* 1. **Edwest**
  2. **Semester 1**
  3. **Examination, 2023**

**COMPUTER**

**SCIENCE**

**Unit 3**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Student Number: In figures |  |  |  |  |  |  |  |  |  |  |  |

In words

**Time allowed for this paper**

Reading time before commencing work: ten minutes

Working time for paper: two hours 30 minutes

**Materials required/recommended for this paper**

Number of additional booklets used (if applicable):

***To be provided by the supervisor***

This Question/Answer Booklet

Source Booklet

###### *To be provided by the candidate*

Standard items: pens, pencils, eraser, correction fluid/tape, ruler, highlighters

Special items: non-programmable calculators, MATHOMAT and/or Mathaid and/or any system flowchart template

**Important note to candidates**

No other items may be taken into the examination room. It is **your** responsibility to ensure that you do not have any unauthorised notes or other items of a non-personal nature in the examination room. If you have any unauthorised material with you, hand it to the supervisor **before** reading any further.

**Structure of this paper**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Section | Number of questions available | Number of questions to be answered | Suggested working time (minutes) | Marks available | Percentage of examination |
| Section One:  Short answer |  | 24 | 70 | 82 | 40 |
| Section Two:  Extended answer |  | 5 | 90 | 85 | 60 |
|  |  |  |  | **Total** | 100 |

**Instructions to candidates**

1. The rules for the conduct of Western Australian external examinations are detailed in the *Year 12 Information Handbook 2023:Part II Examinations*. Sitting this examination implies that you agree to abide by these rules.

2. Write your answers in the spaces provided in this Question/Answer Booklet. A blue or black ballpoint or ink pen should be used. Wherever appropriate, fully labelled diagrams, tables and examples should be used to illustrate and support your answers.

3. You must be careful to confine your responses to the specific questions asked and to follow any instructions that are specific to a particular question. Where no specific instructions are given, you should feel free to use a range of formats to express your knowledge and understandings.

4. Supplementary pages for planning/continuing your answers to questions are provided at the end of this Question/Answer booklet. If you use these pages to continue an answer, indicate at the original answer where the answer is continued, i.e. give the page number.

5. The Source booklet is not to be handed in with your Question/Answer booklet.

**Section One: Short answer**

This section contains questions. You must answer all questions. Write your answers in the spaces provided.

Supplementary pages for planning/continuing your answers to questions are provided at the end of this Question/Answer booklet. If you use these pages to continue an answer, indicate at the original answer where the answer is continued, i.e. give the page number.

Suggested working time: 70 minutes.

**Question 1 (4 marks)**

Discuss two key differences between IP v 4 and IP v 6.

|  |  |
| --- | --- |
| **Description** | **Marks** |
| Fully discusses two key differences | 4 |
| Fully discusses one key difference and outlines one | 3 |
| Outlines two key differences |  |
| Outlines a key difference | 1 |
| **Total** | 4 |
| **Possible answer**  **Key difference 1**: IP v 6 offers more IP addresses than IP v 4. Due to it have 128 bit address lengths. IP v 4 is 32. At 128 there are infinite possibilities for IP addresses.  **Key difference two**: In IP v 6, each networked device has it’s own IP address and does not need to be dependent or hidden behind a network address transmission router. IP v 4, due to a limited supply of IP addresses requires extra detail about the Network Address Transmission router. As a consequence continual routing address reference that is contained within the header of a IP v 4 packet, is not required and transmission is potentially faster as a result. |  |

**Question 2 (3 marks)**

Complete the algorithm below that checks if students are both over 16 and receive an A in English to obtain a Learners permit and outputs the result of the check

PROGRAM: Learners Permit License Eligibility

age:int

e\_result: str

Eligibility:bool

Begin

Input (age, e\_result)

Eligibility false

|  |  |
| --- | --- |
| **Description** | **Marks** |
| Uses if | 1 |
| Uses and | 1 |
| Outputs correct result (changes bool) | 1 |
| Indentation | 1 |
| **subtotal** | **4** |
| Possible answer  Begin  Input (age, e\_result)  Eligibility false  If age >16 **AND** e\_result ==A  Eligibility true  End if  Ouput(eligibility)  End |  |

**Question 3 (2 marks)**

Describe the role of layers within the TCP/IP model?

|  |  |
| --- | --- |
| **Description** | **Marks** |
| Describes the role of layers within the TCP/IP model correctly | 2 |
| States the role correctly | 1 |
| **Total** | **2** |
| **Possible answer**  This layered stack stipulates exactly how data is to be formatted and transmitted across a network which will include the internet. Without a universally understood and applied model, each hardware and software provider would need to create their own system which would make interoperability difficult. |  |

**Question 4 (1 mark)**

A browser sends a request to a web server. Identify the name of the TCP/IP layer that first handles this request.

|  |  |
| --- | --- |
| **Description** | **Marks** |
| Identifies correct layer | 1 |
| **subtotal** | **1** |
| Possible answer  application |  |

**Question 5 (4 marks)**

Identify the different data types that can be used in coding solutions.

|  |  |
| --- | --- |
| **Description** | **Marks** |
| Identifies four (1 mark each | 4 |
| **subtotal** | **4** |
| Possible answer  Boolean, float, string, integer |  |

**Question 6 (4 marks)**

Convert the following 8-bit binary numbers into decimal.

|  |  |
| --- | --- |
| **Binary** | **Decimal** |
| 00011001 |  |
| 01011111 |  |
| 11100001 |  |
| 11111111 |  |

|  |  |
| --- | --- |
| **Description** | **Marks** |
| 1 mark for each correct decimal conversation | 1 |
| **Total** | 4 |
| **Possible answer**   |  |  | | --- | --- | | **Binary** | **Decimal** | | 00011001 | 25 | | 01011111 | 95 | | 11100001 | 225 | | 11111111 | 255 | |  |

**Question 7 (4 marks)**

Convert the following decimal numbers into binary.

|  |  |
| --- | --- |
| **Decimal** | **Binary** |
| 55 |  |
| 17 |  |
| 254 |  |
| 224 |  |

|  |  |
| --- | --- |
| **Description** | **Marks** |
| 1 mark for each correct decimal conversation | 1 |
| **Total** | 4 |
| **Possible answer**   |  |  | | --- | --- | | **Decimal** | **Binary** | | 55 | 00110111 | | 17 | 00001001 | | 254 | 11111110 | | 224 | 11100000 | |  |

**Question 8 (6 marks)**

1. Provide two reasons hexadecimal numbers are used. (2 marks)

1. Convert the following hexadecimal numbers to decimal and then to binary. (4 marks)

|  |  |  |
| --- | --- | --- |
| **Hexadecimal** | **Decimal** | **Binary** |
| A |  |  |
| 3B |  |  |

|  |  |
| --- | --- |
| **Description** | **Marks** |
| Provides two reasons why hexadecimal numbers are used | 2 |
| Provides a reason why hexadecimal numbers are used | 1 |
| **subTotal** | **2** |
| 1 mark for each correct conversation | 1 |
| subTotal | 4 |
| Total | 6 |
| **Possible answer**   1. Reason 1: hex numbers take up less storage   Reason 2: hex numbers can be turned into binary easily and they are easier to read   |  |  |  | | --- | --- | --- | | **Hexadecimal** | **Decimal** | **Binary** | | A | 10 | 00001010 | | 3B | 59 | 00111011 | |  |

**Question 9 (2 marks)**

Discuss why stubs are used when coding a program.

|  |  |
| --- | --- |
| **Description** | **Marks** |
| Fully discusses why stubs are used in programming | 2 |
| States reason | 1 |
| **Total** | 2 |
| **Possible answer**  Stubs are used in lieu of a fully written module or function. The idea is that using the stub will still allow the Main or master module to run so troubleshooting can still occur while awaiting stub replacement with module/function |  |

**Question 10 (6 marks)**

Describe an example of the following types of coding errors.

|  |  |
| --- | --- |
| **Coding error** | **Example** |
| Syntax |  |
| Run time |  |
| Logic |  |

|  |  |
| --- | --- |
| **Description x 3** | **Marks** |
| Fully describes a correct example for each type of error | 2 |
| States only a correct example | 1 |
| **subTotal** | 2 |
| **Total** | 6 |
| **Possible answer**   |  |  | | --- | --- | | **Coding error** | **Example** | | Syntax | Occurs when grammar rules of the language are not adhered to. For example, leaving off a colon in Python may cause issues in running the program | | Run time | The program will run endlessly and use up the system resources. This commonly occurs when a loop is accidentally endless or you divide by 0 | | Logic | The program will run but it will produce an unexpected result. For instance, using a minus sign instead of a plus sign in a calculation. | |  |

**Question 11 (6 marks)**

State the three program control structures and provide an example for each.

|  |  |
| --- | --- |
| **Description x 3** | **Marks** |
| States the program control structure and provides and example | 2 |
| States | 1 |
| **Total** | 6 |
| **Possible answer**  **Control structure 1: Sequence.**  Input num1  Total num 1 x num 1  Output (Total)  **Control structure 2; Selection**  Input num1  If num1 > 0  Total num1 x num1  Else  Output(‘Choose a number greater than 0’)  End if  **Control structure 3**  Input num1  While num1 >0  Total num1 x num1  End while |  |

**Question 12 (4 marks)**

Discuss the purpose of an API (application programming interface) by highlighting two advantages of using them.

|  |  |
| --- | --- |
| **Description** | **Marks** |
| Fully discusses the purpose of an API with 2 advantages | 4 |
| Discusses the purpose of an API and an advantage | 3 |
| Discusses the purpose of an API | 2 |
| Statement only | 1 |
| **Total** | 4 |
| Possible answer  An API allows a program to connect and access data stored in a database online often as a JSON file. Once the connection is made, the program can extract the data it requires from a live database. The advantages include being able to access up to date and very current databases as well as being able to access only the data you require. As opposed to storing a large database containing data you don’t need if you downloaded a csv file. |  |

**Question 13 (4 marks)**

Identify the TCP/IP layer that the following protocols operate on.

|  |  |
| --- | --- |
| **Protocol** | **Layer** |
| Wi Fi |  |
| IP |  |
| HTTP |  |
| UDP |  |

|  |  |
| --- | --- |
| **Description x 3** | **Marks** |
| Identifies correct layer x 4 | 1 |
|  |  |
| **Total** | **4** |
| **Possible answer**   |  |  | | --- | --- | | **Protocol** | **Layer** | | Wi Fi | Network | | IP | Internet | | HTTP | Application | | UDP | Transport | |  |

**Question 14 (8 marks)**

A program has been written to calculate the factorials of a certain number. A factorial is the addition of all the numbers from the factorial down to one (1).

i.e 3 factorial 3! = 3 \*2\*1 = 6

5 factorial 5! = 5 \* 4 \* 3 \* 2 \* 1 =

This can be represented by the equation n! = n \* (n-1) \* (n-2) \* (n-3)\*…(n-(n-1))

Consider the code written as follows:

Function Factorial(x)

Total 1

For i 1 To x

Total Total \* x

End for

Return Total

Endfunction

1. Deskcheck x = 4. Record the output here:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (1 mark)
2. What is the type of error within this code?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (1 mark)
3. Identify the errors in the code. (2 marks)

1. Rewrite the code to correct the error checking your code with a deskcheck. (3 marks)

|  |  |
| --- | --- |
| **Description** | **Marks** |
| Part A |  |
| Outputs the correct amount | 1 |
| **subTotal** | **1** |
| Part B |  |
| Correctly identifies the error type | 1 |
| **subTotal** | **1** |
| Part C |  |
| Identifies two errors | 2 |
| Identifies one error | 1 |
| **subTotal** | **2** |
| Part D |  |
| Correctly rewrites to fix errors and it outputs correctly in deskcheck | 3 |
| Rewrites aspect of code that fixes an error, does a deskcheck | 2 |
| Rewrites the code mostly correctly | 1 |
| **subTotal** | **3** |
| **Total** | **7** |
| **Possible answer**   1. Need to assume that i started at 1. If it did total = 256 at the end 2. Logic 3. Error in not initializing I, Error in the equation inside the loop   Function Factorial(x)  Total 1  i 0  For i 0 to x - 1  Total Total\*(x – i)  End for  Return Total  First pass  1 x 4 = 4  4 x 3 = 12  12 x 2 = 24  24 x 1 = 24 |  |

**Question 15 (6 marks)**

Consider the following program

Input (Num)

If Num > 0

Output(“Your number is positive”)

Else if Num < 0

Output (“Your number is negative”)

Else

Output (“Your number is 0”)

End if

End

1. What would be the most appropriate test data for checking this algorithm. Justify your suggestions. (3 marks)

1. Unfortunately, users are inputting real numbers frequently. What can you do to ensure this entry can be validated and verified? (4 marks)

|  |  |
| --- | --- |
| 1. **Description** | **Marks** |
| Justifies all test data choices and the data is in the at, high, low, unexpected data | 3 |
| Justifies most test data choices and the data is in the at, high, low | 2 |
| Chooses test data in the range, no justification | 1 |
| **Total** | **3** |
| Possible answer  To make sure that the data tests this algorithm, one high number say 1, one low number say -1 and at 0 to make sure all outputs are covered. Then a less obvious number like 2.3. |  |
|  |  |
| Provides coding solutions covering both validation and verification of the data | 3 |
| Provides a solution that covers validation and/or verification of the data | 2 |
| Suggest a solution | 1 |
| **Total** | **3** |
| Possible answer  To validate the input, code can be changed to  Num = int(input) |  |

**Question 16 (3 marks)**

Explain the difference between input validation and exception handling?

|  |  |
| --- | --- |
| **Description** | **Marks** |
| Fully the difference between input validation and exception handing | 3 |
| Mostly explains the difference between input validation and exception handling | 2 |
| States a difference | 1 |
| **subtotal** | **3** |
| Possible answer  Input validation performs checks on a user’s input to ensure it complies with the rules for that input. The exception handling is to handle the situation when the data is an exception. It may interrupt the program to avoid a run time error. For instance in a situation where a division is by z – having an exception handling rule will interrupt the process and prompt for more sensible data.  The validation is set up to avoid a failed operation, the exception rule will be what happens if all else fails and an exception is thrown up. |  |

Questions 17 through 19 use the following code.

|  |  |
| --- | --- |
| 1 | **Program: Days in Month and Leap Year** |
| 2 | Array: month\_days = [0, 31, 28, 31, 20, 31, 20, 31, 31, 31, 31, 30, 31] |
| 3  4  5  6  7  8  9  10 | FUNCTION is\_leap(year)  if year mod 4==0 and ( year mod 100! = 0 or year mod 400 ==0)  return true  else  return false  end if  end |
| 11 |  |
| 12  13  14  15  16  17  18  19  20  21 | days\_in\_month(year, month)  if month >12 or month<1  return ‘Invalid month’  else if month = 2 and is\_leap(year)  return 29  else  return month\_days[month]  end if |
| 22  23 | Module Main |
| 24 |  |
| 25 |  |
| 26 |  |

**Question 17 (2 marks)**

There is an error in the array at position 10. September should have 30 days, not 31.

Write the code required to correct this array.

|  |  |
| --- | --- |
| **Description** | **Marks** |
| month\_days | 1 |
| [9] = 30 | 1 |
| subtotal | 2 |
| Possible answer  month\_days[9] = 30 |  |

**Question 18 (9 marks)**

1. Discuss the benefits of modularization in this code example. (3 marks)

1. Discuss the characteristics of the sub-routines being used in this code. (3 marks

1. In each defined sub-routine, explain why only value parameters being passed? (3 marks)

|  |  |
| --- | --- |
| **Description** | **Marks** |
| **Part a)** |  |
| Discusses at least two benefits of modularization referring to code | 3 |
| Discusses a benefit of modularization referring to code | 2 |
| States a benefit | 1 |
| **Total** | **3** |
| Possible answer  Modularisation allows for efficiency of code and for the sub-routines to be used more than once. In this situation, breaking the code into sub-routines makes the code more readable and it is easier to find problems. In addition, this will allow each of the sub-routines to be used elsewhere |  |
| **Part B** |  |
| Discusses at least two characteristics of the sub routines being used in the code | 3 |
| Discusses a characteristic of the sub routine being used in the code | 2 |
| States a characteristic | 1 |
| **Total** | **3** |
| Possible answer  The sub-routines is\_leap and days\_in\_month used in the code have no input or output statements and return a value via the name of the sub-routine. They are therefore functions. |  |
| **Part d)** |  |
| Explains why value parameters are being passed in each sub-routine | 3 |
| Explains why value parameters being passed in one | 2 |
| States characteristic of value parameter | 1 |
| **subTotal** | **3** |
| **Total** | **9** |
| Possible answer  The parameters being passed in both sub\_routines are value because they are used in the calcualations inside the sub-routine but these variables are not changed inside. In this case, only the value is required and the variables are not changed at their reference address. |  |
|  |  |

**Question 19 (4 marks)**

Complete coding the Main Module at line 22

|  |  |
| --- | --- |
| **Description** | **Marks** |
| Uses Input to get the two variables Year and month | 2 |
| Calls sub routine with correct arguments | 2 |
| **subtotal** | **4** |
| Possible answer |  |
| Main (month\_days)  Begin  Input(year, month)  Call Function days\_in\_month(year, month)  End Main |  |
|  |  |

**Question 20 (2 marks)**

Outline the benefits of using a CASE statement over a multi-way nested if selection.

|  |  |
| --- | --- |
| **Description** | **Marks** |
| Outlines two benefits | 2 |
| Outlines one benefit | 1 |
| **subtotal** | **2** |
| Possible answer  A CASE statement is more efficient when there are multiple categories in terms of how many lines of code need to be written.  A Case statement is easier to understand than the nesting required for a multi-way. |  |

**Section Two: Extended Answer 60%(85)**

This section has **four** questions. Answer **all** questions. Write your answers in the spaces provided.

Supplementary pages for planning/continuing your answers to questions are provided at the end of this Question/Answer booklet. If you use these pages to continue an answer, indicate at the original answer where the answer is continued, i.e. give the page number.

Suggested working time: 90 minutes.

Questions 21 through to 23 refer to pages of your source booklet.

**Question 21 (18 marks)**

Surins have been advised to follow a framework for the development of their coding solutions.

1. Explain how using a development framework would help when developing a software solution for Surins Catering. (2 marks)

|  |  |
| --- | --- |
| **Description** | **Marks** |
| Full explanation referring to Surin’s scenario linking benefits | 3 |
| Discussion linking a benefit | 2 |
| Outlines one benefit | 1 |
| **subtotal** | **2** |
| Possible answer  Creating the software using a development framework allows for the methodical creation of code likely to suit the user and their requirements. In addition, going through the stages will ensure the code is tested to not only be correct with live data but that it also is suitable for users and other systems it communicates with. |  |

1. Outline the stages of the framework and identify an activity that would occur at each stage.

(8 marks)

|  |  |
| --- | --- |
| **Description** | **Marks** |
| Outlines each stage (x 4 – 1 mark for each correct | 4 |
| Identifies activity for each (1 mark each) | 4 |
| **subtotal** | **8** |
| Possible answer  Investigate: problem description, problem requirements, development schedule  ‘  Design: design data structures, design and test algorithm  Develop: develop and debug code, unit testing and use of live data  Evaluate:user acceptance testing, developer retrospective |  |

1. Answer the following questions about programming practice for Surins Catering.

(7 marks)

1. Discuss why is it better, in general, to use local variables as opposed to global variables? (2 marks)

1. Discuss why constants should be used, where possible, in a program? (2 marks)

1. Discuss should data be validated before input for processing? (2 marks)

1. State the function of a desk check. (1 mark)

|  |  |
| --- | --- |
| **Description** | **Marks** |
| Part i |  |
| Discusses why local is better than a global in programming | 2 |
| States superficially | 1 |
| **subTotal** | **2** |
| Part ii |  |
| Discusses why constants should be used | 2 |
| States superficially | 1 |
| **subTotal** | **2** |
| Part iii |  |
| Discusses why data should be validated | 2 |
| States superficially | 1 |
| **subTotal** | **2** |
| Part iv |  |
| Correctly states the function of a deskcheck | 1 |
| **subTotal** | **1** |
| **Total** | **7** |
| **Possible answer**   1. It is better to use a local where possible as the value and scope of the local only exists within the scope or function that initializes and using it. With a global variable, it becomes hard to keep track of its value when many modules/functions are using it and possibility changing it. 2. Constants should be used if a value does not change over a program. This allows the program to call the value over and over again and it will not change. 3. Data should be checked before processing through validation rules as this will save time and prevent potential run time errors.. 4. A desk check is a walk through to mainly check the logic of a program. |  |

**Question 22 (39 marks)**

Referring the figures 2 and 3 on page 2 of your Source booklet.

1. Discuss the differences between a file and an array. (3 marks)

|  |  |
| --- | --- |
| **Description** | **Marks** |
| Fully discusses differences | 3 |
| Discusses a difference | 2 |
| Outlines a difference | 1 |
| **subtotal** | **3** |
| Possible answer  A file, containing data often of different types, is external to the program and is opened from within the program. The program will need to read the file and process the contents of the file and save any changes to the file before closing it. An array contains data of the same type and exists as a data structure within the program and is declared as a variable array before use. |  |

1. Write a module to open and read the file PassengerRecord.txt. (8 marks)

|  |  |
| --- | --- |
| **Description** | **Marks** |
| Module declaration | 1 |
| Assigns open\_read to a variable | 1 |
| Assigns data to an array | 1 |
| While not EOF | 1 |
| Readline | 1 |
| Appends to array. | 1 |
| ends while/module | 1 |
| Closes file | 1 |
| **subtotal** | **8** |
| Possible answer  MODULE ReadFile  myfile = OPEN\_READ(“PassengerRecord.txt”)  lines = []  WHILE NOT myfile.EOF  line = myfile.READLINE()  lines.append(line)  END WHILE  CLOSE(myfile)  END ReadFile |  |

1. Complete the code for the CalcDiscount module. (6 marks)

|  |  |
| --- | --- |
| **Description** | **Marks** |
| Initialize i | 1 |
| Create a for loop i<5 | 1 |
| If Code == Supp\_Code[i] | 1 |
| Then **OrderDiscount** is the supplier discount at position [i] | 1 |
| Else increment the loop until it does | 1 |
| End if and **OrderDiscount** is a variable returned as an argument in the call | 1 |
|  |  |
| **subtotal** | **6** |
| Answers  By virtue of having the same index  Input(Supplier Code)  Read(Code)  i 0  for i < 5  if Code == Supp\_Code[i]  OrderDiscount Supp\_Discount[i]  Else  i i+1  end if  end for  End module |  |

1. Discuss another structure could Surin’s have used for the Supplier and their discount?

(2 marks)

|  |  |
| --- | --- |
| **Description** | **Marks** |
| Discusses another structure | 2 |
| Brief statement | 1 |
| **subtotal** | **2** |
| Possible answer  A library could have been used in this example as it can contain different data types. |  |

1. Complete the code for the Calc\_OrderTotal module. (3 marks)

|  |  |
| --- | --- |
| **Description** | **Marks** |
| Initialize Total | 1 |
| Correct equation 2 | 2 |
|  |  |
| **subtotal** | **3** |
| Answers  By virtue of having the same index  Calc\_OrderTotal (Quantity, Item\_cost, Total)  Total 0  Total Quantity \* Item\_Cost  End |  |

1. Complete the code for the function Discounted\_Total. (3 marks)

|  |  |
| --- | --- |
| **Description** | **Marks** |
| return | 1 |
| Correct equation 2 and BIMDAS correct | 2 |
|  |  |
| **subtotal** | **3** |
| Answers  By virtue of having the same index  Discounted\_Total (Order\_Discount, Total)  Total Total – (Total\*Order\_Discount)  return |  |

1. Create a structure chart below for the program modules and functions created in sections d, e and f . Pass all parameters. (14 marks)

|  |  |
| --- | --- |
| **Description** | **Marks** |
| Modules/functions (1 each | 3 |
| Main | 2 |
| Parameters (1 each) | 8 |
| Return for function | 1 |
| **subtotal** | **14** |
| Answers  Diagram  Description automatically generated |  |

**Question 23 (28 marks)**

This question relates to the diagram on page 4 of the Source Booklet.

1. Identify a hardware device for each of the following layers of the TCP/IP model. Outline it’s role on this layer in Surin’s Catering.: (6 marks)

Transport of the TCP/IP model: Device

Internet of the TCP/IP model:

Network of the TCP/IP model:

|  |  |
| --- | --- |
| **Description** | **Marks** |
| Identifies devices | 1 |
| Outlines role fully in reference to Surins Catering | 2 |
| No reference to Surins | 1 |
| **subtotal** | **3** |
| **Total** | **9** |
| Possible answer  transport devices: switch  In Surins catering, the switch will be switching packets of data using the Transport control protocol to forward data within the LAN.  Internetdevice router  Internet: the router would be operating at this layer it allocates IP and forwards packets between networks based on IP. In Surins – this would be the job of the router to forward packets to the relevant LAN’s  network device: ethernet cable, wireless signal, f  802.11a-n, ethernet  This is about the things that actually transfer the bits. In this situation the actual transferring medium in Surins such as the ethernet cable would be dealing with this layer. |  |

1. Surins have noted that the systems connected to the switch are not running as expected. Orders are sometimes dropping out on the web server and server requests from the laptops are going really slowing.
2. Discuss what could be the problem with the network at this location. (3 marks)

|  |  |
| --- | --- |
| **Description** | **Marks** |
| Discusses what the problem could be referring to diagram | 3 |
| Discusses what the problem could be | 2 |
| Statement only | 1 |
| **subtotal** | **3** |
| **Possible answer**  This particular switch is doing a lot of work and it is not known what it’s capacity is. But given it is taking all requests for both the server, web server, storage and multiple devices, it might not be up to that load. |  |

1. Justify a solution to these performance issues. (3 marks)

|  |  |
| --- | --- |
| **Description** | **Marks** |
| Justifies a solution referring to the diagram | 3 |
| Discusses solution | 2 |
| Statement only | 1 |
| **subtotal** | **3** |
| **Possible answer**  It is likely that the switch is at capacity and is slowing the network performance down. An easy solution would be to use another switch to create a subnet and separate the devices so that the web server and the storage are separated from the server and the devices requesting its services. |  |

1. Describe two procedures that could be used for preventing unauthorized access to a networks data. (4 marks)

|  |  |
| --- | --- |
| **Description** | **Marks** |
| Describes fully a procedure | 2 |
| States a procedure | 1 |
| **subtotal** | **4** |
| Possible answer  Unauthorised access could be prevented by encrypting all the data stored on the servers so that if there is an intrusion, the data is unreadable.  Using up to date patches on the firewall and antivirus protection across the network could help minimize and prevent unauthorized access.  Ensuring only those who need a log in have one and there is a secure password used for access. |  |

1. Discuss why it is important to prevent unauthorized access to a network for Surins.

(3 marks)

|  |  |
| --- | --- |
| **Description** | **Marks** |
| Discusses importance fully linking to Surins business | 3 |
| Discusses importance |  |
| Statement only | 2 |
| **subtotal** | **2** |
| Possible answer  Surins personal and sensitive data about their clients and their employees stored on the databases. It would be important to minimize the risk of hackers getting this data from a legal and ethical point of view |  |

1. Surins Catering have received advice that they should upgrade their network operating system.
2. Discuss the purpose of the network operating system. (3 marks)

|  |  |
| --- | --- |
| **Description** | **Marks** |
| Discusses fully why Surins should have a network operating system referring to two characteristics | 3 |
| Discusses why they should have a network operating system | 2 |
| Statement only | 1 |
| **subtotal** | **3** |
| **Possible answer**  A network operating system manages the networks resources in a client server network. This means it will coordinate the printer, web server and server services in Surins network by responding to requests form clients for these services. It will also manage the hardware and allow multiple devices to communicate and share information and resources |  |

1. One of their best employees has told the managers that they have a mate in another business, who uses an open source network operating system. They have got their friend to copy the code for that operating system to implement in Surins Catering.

Discuss a legal and an ethical issue associated with this action. (6 marks)

|  |  |
| --- | --- |
| **Description ethical** | **Marks** |
| Fully discusses an ethical issue associated with this action for Surin | 3 |
| Discusses an ethical issue | 2 |
| Statement only | 1 |
| **subTotal** | **3** |
| **Description legal** | **Marks** |
| Fully discusses a legal issue associated with this action for Surin | 3 |
| Discusses a legal issue | 2 |
| Statement only | 1 |
| **subTotal** | **3** |
| Total | **6** |
| **Possible answer**  Ethically, even thought this operating system has open source code, copying someone else’s operating system and claiming it as your own is not good ethics. In this situation, the company would be benefitting from someone else’s hard work and from a company whose commercial IP may be caught up in the way their network operating system manages their resources. It might be the thing that gives them the edge in competition.  Legally. This is someone else’s Intellectual Property and may be subject to Copyright laws. A material expression of an idea, such as code for an operating system, is automatically covered by the Copyright Act. So at the very least, Surins’ should be seeking permission and attributing the original author of the code. |  |

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