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

**COMPUTER**

**SCIENCE**

**Unit 1**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 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 | 20 | 20 | 70 | 84 | 40 |
| Section Two:  Extended answer | 3 | 3 | 90 | 88 | 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 40% (84 Marks)**

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.

**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

**Question 3 (2 marks)**

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

**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.

**Question 5 (4 marks)**

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

**Question 6 (4 marks)**

Convert the following 8-bit binary numbers into decimal.

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

**Question 7 (4 marks)**

Convert the following decimal numbers into binary.

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

**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 |  |  |

**Question 9 (2 marks)**

Discuss why stubs are used when coding a program.

**Question 10 (6 marks)**

Describe an example of the following types of coding errors.

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

**Question 11 (6 marks)**

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

**Question 12 (4 marks)**

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

**Question 13 (4 marks)**

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

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

**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)

**Question 15 (6 marks)**

Consider the following programme.

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)

**Question 16 (3 marks)**

Explain the difference between input validation and exception handling?

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.

**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)

**Question 19 (4 marks)**

Complete coding the Main Module at line 22

**Question 20 (2 marks)**

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

**Section Two: Extended Answer 60% (88)**

This section has **three** 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)

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

(8 marks)

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)

**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)

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

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

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

(2 marks)

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

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

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

**Question 23 (31 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 its role on this layer in Surin’s Catering (9 marks)

Transport of the TCP/IP model: Device

Role:

Internet of the TCP/IP model:

Role:

Network of the TCP/IP model:

Role:

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)

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

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

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

(3 marks)

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)

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)

**End of questions**

Question No:

Question No: