



HIGHER SCHOOL CERTIFICATE EXAMINATION

1997

# COMPUTING STUDIES

3 UNIT (ADDITIONAL)

*Time allowed—One hour and a half  
(Plus 5 minutes reading time)*

## **DIRECTIONS TO CANDIDATES**

### **Section I** (20 marks)

- Attempt ALL questions.
- Mark your answers in pencil on the Answer Sheet provided.

### **Section II** (30 marks)

- Attempt BOTH questions.
- Answer each question in a *separate* Writing Booklet.

**SECTION I**

(20 Marks)

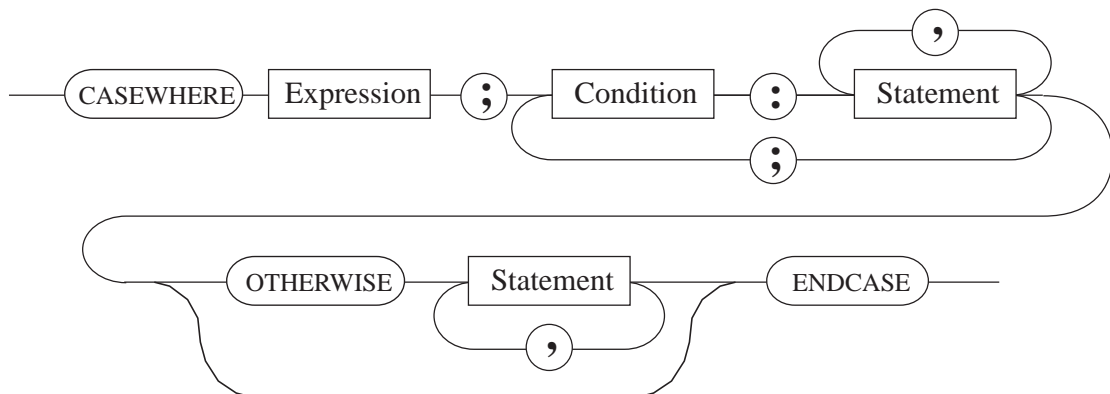
Attempt ALL questions.

Select the alternative A, B, C, or D that best answers the question.

Mark your answers in pencil on the Answer Sheet provided.

1. The rules that govern constructs in a programming language are known as
  - (A) syntax.
  - (B) operators.
  - (C) statements.
  - (D) procedures.
  
2. An object-oriented language is used to
  - (A) describe the form of a graphic object.
  - (B) respond to operator actions in entering data.
  - (C) associate data with the process that operates on it.
  - (D) form the code that runs when loaded into a computer.
  
3. The programming paradigm most likely to be used when program actions need to be controlled by the user is
  - (A) declarative.
  - (B) procedural.
  - (C) event driven.
  - (D) object oriented.
  
4. A *complex* report program is tested and produces only the heading of the first page before ending normally. The best way of finding the program errors is by using
  - (A) stubs.
  - (B) desk checking.
  - (C) stepwise refinement.
  - (D) debugging output statements.

5. The introduction of an interpreter upgrade causes programs, that worked successfully with the previous interpreter version, to now show errors. These errors would most likely be related to
- (A) program logic.
  - (B) program syntax.
  - (C) incorrect compilation.
  - (D) incorrect typing of program source code.
6. An error that occurs when a result cannot be correctly stored in the nominated memory location is most likely to be a
- (A) logic error.
  - (B) syntax error.
  - (C) run-time error.
  - (D) compilation error.
7. The syntax of a multiway selection statement in a proposed language is defined by:



Which of the following is a syntactically correct multiway selection statement in that language?

- (A) CASEWHERE Expression; Condition: Statement Statement ENDCASE
- (B) CASEWHERE Expression; Condition: Statement Statement; ENDCASE
- (C) CASEWHERE Expression; Condition: Statement, Statement; OTHERWISE: Statement, Statement; ENDCASE
- (D) CASEWHERE Expression; Condition: Statement; Condition: Statement OTHERWISE Statement ENDCASE

8. A data structure in which a collection of data items of the same type can be treated as a single entity is called
- (A) a string.
  - (B) a record.
  - (C) an array.
  - (D) an address.
9. A *division by zero* error in a program is called
- (A) a syntax error.
  - (B) a run-time error.
  - (C) a specification error.
  - (D) a desk-checking error.
10. A variable used in a program that can indicate the result of a process, or that the process was executed, is called
- (A) a flag.
  - (B) a stub.
  - (C) an identifier.
  - (D) an operand.
11. A programming technique characterised by the whole being broken down into small independent modules, each of which has a single entry and exit point, is
- (A) desk checking.
  - (B) incremental compilation.
  - (C) structured walk-through.
  - (D) structured programming.
12. A program written in an assembler language must be
- (A) interpreted by a process each time it is run.
  - (B) translated by a process each time it is run.
  - (C) translated by a process to form a run-time program.
  - (D) incrementally compiled by a process to form a run-time program.

- 13.** The purpose of using incremental compilation is to allow
- (A) translation, one line at a time, of source code into object code.
  - (B) an interpreter to compile frequently-used sections of source code.
  - (C) execution of one or more statements a number of times in a program.
  - (D) the conversion of increasingly more complex source programs into machine language before their execution.
- 14.** Radio buttons are best used in a program with a graphical user interface when
- (A) only one option can be chosen.
  - (B) more than one option can be chosen.
  - (C) the options are ordered.
  - (D) no option needs to be chosen.
- 15.** A social club wants a programmer to write a program to store its members' names and ages. Which of the following would be the most suitable data structure?
- (A) Field
  - (B) Record
  - (C) Data list
  - (D) Array of characters
- 16.** A program is required to add together a long list of real numbers, some of which are very large and others of which are very small. In attempting to minimise round-off errors,
- (A) each small value should first be added to a large value.
  - (B) all small values should be added together before adding any large values.
  - (C) all large values should be added together before adding any small values.
  - (D) the order of addition is irrelevant.
- 17.** An interactive program, with a large number of screens, is to be written for a video game company. Which of the following methods would be best to show the program concepts to management?
- (A) Storyboard
  - (B) IPO chart
  - (C) Function chart
  - (D) Structure diagram

18. The elements of ARRAY [X, Y] are shown below.

	1	2	3	4	5
1	1	6	7	1	6
2	3	1	8	8	9
3	4	2	1	C	7
4	2	D	1	5	8
5	0	9	3	6	5
6	8	6	4	7	7
7	9	5	9	2	2

$$\text{ARRAY}[3, 4] = C \quad \text{ARRAY}[4, 2] = D \quad \text{ARRAY}[6, 3] + C = 7 \quad C + D = 9$$

The value of ARRAY [ARRAY [1, C], ARRAY [D, 3]] is

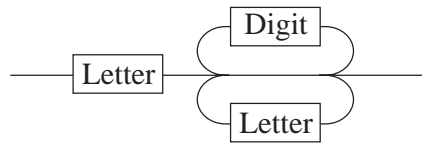
- (A) 1
- (B) 2
- (C) 4
- (D) 6

19. A program is to be written that helps monitor the daily price fluctuations of 100 products sold at the local store. The most likely data structure for storing all the required information in memory is

- (A) a string.
- (B) a record.
- (C) an array.
- (D) an array of records.

20. Study the following railroad diagrams.

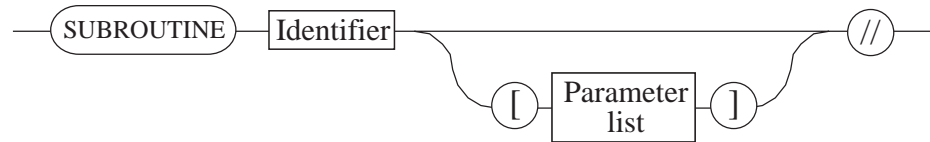
Identifier



Parameter list



Subroutine heading



Which of the following is syntactically valid?

- (A) SUBROUTINE 2by2[number]//
- (B) SUBROUTINE matrix[one/two]//
- (C) SUBROUTINE go2bed[after/dinner]/
- (D) SUBROUTINE toB/ornot2B//

**SECTION II****Marks**

(30 Marks)

Attempt BOTH questions.

**QUESTION 21.** Use a *separate* Writing Booklet. (15 marks)

USE THE FOLLOWING SCENARIO TO ANSWER PARTS (a), (b), AND (c).

The Quality Clothing Company is a manufacturer of women's and children's wear. The firm usually sells its products to retail stores but has now decided it would be more profitable to sell direct to the public. Rather than have its own retail shops the company has decided to sell its products through the World Wide Web on the Internet. Market research has indicated that most of the population likely to buy the company's clothes have home computer access to the Internet, would be prepared to shop using this method, and have their purchases delivered to them.

The web-based sales system is designed to have the following functions:

- an on-line product catalogue giving details of quality, size, and colour range and a picture of the product;
- on-line registration of customers (customers must supply details about themselves for credit rating checks before they order);
- on-line ordering of products;
- ability to enquire about the status of orders not yet delivered.

Systems analysis has shown that the average customer would use the system three or four times a year and then only if the interface between system and customer is extremely user-friendly. The user-friendly requirement is not so necessary for the clothing company employees who will operate the system at the clothing company's end, since they will be using it daily. Employees will be required to carry out both computer-based and non-computer tasks.

- (a) (i) User documentation is one way of making a system user-friendly. Describe the type of documentation you would recommend for the *customer* user of the web-based sales system. Give TWO reasons for your recommendation. **5**
- (ii) For the same system, describe the type of documentation you would recommend for the *clothing company* employees who operate the system on a daily basis. Give TWO reasons for your recommendation.



QUESTION 21. (Continued)

**Marks**

- (b) Below is a possible design for the home page (main page) of the Quality Clothing Company sales systems. **4**

**QUALITY CLOTHING COMPANY**

**Manufacturers of Fine Women's & Children's Wear**

[ 1 ] Product Catalogue

[ 2 ] Customer Registration

[ 3 ] Ordering

[ 4 ] Order Inquiry

Selection? [ ]

- (i) Name TWO screen design *principles* and discuss how these principles could be used to improve the above web home page design.
- (ii) Name TWO screen design *elements*, and discuss how these elements could be used to improve the above web home page design.
- (c) (i) Prototyping is one method of system development. Describe TWO of its features. **6**
- (ii) Describe the processes involved in creating a design prototype for the customer registration and ordering part of the web-based sales system.
- (iii) Describe TWO tests that you could carry out to ensure that the system is user-friendly and functionally correct.

**QUESTION 22.** Use a *separate* Writing Booklet. (15 marks)

**Marks**

- (a) (i) Describe TWO advantages of high-level languages compared to low-level languages. **4**
- (ii) Explain the difference between compilation and interpretation as methods of translation.
- (b) The following algorithm is used to find the existence and position of a character in a data set. **5**

```

① BEGIN MAINPROGRAM
② INITIALISATION
③ set Max to 10
④ set Position to 0
⑤ END INITIALISATION
⑥ REPEAT
⑦     read a character
⑧     increment Position
⑨ UNTIL (character = 'a') or (Position = Max)
⑩ IF   character = 'a' THEN
⑪     print "Found it in Position"
⑫     print Position
⑬ ELSE
⑭     print "Not found it by Position"
⑮     print Position
⑯ ENDIF
⑰ END MAINPROGRAM

```

- (i) Indicate the output of the algorithm on the following data sets, where ‘\_’ represents a SPACE:
1. A\_\_cat\_\_in\_\_a\_\_hat
  2. Every\_\_time\_\_a\_\_bell\_\_tolls
- (ii) The algorithm above uses a REPEAT (post-test) loop. Rewrite the algorithm in *EITHER* pseudocode *OR* a flowchart, using a pre-test loop to perform the same functions as the original algorithm. It is not necessary to rewrite lines ⑩ to ⑰ of the algorithm.

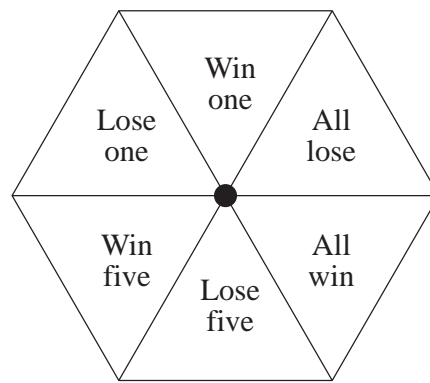
## QUESTION 22. (Continued)

Marks

- (c) A new game is invented called SPINNER. The game is played by spinning a six-sided top that determines the score of each player. The winner is the player with the highest score at the end of the game. 6

## THE GAME

- The players start in a predetermined order.
- Each player begins the game with a score of 5 points.
- The player spinning the top is referred to as the spinner.
- The first player spins the top. The following diagram represents the spinning top.



- The spinning top is passed on to the next player and the game continues.
- The winner is the first player to obtain a score over 50 points, at which time the game is completed.
- The scores for each player are calculated according to the following rules:

RULES FOR POINT SCORING	
Win one:	The spinner adds one to his/her own score.
Lose one:	The spinner subtracts one from his/her own score.
Win five:	The spinner adds five to his/her own score.
Lose five:	The spinner subtracts five from his/her score.
All win:	All players <i>except</i> the spinner add ten points to their own scores.
All lose:	All players <i>except</i> the spinner lose ten points from their scores.

Using pseudocode or a flowchart, write a clear and concise algorithm to play the game of SPINNER if there are four players.

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