Assessed Outcomes:

The Course Outcomes that will be assessed in this task are:-

H1.1 explains the interrelationship between hardware and software
H1.3 describes how the major components of a computer system store and manipulate data
H2.2 explains the relationship between emerging technologies and software development
H4.1 identifies needs to which software solutions are appropriate
H4.2 applies appropriate development methods to solve software problems
H4.3 applies a modular approach to implement well structured software solutions and evaluates their effectiveness
H5.2 creates and justifies the need for the various types of documentation required for a software solution
H5.3 selects and applies appropriate software to facilitate the design and development of software solutions

Section I

Total marks (25)
Attempt Questions 1 – 25
Allow about 40 minutes for this section

1. The CPU in a computer system performs the following tasks while executing software
    1. accesses RAM location 1556778
    2. copies the data stored there into the CPU instruction register
    3. decodes the data to identify the instruction it represents
    4. obeys the instruction

    These steps represent a process known as
    A. interpretation
    B. compilation
    C. the fetch-execute cycle
    D. processing

2. The instructions executed by the CPU are known as
    A. an EXE file
    B. object code
    C. a linked file
    D. binary source code

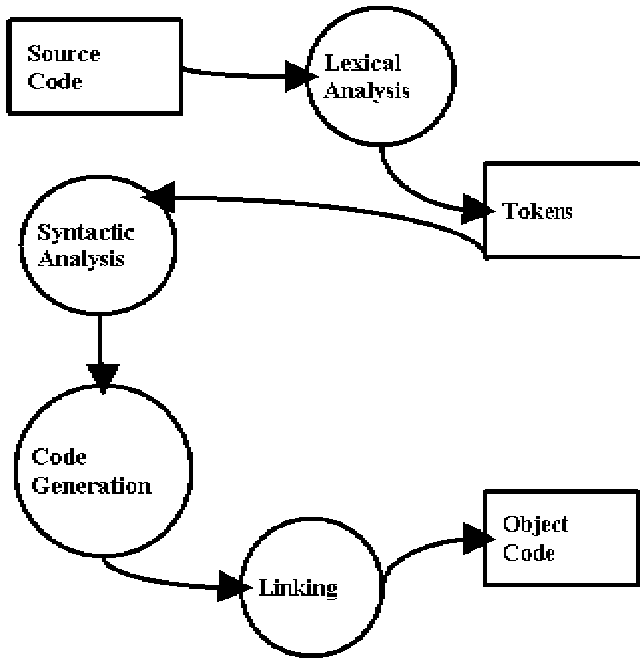
3. The advantage of a language interpreter over a compiler is that
    A. it is faster and uses less memory
    B. it allows errors to be quickly corrected
    C. it produces faster source code
    D. it avoids run time errors

4. Deciding whether a software solution to a problem is appropriate for the people who will have to use it is a matter of
    A. technical feasibility
    B. choosing the correct programming language
    C. operational feasibility
    D. providing the correct user documentation

5. A feasibility study for a software project should be conducted
    A. before the software goes on sale to determine the best price
    B. before the project begins
    C. while the software is being written as part of the testing process
    D. to help select the best programming language to use

6. A system model
    A. describes or helps us understand part of a system
    B. is a complete description of a working system
    C. shows how data flows through a software system
    D. is used to test the operation of a software system

The figure below is used for questions 7 to 11.



7. The main purpose of the process shown in the figure is to
   A. process data entered by the user
   B. convert high level language instructions into machine code
   C. check language syntax for errors
   D. assist programmers to design and test algorithms

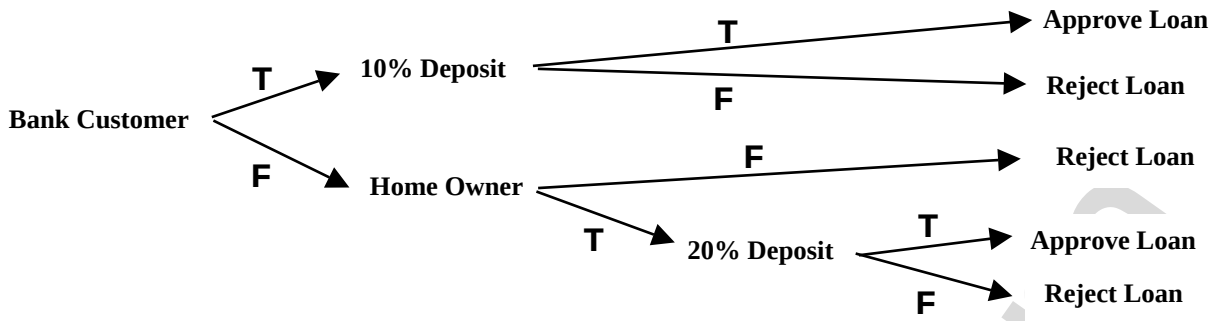
8. The figure is a
   A. data flow diagram for the operation of an interpreter
   B. function chart for a program module
   C. system flow chart for the operation of a program language translator
   D. model for the operation of a compiler

9. The stage in the diagram labelled "Linking" could be described as
   A. creating binary (machine code) instructions for the CPU
   B. combining different source code modules together to create the completed program
   C. providing the connections between the object code and the operating system
   D. converting the generated code into machine code for the CPU

10. The stage in the diagram labelled "Tokens" represents
    A. the entry of data from the users
    B. the storage of data representing instructions
    C. the processing of values representing instructions in the program
    D. the results of calculations performed by the users program

11. The major use for this type of diagram is to
    A. explain the decisions made by the system
    B. describe the events in a software translation process
    C. allow users to redesign the operation of their source code
    D. show the movement of data through a system

Questions 12 and 13 use the decision tree below that processes requests for a bank loan.



Where **T** = True and **F** = False

12. Which sequence of decisions would give a loan to a person who is not a customer of the bank?
    A. T T
    B. F T F
    C. F T T
    D. T F

13. The decision tree has to be turned into an algorithm. Which of the following algorithms best represents the decision tree?

A

```
IF bank_customer THEN
    IF 10pc_deposit THEN
        ApproveLoan
    ELSE
        RejectLoan
    ENDIF
ELSE
    RejectLoan
ENDIF
```

B

```
IF bank_customer AND 10pc_deposit THEN
    ApproveLoan
ELSE
    IF home_owner OR 20pc_deposit THEN
        ApproveLoan
    ELSE
        RejectLoan
    ENDIF
ENDIF
```

C

```
CASEWHERE
    10pc_deposit
        ApproveLoan
    20pc_deposit
        ApproveLoan
    OTHERWISE
        RejectLoan
ENDCASE
```

D

```
IF NOT bank_customer THEN
    IF home_owner AND 20pc_deposit THEN
        ApproveLoan
    ELSE
        RejectLoan
    ENDIF
ELSE
    IF 10pc_deposit THEN
        ApproveLoan
    ELSE
        RejectLoan
    ENDIF
ENDIF
```

14. The following algorithm

```
BEGIN Main algorithm
        A = 10
        B = 5
        REPEAT
                B = B – 1
                C = A / B
                Print C
        UNTIL B = 0
END Main algorithm
```

A. will print 5 values and then terminate
B. will cause a run time error
C. contains a syntax error
D. will not terminate

Questions 15 to 18 use the following two algorithms. The algorithm **GetKey** is a function in the algorithm Main Program

```
BEGIN Function GetKey
        REPEAT
                CheckKeyboard
        UNTIL KeyPressed
        KeyChr = Symbol of key pressed
        RETURN KeyChr
END Function GetKey
```

```
BEGIN Main Program
        Character = GetKey
        Print "You pressed ", Character
END Main Program
```

15. Which of the following best describes the relationship between the function GetKey and the Main Program?
A. the main program passes a parameter called "Character" to the function
B. the function passes a parameter to the main program
C. both the main program and the function pass parameters to each other
D. parameters are not involved, but the function returns to the main program

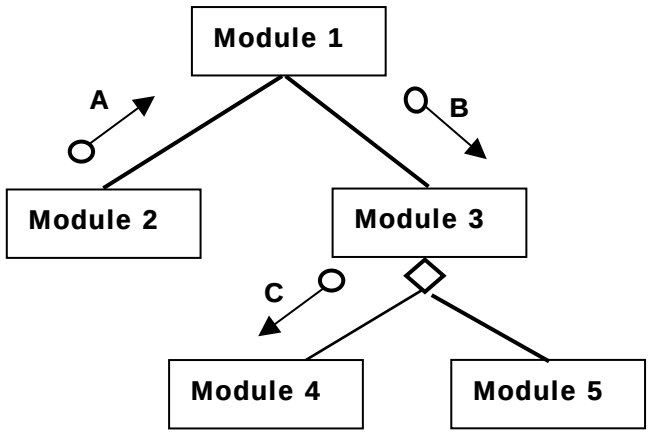
16. The scope of the variable KeyChr is
A. global to the Main Program and a local to the function GetKey
B. global to the Main Program only
C. local to the function GetKey only
D. local to both the function GetKey and the Main Program

17. The two algorithms demonstrate the use of
A. intrinsic documentation through the use of identifier names
B. top-down design and intrinsic documentation
C. desk-checking
D. a boolean function

18. The function GetKey contains the word "CheckKeyboard". This word is most likely to be
A. a variable name
B. part of the internal documentation
C. a pseudocode sequence instruction
D. another module in the program

19. A boolean function
    A. returns a true or false result
    B. only uses boolean variables
    C. is used to test the operation of a program
    D. can only accept boolean parameters

Questions 20 to 22 refer to the following diagram.



20. The diagram is an example of documentation designed to
    A. assist the users of the program
    B. show how a software product works
    C. allocate tasks to different teams of programmers
    D. show the relationships between the program components

21. The items in the diagram labelled "A", "B" and "C" represent
    A. the order in which the modules are to be executed
    B. parameters passing between the different modules
    C. control or break points used in developing the program
    D. I/O data values

22. If Module 1 is the starting point of the program, then a correct order for the execution of the program components would be
    A. Module 1, Module 2, Module 1, Module 3, Module 5
    B. Module 1, Module 2, Module 3, Module 4, Module 5
    C. Module 1, Module 3, Module 4, Module 5
    D. Module 1, Module 3, Module 4

23. A current trend in software development is to produce software that can be customised by the users to suit their own individual needs. The major advantage of this for the users is that
    A. time and money are saved by not having to purchase "off the shelf" software
    B. they have the ability to develop their own solutions without the need for programmers
    C. the programming languages used are easy for non-programmers to understand
    D. they can use outsourcing for all their program development

24. Referring to the following module

```
BEGIN SUBPROGRAM age (number, target, result)
        Count = 0
        result = false
        REPEAT
                OUTPUT "Guess my age"
                INPUT guess
                add 1 to Count
                IF guess = target THEN
                        result = true
                END IF
        UNTIL Count > number OR result = true
        RETURN result
END SUBPROGRAM age (number, target, result)
```

Which one of the following statements is true?

A. the parameters "number", "target" and "result" must all be given to the module by the calling program
B. the loop cannot be tested because the value of "number" is not known
C. the subprogram "age" is a boolean function
D. a while endwhile loop structure would have been better for this module

25. During the execution of a computer program, the following steps take place:

Step 1. The number 8 is placed in the accumulator.
Step 2. The number 5 is added to the accumulator.
Step 3. The result of this addition is stored in memory location 5002.

Which one of the following events occurs during Step 3?

A. 5002 is moved to the accumulator.
B. 5002 is moved to the RAM.
C. 13 is moved to the accumulator.
D. 13 is moved to the RAM.

END OF SECTION ONE

Section II

Total marks (30)
Attempt Questions 26 and 27
Allow about 50 minutes for this section

Answer each question on SEPARATE sheets.
If you include diagrams in your answer, ensure that they are clearly labelled.

Marks

Question 26 (16 marks) Use a SEPARATE writing sheet.

(a) Give TWO reasons why computer software (such as an accounting package) is normally bought 'off the shelf' rather than being outsourced or developed in-house **2**

(b) Outsourcing has become a popular method for creating customised software solutions

(i) What is outsourcing? Give an example of how it could be used. **2**

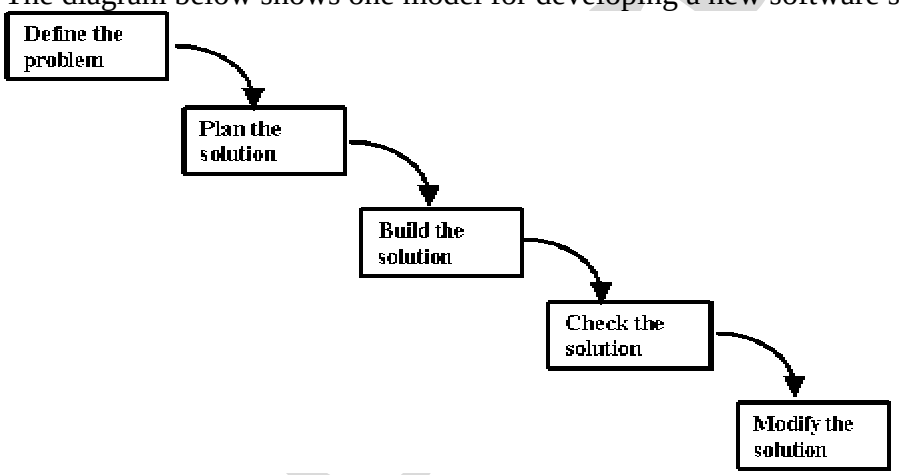
(ii) What effect will outsourcing have on the employment of computer professionals? Explain your answer. **1**

(c) A feasibility study is often the first step in developing a new system or software solution.

(i) List and describe TWO factors that the feasibility study will investigate **2**

(ii) Describe ONE social or ethical factor that would need to be considered before a new system is developed **1**

(d) The diagram below shows one model for developing a new software solution to a problem



(i) During which stage of this process will algorithms be written and tested? **1**

(ii) Name and describe TWO methods for testing algorithms. Illustrate ONE of the methods with an example **3**

(iii) During which of these stages will the programmers probably use function libraries? **2**

(iv) What is a function library? Give ONE advantage of their use. **2**

Marks

Question 27 (14 marks) Use a SEPARATE writing sheet.

(a) The following algorithm is a function that gets an array of numbers (which it calls "NumberList") from another algorithm

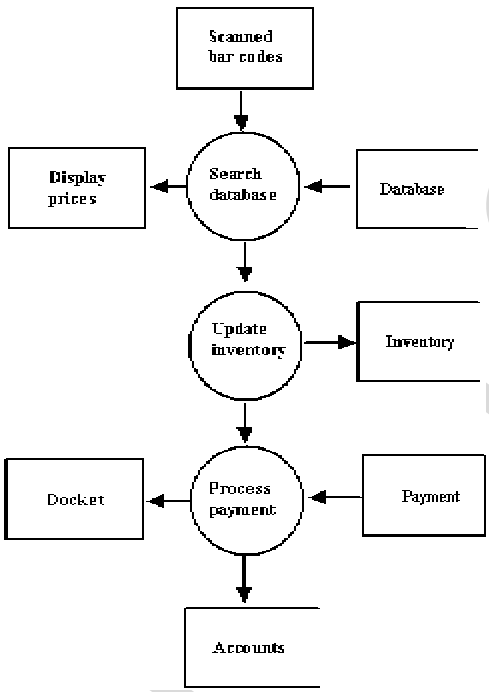
```
BEGIN SUBPROGRAM GetLargest (NumberList)
    largest = NumberList(1)
    count = 2
    REPEAT
        IF NumberList(count) > largest THEN
            largest = NumberList(count)
        ENDIF
        add 1 to count
    UNTIL count > Size_of_NumberList
    RETURN largest
END SUBPROGRAM GetLargest (NumberList)
```

The algorithm is given an array containing the numbers 5, 2, 10, 4

(i) Perform a desk check on the algorithm using the numbers given. Show all your results. **4**

(ii) What value will the algorithm return? **1**

(b) The diagram below is a model for a software product designed to process sales made at a store cash register



(i) Identify the type of model shown in the diagram **1**

(ii) The model contains a number of operations that involve moving data to or from external data files. List these operations and, for each one, describe the data movement involved. **4**

(iii) Using this model draw up an IPO chart for the software system **4**

END OF SECTION TWO