical questions whose responses can be coded from the questionnaire and explain the coding options. **( 6 marks)**

(c) Perform the following calculations:

(i) $11010_2 - 01100_2$ **( 2 marks)**

(ii) $11011_2 + 01100_2$ **( 2 marks)**

**Total 24 marks**

## SECTION II

## PROGRAMMING

**Answer QUESTION 5 and any TWO other questions in this section.**

**5.** Consider the following method of calculating a discount on purchases:

Customers will be given a 3% discount on all purchases up to the first $100.00 spent at the store and a further discount of 5% if the amount is greater than $100.00.

A customer who purchases materials amounting to $323.00 will get 3% discount on the first $100.00 = $3.00, and 5% on the remaining amount = 5% x $223.00 = $11.15. The total discount is $14.15 and the customer will therefore pay $323.00 – 14.15 = $208.85.

(a) Construct a trace table using the customer number 6301 and purchase = $500.00. **( 3 marks)**

(b) Write a program code to perform EACH of the following:

(i) Accept the customer number and value of the total purchases, calculate the discount and print, on three different lines, the Purchase Total, the Discount and the Final Cost (Purchase Total – Discount). Also print on one line, a running total of the total purchases and total discount. **(16 marks)**

(ii) Search for the customer who purchased $652.59. Print the customer number and the discount amount. **( 5 marks)**

(iii) Explain THREE error checks that you would include in your code. **( 3 marks)**

**Total 27 marks**

**6.** The following are some of the ingredients used in making a 1-2-3-4 pound cake.

1 cup butter
2 cups sugar
3 cups cake flour
4 eggs

This recipe uses the principle that for every unit of butter used, two units of sugar, three units of flour and four "units" of eggs are added to complete the mixture.

(a) Write a program that

(i) accepts the value for the amount of butter to be used **( 3 marks)**

(ii) calculates the amount of sugar, cake flour and eggs, using the value entered for the butter **( 6 marks)**

(iii) prints the ingredients (with amounts) one item per line. **( 8 marks)**

(b) Copy and complete the following table by providing values for missing ingredients.

| **Butter** | **Sugar** | **Cake Flour** | **Eggs** |
|---|---|---|---|
| 1.5 cups | | | |

**( 3 marks)**

(c) Consider the table below which contains the cost of ingredients. If the variable 'x' is used to represent the amount of butter used in a mixture and the other values are found using this variable, develop programming code (e.g. Cost = ? + ? ...) which will provide the total cost of these ingredients.

| **Butter** | **Sugar** | **Cake Flour** | **Eggs** |
|---|---|---|---|
| $1.00 per cup | $0.80 per cup | $0.70 per cup | $0.25 each |

**( 4 marks)**

**Total 24 marks**

**7.** Three students compete to become President of their local Student Government. The school has 520 students: 200 Athletes, 150 cheerleaders, 100 musicians, and 70 regular students. All the students voted in the election.

Candidate 1 receives: 50% of the Athlete votes,
75% of the Cheerleader votes,
10% of the Musician votes, and
15% of the Regular student votes.

Candidate 2 receives: 35% of the Athlete votes,
20% of the Cheerleader votes,
25% of the Musician votes, and
50% of the Regular student votes.

Candidate 3 receives: All remaining votes.

(a) Using the following program segment, write the missing lines of pseudocode that will help to identify the winner.

**Program**

Variables
Integers : Allstudents, Athletes, Cheerleaders, Musicians, Regulars;
Real : Candidate1, Candidate2, Candidate3
Assignments
AllStudents = 520
Athletes = 200
Cheerleaders = 150
Musicians = 100
Regulars = 70
Calculations
*Candidate1* = (0.5 * Athletes) + (0.75 * Cheerleaders) + (0.1* Musician) + (0.15 * Regulars)

*Candidate2* = _____ **( 5 marks)**

*Candidate3* = _____ **( 3 marks)**

Condition/Decision Block

(b) You may assume that no two candidates have the same number of votes. Write pseudocode to compare their votes and declare a winner. Your code must:

(i) Compare each candidate with the others using If-Then-Else statements. **(12 marks)**

(ii) Print the sentence "The Winner is Candidate *X*" (*X* represents the candidate number of the winning candidate). **( 4 marks)**

**Total 24 marks**

**8.** Consider the following code which inputs an integer N and prints the value of F.

```
int factorial (integer N)
begin
    integer K;
    integer F;

K = 2;
G = 1;

While (K <= N) do
begin
    F = F * K;
    K = K + 1;
end
print F;
end.
```

(a) Copy and complete the following table if the value N = 5 is input.

| N | G | K | F |
|---|---|---|---|
| 5 | 1 | 2 | 2 |
| | | 3 | |
| | | 4 | |
| | | 5 | |
| | | | |

**( 5 marks)**

(b) Write a program in an acceptable programming language that manipulates each line of data in a file 'activity.dat'. The first variable **type** consists of either a D (for Deposit) or W (for withdrawal). Your program counts the number of deposits and withdrawals in the file and prints the count of the deposits and withdrawals on two separate lines.

**(14 marks)**

(c) Using 1 mile = 1.85 kilometers, write a program that will accept a value (in miles) as the speed measured by the car's speedometer. Convert that measurement to kilometers and alert the driver if he or she is traveling more than 90 km/hr (kilometers per hour).

**( 5 marks)**

**Total 24 marks**

**END OF TEST**