COMPUTER SCIENCE
Units 3 & 4

Student Number: In figures

Student name   In words   _____

Teacher   _____

Time allowed for this paper
Reading time before commencing work: ten minutes
Working time for paper: three hours

Materials required/recommended for this paper
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	15	15	70	90	40
Section Two: Extended answer	7	7	110	118	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 2020*. 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. Spare pages are included at the end of this booklet. They can be used for planning your responses and/or as additional space if required to continue an answer.
   - Planning: If you use the spare pages for planning, indicate this clearly at the top of the page.
   - Continuing an answer: If you need to use the space to continue an answer, indicate in the original answer space where the answer is continued, i.e. give the page number. Fill in the number of the question(s) that you are continuing to answer at the top of the page.

Section 1: Short Answer   **40% (90)**

This section contains **18** questions. You must answer **all** questions. Write your answers in the spaces provided.

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- Planning: If you use the spare pages for planning, indicate this clearly at the top of the page.
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Suggested working time: 70 minutes.

Melanie has stored the years daily temperatures in degrees Fahrenheit. Unfortunately, the area manager requires the temperatures to be in Celsius. The formula to convert is (C is reading in Celsius and F is for reading in Fahrenheit)

$$C = (F-32) \times 5/9$$

Question 1   **(5 marks)**

Complete the algorithm required to write all the Fahrenheit readings in this array to new array storing the temperatures in Celsius.

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Question 2   **(8 marks)**

List two advantages and two disadvantages associated with compilers and interpreters in the table below.

Translator	Advantages	Disadvantage
Compiler		
Interpreter		

Question 3   **(8 marks)**

Explain why a router can have up to **four** different functions within a home environment.

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Questions 4 and 5 relate to the following code.

Program: HouseLoan

```
Var HousePrice, TotalHousePrice, StampDuty:Real

CalcStampDuty(HousePrice, StampDuty)
      Begin
      StampDuty     ←     (0.1xHousePrice)
      End
CalcSettlementFee(HousePrice)
      HousePrice *0.05
      Return
CalcLoanAmount(TotalHousePrice)

       Var: Deposit, LoanAmount:real
       Begin
       Input(Deposit)
       LoanAmount    ←      TotalHousePrice – Deposit
       Output(LoanAmount)
       End

Begin
Input(HousePrice)
CalcStampDuty(HousePrice, StampDuty)
TotalHousePrice   ←   HousePrice +Stampduty+ CalcSettlementFee(HousePrice)
CalcLoanAmount(TotalHousePrice)
End
```

Question 4   **(8 marks)**

a) Identify a function within this program.   (1 mark)

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b) Identify the local variables in this program   (2 marks)

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c) Identify a variable that is global   (1 mark)

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d) Discuss why is often not considered good coding to use global variables**.**   (2 marks)

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e) Explain how would you change CalcLoanAmount to convert it to a function?   (2 marks)

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Question 5   **(9 marks)**

Create a Structure Chart that shows the modules and the flow of parameters below.

Question 6   **(3 marks)**

Discuss the differences between single mode and multimode fibre-optic cable.

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Question 7   **(7 marks)**

a) Explain what a Distributed Denial of Service Attack (DDoS) is and discuss the impact it
    could have on a network.   (3 marks)

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b) Discuss what can be done to ensure a network is protected against a DDoS attack.
                                                                          (4 marks)

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Question 8   **(1 mark)**

What sort of errors are identified in a trace table?

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Question 9   **(15 marks)**

Complete a trace table for the following code for numbers 16, 40 and then 15, 41.

```
Begin
Num1 ← Input
Num2 ← Input
While Num1 != Num2
        If Num1 > Num2 then
                Num1 ← Num1-Num2
        Else
                Num2 ← Num2-Num1
        End if
End while
Output Num1,Num2
End
```

Question 10 **(2 marks)**

Discuss why protocols are needed in network communications.

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Question 11 **(8 marks)**

Identify protocols from the Transmission Control Protocol/Internet Protocol (TCP/IP) suite to
describe how each layer of the TCP/IP model facilitates network communications.

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Question 12 **(6 marks)**

Identify two activities that take place in the Software Development Cycle (SDC) in the
following stages:

Design data and algorithms: _____

_____

Debug syntax and logic errors: _____

_____

Document internally and externally:_____

_____

Question 13   **(2 marks)**

Explain why it is important to test and implement with live data.

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Question 14   **(2 marks)**

Discuss the difference between pass by value and pass by reference parameters?

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Question 15   **(7 marks)**

Angelo visits a clinic and to see his Doctor at a scheduled appointment time. He has complex needs so will see his Doctor several times. Draw an Entity Relationship Diagram (ERD) to represent this scenario. Show Primary keys and Foreign keys.

End of Section one

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Section Two: Extended answer   **60% (118 Marks)**

This section has **seven (7)** questions. Answer **all** questions. Write your answers in the spaces provided.

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Suggested working time: 110 minutes.

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Questions 16 through to 20 refer to the Source Booklet

The Global Management Company that now owns Centro City Waves has advised that the organization will be required to computerize and automate the reception functions.

Question 16   **(16 Marks)**

Create a context diagram for the Centro City Waves reception area.

Question 17   **(36 Marks)**

Create a Level 0 Data Flow Diagram for the Centro City Waves reception area.

Question 18   **(30 Marks)**

The analyst has strongly recommended a Relational Database system be created to manage the Reception System.

a)   Justify why a Relational Database Management system would be recommended
      referring to specific examples within the data.   (3 marks)

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b)   Normalise the data contained in the documents on pages 3 and 4 of the source booklet
      to third normal form (3NF). Create an Entity Relationship Diagram to represent the
      normalized data. Show Primary/Foreign keys only.   (24 marks)

Extra working space

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c) Having undertaken the process of normalization, explain how this improves the
    database development process. Refer to specific examples within the data.   (3 marks)

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Question 19   **(23 Marks)**

a) Each day, reception inputs the number of members attending into a program that stores
    these daily tallies into an array.

The Total number of members attending and the average daily number of members
attending each day is required by the supervisor.

Create the program that will calculate these requirements for the month of October. All
variables and data structures must be initialized.   (19 marks)

b) To assist with rostering, Centro City Waves requires a print-out from their new database that lists the surnames of all instructors who have their Bronze Medallion.

Assume Instructor details and Qualifications details are in two separate tables, write the SQL Query required to produce this report.   (4 marks)

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Question 20   **(16 Marks)**

As part of the new system, Centro City Waves will transition to a contactless card entry system for members.

a) Describe what contactless cards are and outline how they work.   (3 marks)

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The newly designed and built database will be located on a server and accessible by all instructors over a WIFI network available throughout the facility.

b) Identify and describe the devices necessary to establish and secure this network.

    (6 marks)

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See next page

c) The global owners of Centro City Waves have completed a site visit and have asked why
    cloud services are not being used to store data. Discuss this in relation to the Centro
    City Waves system development needs.   (4 marks)

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d) Identify the features of WiMax and discuss the advantages and disadvantages of using
    WiMax as a communication medium.   (3 marks)

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Question 21   (7 marks)

To keep track of the new software development, system analyst has listed the following activities.

No	Task	Duration	Dependency
1	Discuss needs to client	1 day	
2	Develop Requirements Analysis	2 days	1
3	Seek feedback from client	1 day	2
4	Analyse detailed requirements	1	3
5	Design the data and algorithms	4	4
6	Code data structures and instructions	3	5
7	Debug syntax and logic errors	2	6
8	Test to meet specifications	1	6,7
9	Document internally and externally	3	
10	Implement and test with live data	2	8,9
11	Evaluate performance	2	10

Complete a GANTT chart for the project below.   (7 marks)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1																					
2																					
3																					
4																					
5																					
6																					
7																					
8																					
9																					
10																					
11																					

Question 22   **(6 marks)**

Complete the table below identifying three characteristics of a project and discuss how each would help determine which project management methodology to choose.

Characteristic	Linear	Non-linear

End of questions

End of Booklet