Logo, company name

Description automatically generatedSemester 1 2023

ATAR course examination

Question/Answer booklet

**Year 11 ATAR COMPUTER SCIENCE AECSC**

Surname:

Other names:

WA student number (if known)

SIDE Teacher:

SIDE Student Coordinator:

**Supervisor’s declaration**

I declare that this examination paper has been completed by the student named above. The time and resource restrictions have been observed and the student has NOT accessed notes, texts, reference books, the internet, a computer, a calculator or a mobile phone unless otherwise specified. I understand that breaches of the examination rules could lead to an examination paper being cancelled or having an examination mark significantly lowered.

Supervisor’s name:

Signature: Date:

**Time allowed for this paper**

Reading time before commencing work: ten minutes

Working time: two and a half hours

**Materials required/recommended for this paper**

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

This Question/Answer booklet

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

Standard items: pens (blue/black preferred), pencils (including coloured), sharpener, correction fluid/tape, eraser, ruler, highlighters

Special items: up to three calculators, which do not have the capacity to create or store programmes or text, are permitted in this ATAR course examination, 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 unauthorised material. 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 | 14 | 14 | 60 | 62 | 40 |
| Section Two:  Extended answer | 4 | 4 | 90 | 93 | 60 |
|  |  |  |  | **Total** | 100 |

## Instructions to candidates

1. Write your answers in the spaces provided in this Question/Answer booklet. A blue or black pen should be used. Wherever appropriate, fully labelled diagrams, tables and examples should be used to illustrate and support your answers.
2. You must be careful to confine your answers 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.
3. Additional working space pages at the end of this Question/Answer booklet are for planning or continuing an answer. If you use these pages, indicate at the original answer, the page number it is planned/continued on and write the question number being planned/continued on the additional working space page.

## Section One: Short answer 40% (62 marks)

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

Supplementary pages for the use of planning/continuing your answer to a question have been 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: 60 minutes.

1. (2 marks)

Study the pseudocode below.

Line 1 BEGIN

Line 2 account\_balance = 45

Line 3 ticket\_price = 95

Line 4 IF ticket\_price ≥ account\_balance

Line 5 print (“Success, ticket purchased!”)

Line 6 ELSE

Line 7 print (“Insufficient funds, please deposit money into your account!”)

Line 8 END IF

Line 9 END

* 1. List the line number of the incorrect statement. (1 mark)

* 1. Re-write the line from your answer a) to correct the code error. (1 mark)

1. (3 marks)

Unicode and ASCII are the most popular character encoding standards used for the representation of text and symbols in computers.

In the ASCII and Unicode table, the lower-case letter ‘z’ can be represented as the hexadecimal value ‘7A’.

Convert this hexadecimal (base 16) number to a decimal (base 10) number and show your workings below.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Working area. Write your final answer on the line below this box.   |  | | --- | |  | |  | |  | |  | |  | |

Answer:

1. (4 marks)

Outline the role of the following software in providing network security.

Firewall

Operating system

1. (8 marks)

Write a pseudocode example for each of the following control structures and scenarios.

Sequence:

* 1. Input 3 numbers, add these together and divide by 2, then print the result. (2 marks)

Selection:

* 1. Input 2 numbers, print either “Num 1 is bigger than Num 2”, “Num 2 is bigger than Num 1” or “The numbers are equal”, depending on which condition is true. (3 marks)

**Question 4** (continued)

Iteration:

* 1. Print the y values for the linear equation (y = x + 7) where x = 1 to 5. (3 marks)

1. (5 marks)
   1. Give an example of the following data types. The first one has been done for you.   
       (2 marks)

|  |  |
| --- | --- |
| **Data Type** | **Example** |
| String | “Hello, World!” |
| Float |  |
| Boolean |  |

When the following python code is run, an error appears. The code and error are shown below.

Code: def add\_numbers(a, b):

return a + b

num1 = 5

num2 = "10"

result = add\_numbers(num1, num2)

Error: TypeError: unsupported operand type(s) for +: 'int' and 'str'

* 1. Outline the reason the error is occurring. (2 marks)

* 1. Rewrite the line with the error in Python code. (1 mark)

1. (4 marks)

Describe how the following factors can affect network performance.

Bandwidth

Network design

1. (5 marks)

Rachel is researching the effects of sunburn and short-term over exposure to the sun’s rays. She would like to create a sun smart app which displays the current UV (Ultraviolet Light) levels for the user on their mobile phone in their current location. Rachel hopes to warn users of the dangers of prolonged exposure to high UV levels and aims to reduce the rates of skin cancer across the globe.

<https://api.openglobalweathermap.org>provide an API which Rachel can use for global weather data.

* 1. Expand the acronym API as used in this circumstance. (1 mark)

* 1. Using this scenario, explain how Rachael would use an API when developing her software. (4 marks)

1. (6 marks)

Explain what occurs in the following stages of the Framework for development.

Design:

Evaluate:

1. (7 marks)

Refer to the partial pseudocode below:

IF age > 13 AND age < 28

PRINT “GEN-Z”

END IF

* 1. Describe the test data you would use to check this algorithm for accuracy providing examples. (3 marks)

* 1. Describe the following activities that programmers often use to test their algorithms or coded solutions. (4 marks)

Trace tables:

Stepping through code:

1. (4 marks)

Rebecca was travelling in a car on her way to a holiday destination. For fun, she decided to create a program that would calculate the average speed her mother was driving based on the following formula.

Begin

average\_speed = 0

distance\_km = 240

time = 0

input(time)

average\_speed = (distance\_km / time)

print(average\_speed)

End

* 1. Identify the constant and a variable in the pseudocode. (2 marks)

Constant:

Variable:

* 1. Describe why it is important to use meaningful variable names. (2 marks)

1. (2 marks)

Describe the key characteristics of a one-dimensional array.

1. (4 marks)

Describe the following coding errors and include an example for each.

Logic error:

Example:

Syntax error:

Example:

1. (4 marks)
   1. One of the differences between IPv4 and IPv6 is the number of possible IP addresses. Describe how IPv6 is capable of making so many more addresses available. (2 marks)

* 1. State two other advantages IPv6 has over IPv4. (2 marks)

One:

Two:

1. (4 marks)

Outline **two** advantages and **two** disadvantages for a company who might be considering the use of open-source human resource management software for maintaining their employee information.

Advantage one:

Advantage two:

Disadvantage one:

Disadvantage two:

**End of Section One**

## Section Two: Extended Answer 60% (93 Marks)

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

Supplementary pages for the use of planning/continuing your answer to a question have been 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.

1. (44 marks)

The Laser Arena laser game is played by teams of players in a misty maze, firing bright laser beams at each other from their laser guns. Each player wears a lightweight vest covered with electronic sensors that detect when it is hit by a laser beam. The microprocessor in the vest performs all the difficult calculations real-time during the game.

Individual players win points by hitting opponents with their laser beam and lose points by being hit. This way they contribute to the overall score of their team in team games. Team members also receive points for attacking the enemy base. Teams are recognised by the colour of the lights on the player’s vest and gun. The vests transmit their signals via wireless signals to wireless access points throughout the arena.

Refer to the next page for the partial written code.

The following algorithm has been partly written for the vest software.

Function calcEnemyHit (zone)

//Code to be completed

End Function

Module calcPlayerDamage (playerPoints, playerHits)

//Code to be completed

End Module

Module calcBaseHit (teamPoints, baseHits)

//Code to be completed

End Module

Module calcPlayerPoints (playerPoints, enemyHits, playerHits)

// This module is used to calculate the individual points earned and lost by each player, as well as a cumulative team points earned

// Request from the end user the number of enemy vest hits and then uses the calcEnemyHit module to calculate the points earned by the player

// It then gets the number of times the player was hit and uses the calcPlayerDamage module to calculate the points to be removed

// The playerPoints, enemyHits and playerHits values are sent back to the calling module

End Module

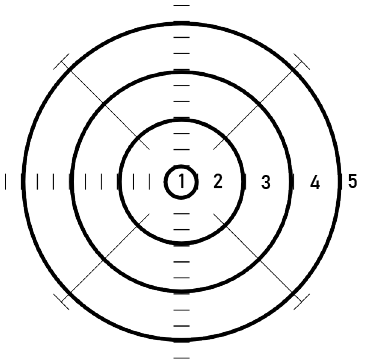
Main Module

//Code to be completed

End Module

Each player wears a vest. When an opponent hits the player’s vest a sensor detects which part of the vest has been hit. Points are awarded for accuracy. The following image and table show the zones and the value of points received for hitting the zone.

|  |  |
| --- | --- |
| **Zone** | **Points** |
| 1 | 100 |
| 2 | 75 |
| 3 | 50 |
| 4 | 25 |
| 5 | 0 |



1. Write an algorithm for the function *calcEnemyHit*. It should receive a zone value and return a point value based on the information provided above. (9 marks)

When a player is hit by an opponent’s laser, the *calcPlayerDamage* module is called.

1. Write an algorithm for the *calcPlayerDamage* module.

The module should receive the player points so far (*playerPoints*) and the number of times the player has been hit (*playerHit*). The score should be reduced by 50 damage points for each time the player was hit.

If the player does not have sufficient points, the player score should be set to 0. The module should return *playerPoints* to the calling module.

Ensure appropriate use of variables and/or constants within this module. (7 marks)

Each team defends their own base and attacks the enemy base. If a team member hits the enemy base with one of their lasers, their team receives 1000 team points.

1. Write an algorithm for the module *calcBaseHit* that calculates the points your team receives for hitting the enemy base.

The module should receive the team score so far (*teamPoints*) and the number of times the base has been hit (*baseHit*). It then calculates the updated *teamPoints* based on this information and returns this to the calling module.

Ensure appropriate use of variables and/or constants in this module. (4 marks)

1. The constant holding the value for the number of points received for a base hit for this module is said to have local scope. Explain what this means. (3 marks)

1. After the game is over, a scorecard is printed. (12 marks)

You are required to develop the main module for the program. The main module should:

Ask the user for how many players in their team (“How many players?”)

Calculate the player score for each player in the team.

Print a score card that includes:

* The last player’s total points – eg. Your individual player points are: 200
* Number of times the last player was hit by the opposition – eg. You shot 15 enemies
* The number of times the team hit the base – eg. Your team shot the enemy base 3 times
* The team’s total points – eg. Your total team points are 2150 points

Graphical user interface, text, application

Description automatically generated

1. Draw a structure chart for the score card program in the area below. (9 Marks)
2. (18 marks)

The Laser Arena wants to encourage customers to return and have developed a leader board points system. The Laser Arena records player points each time they play a game. If the player has played more than 5 games, their total number of points is greater than 500 points and they get their highest score, the player gets a voucher for 50% of their next game.

gameScores = [105, 55, 200, 100, 50]

playerPoints = 205

* 1. Write an algorithm for a module in pseudocode that receives the game scores and the player points, adds a player’s points to a game scores array and returns the number of games played as gamesPlayed.  
      (5 marks)

MODULE addPlayerScore( )

END MODULE

* 1. Write an algorithm for a function in pseudocode that adds up the total number of points the player has scored from the array, store it in the variable, totalPlayerPoints and outputs the total.  
      (6 marks)

FUNCTION calTotalPoints( )

END FUNCTION

* 1. Write an algorithm for a module in pseudocode that finds the maximum value in the array, checks to see if it is larger than the value stored in playerPoints and, if so, outputs “This was your top score, well done!”. (7 marks)

MODULE checkIfLargest ( )

END MODULE

1. (21 marks)
   1. The owners of Laser Arena want to provide free Wi-Fi to their customers who are in the café during the laser games. The owners have hired you to design their network.

Current network architecture

* The business connects to the internet via a modem and a router.
* A firewall protects the Laser Arena business.
* 3 WAP’s connect 30 vests to a game server and laptop in the laser game area.
* The accounts office has a switch, 2 desktop computers, printer, and a business server.

New network architecture

* Wi-Fi to the café

Show that the café area, laser game arena and accounts office are all in different network segments.

Draw a networking diagram in the area below using CISCO network icons.  
 (14 marks)

|  |
| --- |
| Planning: anything written on this page will **not** be marked. |
| **Complete your network diagram in this area** |

* 1. Outline the function of the following network components required for the network.  
      (3 marks)

Router:

Switch:

Wireless Access Point:

* 1. The owners are considering upgrading their transmission media. Outline one advantage and one disadvantage for each of the following transmission media.  
      (4 marks)

**UTP**

Advantage:

Disadvantage:

**Fibre**

Advantage:

Disadvantage:

1. (10 marks)

Laser Arena is planning for the addressing structure for the existing and new parts of their network.

The following is information about the IP address, subnet mask and default gateway for one of the hosts on the accounts office segment of the network.

A picture containing black

Description automatically generated

1. Explain the role of an IP address on a computer network. (3 mark)

1. State how many usable IPv4 addresses (hosts) they currently have in the network using a 255.255.255.0 subnet mask. Justify your answer. (3 marks)

Number of addresses:

Justification:

1. Describe the role of subnet masks. (2 marks)

The game area and café will be on separate networks to the accounts office devices. All three networks will have the same number of usable hosts.

1. Provide a valid IP address and subnet mask for one device on each of the other network segments. (2 marks)

Your answer should use the same first two octets as the accounts office network.

Café device:

IP address:

Subnet mask:

Game area device:

IP address:

Subnet mask:

**End of Examination**

**Spare lined paper for long answers or corrections**

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