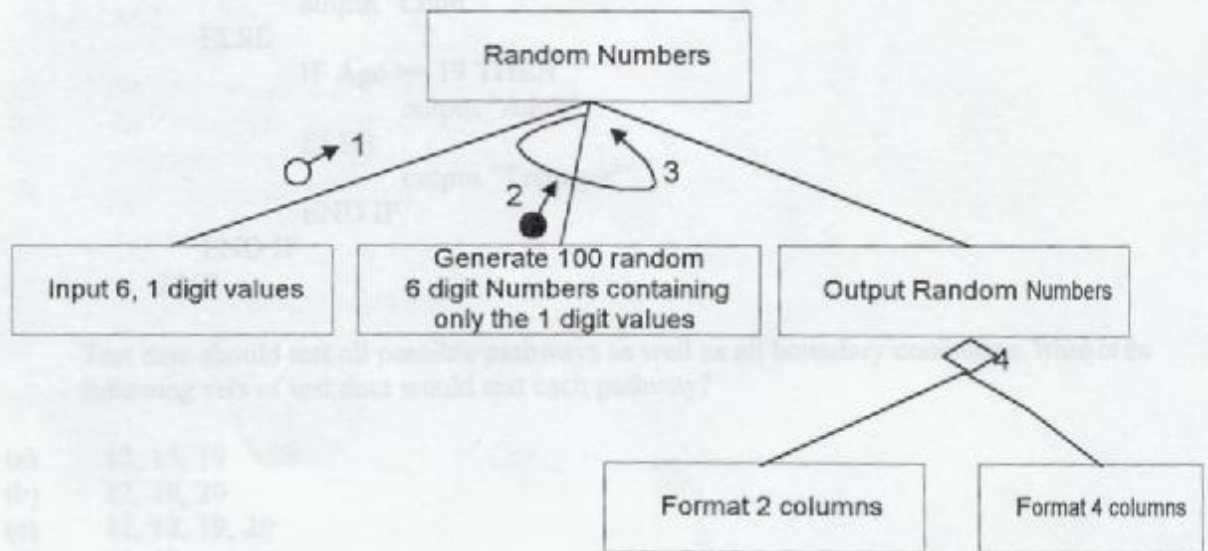


5. Study the structure diagram shown below.



Which of the following alternatives correctly identify the elements labelled 1, 2, 3, and 4.

- (a) 1 - parameter, 2 - decision, 3 - control parameter, 4 - process
- (b) 1 - flag, 2 - control parameter, 3 - repetition, 4 - decision
- (c) 1 - parameter, 2 - control parameter, 3 - repetition, 4 - decision
- (d) 1 - control parameter, 2 - parameter, 3 - decision, 4 - repetition

6. A compiled programming language is likely to issue a syntax error for a given piece of code

- (a) when an attempt is made to run the program
- (b) before an attempt is made to compile the program
- (c) when the line of code with the syntax error on it is executed.
- (d) during compilation of the program

7. A computer program receives share price data from the stock exchange and processes this data to produce stock trends. Which of the following diagrammatic methods would best show the processing in order that accountants can verify the logic used in application?

- (a) A storyboard
- (b) A structure chart
- (c) A function chart
- (d) A flowchart

8. Consider the following algorithm:

```
BEGIN MAINPROGRAM
input Age
IF Age <= 12 THEN
    output "Child"
ELSE
    IF Age >= 19 THEN
        output "Adult"
    ELSE
        output "Teenager"
    END IF
END IF
END
```

Test data should test all possible pathways as well as all boundary conditions. Which of the following sets of test data would test each pathway?

- (a) 12, 15, 19
- (b) 12, 19, 20
- (c) 11, 12, 19, 20
- (d) 12, 19

9. Study the following algorithm:

```
BEGIN MAINPROGRAM
Count = 0
Tally = 0
read Character
WHILE Character <> "#"
    IF Character = "X" or Character = "Z" THEN
        Count = Count + 1
    END IF
    Tally = Tally + 1
    Read Character
END WHILE
output Tally, Count
END MAINPROGRAM
```

What will be the output, if the input data is used? X, Y, Z, Z, Y, Z, #, X, Y, Z, #

- (a) 6, 4
- (b) 7, 4
- (c) 11, 6
- (d) 11, 11

10. In determining the feasibility of a solution, a systems manager would not consider

- (a) Social and ethical issues.
- (b) Scheduling.
- (c) Possible alternatives.
- (d) Data types.

11. A business uses a COBOL based application to manage staff pay. The maintenance programmer that has been responsible for updating the package over the past 20 years has just retired and the business has offered you the job of maintaining its source code.

What kind of documentation would be the most useful in helping you to understand the company's source code?

- (a) the user manual and help files
- (b) the design brief and storyboards
- (c) program comments and intrinsic documentation
- (d) algorithms and the results of desk checks

12 In an Implementation of BASIC

XY

X1\$

Name\$

Price12

are legal variable names, while

x

12

Add\$ress

*/m

name\$

price12

\$12

are not legal variable names

Variable names are composed of the following elements

- <lowercase> lowercase alphabetical characters
- <uppercase> uppercase alphabetical characters
- <digits> single integers in the range 0 to 9
- <stringsymbol> the character "\$"

Using this information which of the following EBNF statements best describes a variable?

- (a) <lowercase> | <uppercase> {<digits>|<lowercase>|<stringsymbol>}
- (b) <uppercase> {<uppercase>|<lowercase>|<digit>} [<stringsymbol>]
- (c) <uppercase> [<lowercase>|<digit>] <stringsymbol>
- (d) <stringsymbol> {<digits>}

13. One of the most popular of modern-day programming languages is Java. It has become very popular because

- (a) The Java development tools are freely distributed.
- (b) It is suitable for web-based applications.
- (c) It is object oriented.
- (d) It supports wide variety of data structures.

14. During Software development the developing solution is tested in a variety of ways. The logical order in which these testing procedures would be used is

- (a) use of case tools, module testing, beta testing
- (b) structured walk throughs, peer checking, alpha testing, blackbox testing
- (c) desk checking, module testing, system testing, live testing
- (d) peer checking, desk checking, acceptance testing, volume testing

15. When a piece of source code calls a predefined library routine, the programmer must know how to make effective use of:

- (a) parameter passing.
- (b) local variables.
- (c) global variables.
- (d) internal documentation.

16. A CPU uses the following machine code instructions

- IPT input a 2 byte Binary ASCII code from the keyboard and place in the specified address
- LR load the specified register with the data held in the specified address
- CMR compare the contents of two registers and store the largest value in the first register
- SR copy the contents of a given register into a given address
- PR display the contents of a given address

Study the following machine code sequence

```
IPT 2003
IPT 2005
IPT 2006
LR 01, 2003
LR 02, 2005
CMR 02, 01
SR 02, 2005
PR 2006
```

If the data input from the keyboard is 3, 2, and 1 respectively, what is the resultant output?

- (a) 2006
- (b) 02
- (c) 2
- (d) 1

17. The role of a special register called the accumulator in the fetch - execute cycle is ;

- (a) to store intermediate results
- (b) to specify the location from which the next instruction will be fetched.
- (c) to count the number of instructions that have been processed
- (d) store data loaded into memory

18. An array originally contained the following values:

6, 9, 4, 3, 2, 8

After the 3rd pass using a descending bubble sort, what are the contents of the array?

- (a) 9, 6, 4, 2, 3, 8
- (b) 9, 6, 8, 4, 3, 2
- (c) 3, 2, 4, 6, 8, 9
- (d) 6, 9, 8, 4, 3, 2

19. When designing a screen to maximise the usability of an application, a programmer would include the use of;

- (a) large icons and buttons in bright colours, so they are easy to locate
- (b) error messages in capital letters, so that they are clear and easy to read
- (c) 64 point headings, in bold, using a serif font, with a red colour for maximum impact
- (d) standard window elements such as menu labels and toolbar icons

20. A web page developer is developing a screen design for use on an eCommerce site. The screen is to obtain the following information from the user, and return the information to the site for automatic processing .

items chosen
credit card type (Visa, Mastercard, Amex, Bankcard),
card number
expiry date,
card holder's name
card holder's address

Which of the following screen elements would be best used to obtain the 'credit card type'?

- (a) radio buttons
- (b) prompts
- (c) check boxes
- (d) text box

SECTION II (60 Marks)

Attempt questions 21, 22, and 23

(20 Marks)

Question 21. Answer in the spaces provided on the paper.

- (a) On an overseas trip, Joanne a year 12 student bought a computer game on CD for a fraction of its cost back in Australia. On her return to school she made a number of copies of the CD and sold them to her friends for \$5.00 each.
- (i) Explain why Joanne's actions in copying and distributing the software are against the laws of copyright. (2 Marks)

(b) Some software licenses state that decompilation is not allowed. Discuss the use of decompilation and give an example of a situation where decompilation may be allowable. (2 Marks)

- (ii) Describe the problems that Joanne's friends may face because of the pirated copies. (2 Marks)

(c) Describe the role of 'Case Tools' in the development of software and discuss the advantages and disadvantages of using these tools. (2 Marks)

(iii) Describe the effects that actions like Joanne's, could have on the developers and distributors of the program. (3 Marks)

(b) Some software licences state that decompilation is not allowed. Discuss the issue associated with decompilation and give an example of a situation where decompilation may be allowable. (3 Marks)

(c) Describe the role of 'Case Tools' in the development of software and discuss the advantages and disadvantages of using these tools (3 Marks)

(d) With the aid of diagrams describe the sequence of stages involved with developing a software solution using a prototyping approach. In your answer explain how Rapid Application Development tools may assist in the prototyping approach (7 Marks)

programming language

(4 Marks)

Data Type	Number of Bytes	Range
Integer	2	-32768 - +32767
Long Integer	4	-2,147,483,648 - +2,147,483,647
Real - Single Precision	4	$\pm 3.4 \times 10^{-38}$ - $\pm 3.4 \times 10^{38}$
Real - Double Precision	8	$\pm 1.5 \times 10^{-308}$ - $\pm 1.5 \times 10^{308}$

For each of the data types shown, explain

- how the data is stored in memory
- why the maximum value is the value given

Question 22. Answer in the space provided.

(20 Marks)

(a) The following table describes the numerical data types available in a particular programming language.

(4 Marks)

Data Type	Number of Bytes	Range
Integer	2	-32768 - +32767
Long Integer	4	-2,147,483,648 - +2,147,483,647
Real-Single Precision	4	$-/+3.4 \times 10^{-38}$ + $-/+3.4 \times 10^{38}$
Real - Double Precision	8	$-/+1.8 \times 10^{-308}$ + $-/+1.8 \times 10^{308}$

For each of the data types shown, explain

- how the data is stored in memory
- why the maximum value is the value given

(b) When data is entered into a program it is important that it is of the correct type and within the correct range. Similarly the outputs from programs should be tested to ensure they are within reasonable limits.

(i) A computerised test allows students to answer 20 multiple-choice questions. To answer each question the student has to type in the letter corresponding to the best answer. Design an algorithm that could be used as a reasonableness check to validate the answer given by the student for each question. This check is to be performed each time an answer is entered into the system. For convenience assume that the test questions have already been stored in an array called 'Questions' (Use pseudocode or a flowchart) (4 Marks)

(c) You have just been employed as a maintenance programmer for a local software developer. The company recently released a simple to use web-base authoring tool called 'WebDisplay'. The company has been getting a number of complaints about bugs in the application and you have been given the task of fixing the application so that it is free from errors.

You have access to all the original source code and all documentation for the product.

(i) Identify the techniques used in the original source code would assist you with your task? (2 Marks)

(ii) A computer-based application requires its users to log on using a 4 digit pin number. The system only accepts digits and waits until the user enters all 4 digits before automatically processing the information.

Describe in words a method that could be used to collect and validate this pin number before it is accepted by the system. In your answer specify the data type you would use for the pin number. (4 Marks)

(c) You have just been employed as a maintenance programmer for a local software developer. The company recently released a simple to use web-base authoring tool called 'WebDisplay'. The company has been getting a number of complaints about bugs in the application and you have been given the task of fixing the application so that it is free from errors.

You have access to all the original source code and all documentation for the product.

(i) Identify the techniques used in the original source code would assist you with your task? (2 Marks)

(ii) Explain how you would go about finding the errors that customers have reported. In your answer identify what types of errors they could be. (4 Marks)

A software development team for a large company approaches your Software Development team to produce a website package for the following project:

The company has a local area network, which is dedicated to database management. The statistics do not have access to word processing applications and the company's policy prevents systems on their network from accessing Internet and external resources. The media officer however, wants all staff to have access to a weekly employee bulletin.

The company decides it needs an application that will deliver the employee bulletin to each workstation at the press of a designated function key. All the information needed for the application is to be stored on the company's main filerover in a file of records called 'BULLETIN.DAT'. This file will be replaced each week by the media officer.

The format of the weekly bulletin is to remain constant and include text, images, advertisements and a video sequence. The media officer has specifically requested that each employee bulletin:

- always have a constant layout
- be to have a date and volume number on the first page
- be to be no more than 4 pages
- be to allow a maximum of 3 separate articles with a headline and byline for each
- be to allow for an advertisement to be presented at the bottom of each page
- be to allow for a single image on pages 1 to 3, and a video on page 4
- contain navigational elements to allow users to scroll through the bulletin and jump from page to page

8. Identify some of the questions the software team should investigate in relation to the usage of the Hardware and Software used by the company. (2 Marks)

(iii) Describe one way the company could go about providing legitimate customers with updates of the bug free version of 'WebDisplay'. (2 Marks)

Question 23

(20 Marks)

An 'employee media officer' for a large company approaches your Software Development Team to produce a solution package for the following problem.

The company has a local area network, which is dedicated to database management. Workstations do not have access to word processing applications and the company's policy prevents systems on their network from accessing Internet and intranet resources. The media officer however, wants all staff to have access to a weekly employee bulletin.

The company decides it needs an application that will deliver this employee bulletin to each workstation at the press of a designated function key. All the information needed for the application is to be stored on the company's main fileserver in a file of records called "BULLETIN.DAT". This file will be replaced each week by the media officer.

The format of the weekly bulletin is to remain constant and include text, images, advertisements and a video sequence. The media officer has specifically requested that each employee bulletin;

- is to have a constant layout
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- is to allow for an advertisement to be presented at the bottom of each page
- is to allow for a single image on pages 1 to 3, and a video on page 4
- contains navigational elements to allow users to scroll through the bulletin and jump from page to page

i) Identify some of the questions the software team should investigate in relation to the nature of the Hardware and Software used by the company. (2 Marks)

ii) Select an appropriate approach you would use to develop a software solution for this problem and describe the advantages of using this approach. (2 Marks)

iii) Identify the most appropriate method of representing the employee bulletin software. Justify your choice. (2 Marks)

vi) Using the information given and your knowledge of interface design, develop a screen design for Page 1 of the employee bulletin. Name all the screen elements you have included and describe the screen design principle you have used. (6 marks)

iv) Describe the project management techniques you would use with your team to ensure that a solution is developed in the given time frame. In your description make specific mention of the software development phases you would use. (4 Marks)

v) Describe the nature of the data structures, which would be used to store the data read into the bulletin application. (4 Marks)

Question 24 Answer the question in the space provided (20 Marks)

A sequential file called *Para1.txt* contains records which have two fields, *First* and *Second*. Each field holds an integer from 1 to 10. For example Record 3 might contain 3, 5.

The algorithm below is designed to read pairs of integers from the file and count how often they occur. It will then store this count in a two-dimensional array called *Pairs*.

```
1 BEGIN
2 OPEN Para1
3 FOR a = 1 to 10
4 FOR b = 1 to 10
5 Pairs(a, b) = 0
6 NEXT b
7 NEXT a
8 WHILE not eof(Para1)
9 READ x, y from Para1
10 Pairs(x, y) = Pairs(x, y) + 1
11 END WHILE
12 FOR a = 1 to 10
```

vi) Using the information given and your knowledge of interface design, develop a screen design for Page 1 of the employee bulletin. Name all the screen elements you have included and describe the screen design principle you have used. (6 marks)

```
13 write heading
14
15 NEXT a
16 CLOSE Para1
17 END
```

20) Which block of code performs an initialisation function? What is it doing?

(2 Marks)

21) A new and similar file, *Para2.txt*, holds numbers between 1 and 50. Identify the number(s) of the line(s) that need to be changed, in order for this program to correctly read *Para2.txt*, and indicate how they should be changed. (2 Marks)

Section III (20 marks)

Question 24 Answer the question in the space provided (20 Marks)

A sequential file called *Pairs* has records which have two fields; *First* and *Second*. Each field holds an integer from 1 to 10. For example Record 5 might contain 3, 5.

The algorithm below is designed to read pairs of integers from the file and count how often they occur. It will then store this count in a two-dimensional array called *Points*.

```
1      BEGIN
2      OPEN Pairs
3      FOR a = 1 to 10
4      FOR b = 1 to 10
5      Points(a, b) = 0
6      NEXT b
7      NEXT a
8      WHILE not eof(Pairs)
9      READ x, y from Pairs
10     Points(x, y) = Points(x, y) + 1
11     END WHILE
12     FOR a = 1 to 10
13     FOR b = 1 to 10
14     write Points(a,b)
15     NEXT b
16     write newline
17     NEXT a
18     CLOSE Pairs
19     END
```

(i) Which block of code performs an initialisation function? What is it doing? (2 Marks)

(ii) A new and similar file, *Pairs2*, holds numbers between 1 and 50. Identify the number(s) of the line(s) that need to be changed, in order for this program to correctly read *Pairs2*, and indicate how they should be changed. (2 Marks)

(iii) Represent the lines 3 to 7 as a flowchart, using an appropriate **alternative** control structure but preserving the intent of the solution. (4 Marks)

(iv) The algorithm has three distinct tasks. Restructure the program to reflect these three tasks producing a Mainline program and Subprogram structure. Use logical names for you subprograms. (5 Marks)

(v) Apart from the restructuring the program to produce a modular structure, describe one other way in which you could improve the readability of this program. (2 Marks)

(vi) Modify the output code so that output only occurs if $P_{\text{units}}(a, b) > 0$ and all output terminates when $P_{\text{units}}(a, b) = 10$. (3 Marks)

- (v) Produce a Structure Chart illustrating the modular structure you have designed in part (iv). (2 Marks)

- (vi) Apart from the restructuring the program to produce a modular structure, describe one other way in which you could improve the readability of this program. (2 Marks)

- (vii) Modify the output code so that output only occurs if $Points(a,b) > 0$ and all output terminates when $Point(a,b) = 10$ (3 Marks)