TSSM
Creating VCE Success

2020 Trial Examination

Letter

STUDENT NUMBER

SOFTWARE DEVELOPMENT
Units 3 & 4 – Written examination

Reading time: 15 minutes
Writing time: 2 hours

QUESTION AND ANSWER BOOK

Structure of book

Section	Number of questions	Number of questions to be answered	Number of marks
A	20	20	20
B	6	6	20
C	6	12	60
			Total 100

- Students are permitted to bring into the examination room: pens, pencils, highlighters, erasers, sharpeners and rulers
- Students are NOT permitted to bring into the examination room: blank sheets of paper and/or white out liquid/tape.
- No calculator is permitted in this examination.

Materials supplied

- Question and answer book of 21 pages.

Instructions

- Print your name in the space provided on the top of this page.
- All written responses must be in English.

Students are NOT permitted to bring mobile phones and/or any other unauthorised electronic communication devices into the examination room.

SECTION A– Multiple-choice questions

Instructions for Section A
Answer **all** questions in section A.
Choose the response that is **correct** or that **best answers** the question.
A correct answer scores 1, an incorrect answer scores 0.
Marks will **not** be deducted for incorrect answers.
No marks will be given if more than one answer is completed for any question.

Question 1

A document is created outlining all the necessary properties of variables and data structures. This document is referred to as:

A. Object Description Table
B. Internal Documentation
C. Data Dictionary
D. Pseudocode

Question 2

Mr. Baker, a Chemistry teacher, is working on an app to assist him in marking student lab work in the classroom. For each student he is able to enter marks and comments for each section of the lab exercises. The most practical data structure to store this data would be:

A. String
B. 2D Array
C. Record
D. Hash Table

Question 3

There are a number of methods of keeping data secure on mobile devices. Most mobile phones use a method of face recognition, voice recognition or finger print scanning. This type of security is called:

A. Encryption
B. Biometrics
C. Authentication
D. Transport Layer Security

Question 4

Risk Management models include the identification of security risks, the implementation of security as well as detection of security breaches. What other functions does risk management also entail?

A. Data integrity management
B. Responding to security breaches and recovering data
C. Installing and updating all security software
D. Ensuring Back Ups are up to date.

Question 5

HotelsOnline is a mobile application that finds room vacancies nearest the end-user. The app searches a database of all the thousands of hotels signed up for the service for vacancies and GPS locations. The search needs to happen quickly and return a result to the user promptly. Which algorithm would best provide a fast search?

A. Selection

B. Linear

C. Binary

D. Quick

Question 6

Array(5) Unsorted

0	1	2	3	4	5
40,000	16,000	50,500	12,500	70,000	30,000

Array(5) Partially sorted

0	1	2	3	4	5
16,000	12,500	30,000	40,000	50,500	70,000

Josh has used a Quick Sort algorithm to sort Array (5). If Josh used Array (0) as the pivot, how many passes have been completed to create the partially sorted array?

A. 1

B. 2

C. 3

D. 4

Question 7

Myles has developed a software solution that requires storing and editing records of personal information about users of his mobile phone application. He needs to use technology to store the records so that they are easily edited and updated by the app. Which technology is best suited for his solution?

A. Hash Table
B. text files
C. XML files
D. Arrays

```
<?xml version="1.0 encoding="UTF-8"?>
<members>
        <membership>
                <givenname>James</givenname>
                <familyname>Acaster</familyname>
                <mobilenumber>0423877987</mobilenumber>
                <email>AcasterJ@gmail.com</email>
        </membership>
        <membership>
                <givenname>Sarah</givenname>
                <familyname>Pascoe</familyname>
                <mobilenumber>0426677332</mobilenumber>
                <email>Passy@gmail.com</email>
        </membership>
</members>
```

Question 8

In the XML code above which is the root?

A. <members>

B. <membership>

C. <email>

Question 9

What is the purpose of the following line?

<?xml version="1.0 encoding="UTF-8"?>

A. to run a syntax check

B. define the root

C. sets the schema

D. to define the version of XML

Question 10

The XML above is used in an application where the user can enter an email address to search for a name. What is the most appropriate control structure to use to check if a store email matches the entered email address by the user?

A. pre-test loop

B. post-test loop

C. selection

D. sequence

Question 11

In the analysis stage, a developer documents the proposed interactions between the solution user and the solution. A diagram often used to represent this is called as:

A. Use Case Diagram

B. Data Flow Diagram

C. Software Requirements Specifications

D. Pseudocode

Question 12

Kylie has set up her client list where she will update their details as required. The client list includes contact and payment details. This data is legally protected by

A. The Privacy Act 1988

B. Copyright Act 1968

C. Spam Act 2004

D. Charter of Human Rights and Responsibilities Act 2006

Question 13

A printer server stores print jobs in a data structure. Which data structure would best manage print jobs?

A. Stack

B. Queue

C. Array

D. Hash Table

Question 14

Averil is checking her software application by running validation testing. She deliberately entered incorrect data to check if the validation was limiting error-free data into the system. Averil entered "Brissy" into the post code field. What type of validation checking is Averil testing?

A. Type

B. Range

C. Existence

D. Logic

Question 15

A software developer has been working on a website application via remote access. She logs into her company's system by establishing a point-to-point connection that exists over a dedicated connection. This connection has traffic encryption to make sure her code is kept secure while being transferred to and from her company's main computer systems. This connection is commonly known as:

A. VPN

B. TCL

C. Intranet

D. Encryption

Question 16

The latest floods/bad weather Update mobile app developed by the Victorian Emergency Authority directly links to the server with updated GPS locations and flood/weather intensity. All alerts are updated every 10 minutes. To ensure app users get up-to-the-minute flood/weather information, the most appropriate software architecture to be used is:

A. rich client

B. thin client

C. peer-to-peer

D. internet

Question 17

The BingoBoards Company manager has met with her team to develop a vision statement to increase customer satisfaction, to increase staff morale, to upgrade the website, to provide superior service. Which of these is an organisational objective?

A. increase customer satisfaction

B. to increase staff morale

C. upgrade the website within 6 months

D. provide superior service

Question 18

Geoff has finished developing the software for a client. A focus group has been put together to use the software and Geoff will observe them and takes notes. This type of testing is called:

A. Usability Testing

B. Syntax Testing

C. Stress Testing

D. Trace Testing

Question 19

Once the Evaluation Criteria have been audited, what two processes should follow?

A. Implementation and Testing

B. Quality Assurance and Acceptance Testing

C. Update Action Logs

D. Review the Development Model

Question 20

A chemical company hashes their employee network usernames and passwords using the following hash:

$$Hash(x) = Mod\ (x+37),4$$

How many locations will be reserved for storing employee authentication data?

A. 37
B. 3
C. 4
D. 5

SECTION B - Short-answer questions

Instructions for Section B
Answer **all** questions in the spaces provided

Question 1

Linear and Binary Search algorithms can be used to find data, but each has its shortcomings. Identify the one benefit and a limitation of both search algorithms.

(4 marks)

_____

_____

_____

_____

_____

_____

_____

Question 2

One technique used in developing software is constructing a trace table.
What are trace tables and how are they used?

(2 marks)

_____

_____

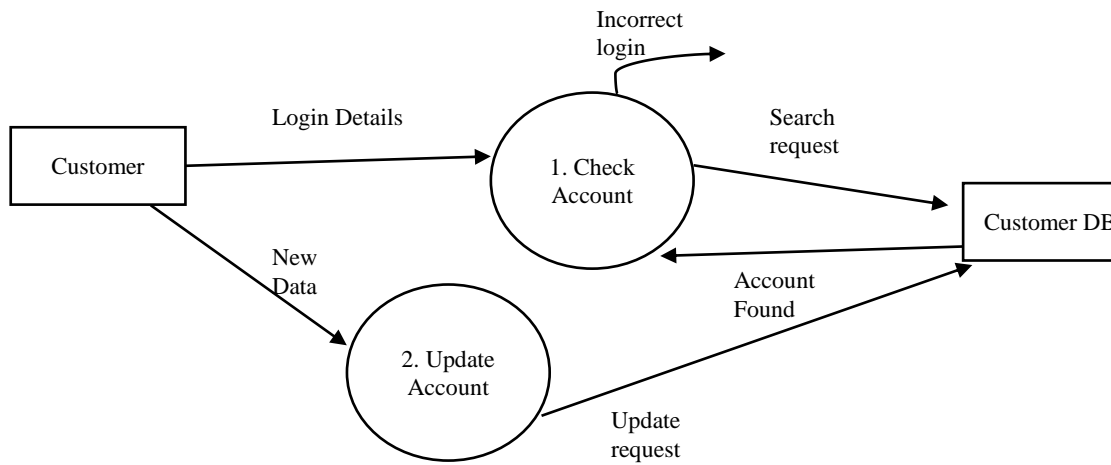_____

_____

SECTION B - continued

Question 3

Software Developers begin a project with a project plan such as a Gantt Chart. Identify two advantages in using project plans and explain how they benefit the project.

(4 marks)

Question 4

The diagram below is a Data Flow Diagram (DFD) for an online customer profile updating system.

(3 Marks)

Give an example of the following features from the DFD above.

a) Data Flow

b) Entity

c) Process

Question 5

Graham has set up new business fixing computers. He needs access to the internet to ensure he can update anti-malware and firewall software. Graham has a team of three others working in the business. They store all their files centrally on a file server. He s debating over whether he should install Cat-6 cabling for the network in the office or to just have a Wi-Fi network.

Outline one advantage and one disadvantage of both cabling and Wi-Fi options.

(4 Marks)

_____

_____

_____

_____

_____

_____

_____

_____

Question 6

Identify three techniques used in developing internal documentation and appropriate naming conventions.

(3 Marks)

_____

_____

_____

END OF SECTION B

SECTION C- Case study

Instructions for Section C

Please remove the insert from the back of this book during reading time.

Use the case study provided in the insert to answer the questions in this section.

Answer **all** the questions in the spaces provided.

Question 1

(1 Mark)

After a discussion with the Director of the Victorian Emergency Services, Justin has a list of outcomes that are expected from the new upgrades. The Director believes that the new features of the app and website will decrease the number of fatalities and the number of homes and other structures lost to fire or other major natural disasters.

Is the Director's belief an objective or a goal of the new information system?

Question 2

(6 Marks)

Justin is required to develop a prototype in three months. There will then be a further five months to evaluate it, further develop it and have it ready for the next fire season. Justin has made a list of all the tasks (below) he needs to put into his Gantt Chart.

TASKS
- Collect data requirements 5 days
- Develop membership data storage and login system 10 days
- Test and debug the membership system 10 days
- Membership System Completed 0 days
- Develop the Emergency Service Team update system 10 days
- Test and debug the Service Team system 10 days
- Emergency Service Team System Completed 0 days
- Integrate new elements into current event system 5 days
- Test and debug system 10 days
- Prototype Test ready 0 days
- Conduct usability tests 5 days
- Respond to usability tests 5 days
- Prototype competed 0 days

Given the tasks and durations on the previous page, complete the Gantt chart below to show how the project can be delivered on time while acknowledging:

- all dependent tasks
- Four Key milestones
- Appropriate development and testing durations

Tasks	Days														
	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75
1															
2															
3															
4															
5															
6															
7															
8															
9															
10															
11															
12															
13															

Question 3

(4 Marks)

Justin is working with a designer, Steven, who has begun the software requirements specifications for the new updates. Discuss two data collection techniques Steven should use to determine the needs and requirements of the end users of the website and app.

Question 4

(4 Marks)

The success of the new upgrades to the emergency app and website will rely heavily on emergency services updating the system with changes to conditions in a timely manner. The upgrades will rely heavily on the participation of emergency workers, volunteers and other members to continue to upload data during a crisis.

Outline two potential advantages and two disadvantages for the stakeholders affected by the new upgrades.

SECTION C – continued
TURN OVER

Question 5

(6 Marks)

Steven is writing the software requirements specification (SRS) that will be used to design a solution for the Vic emergency app and website. Steven and Justin need to discuss and determine the constraints of the solution.
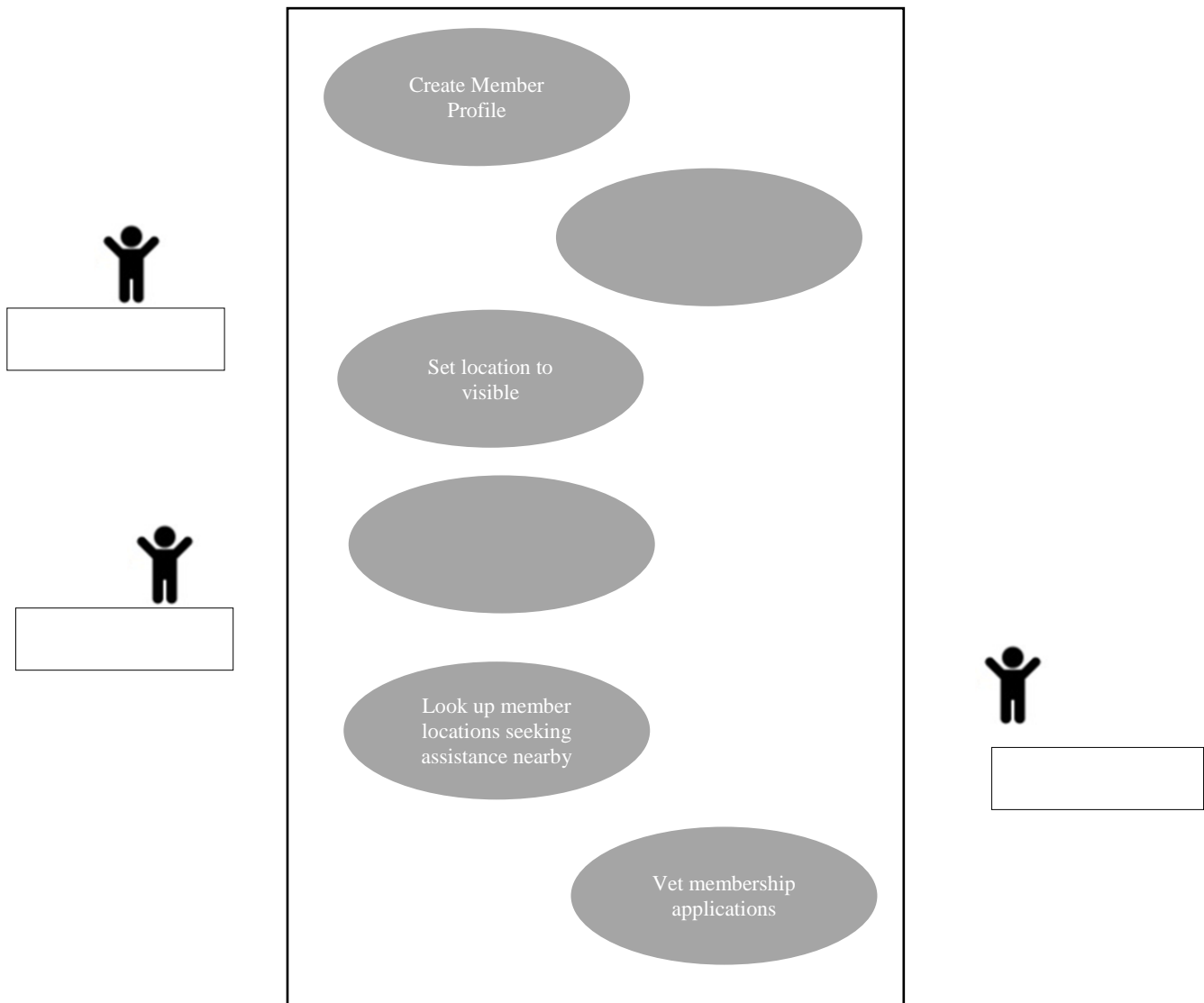
State and explain three constraints of the upgrades to the app and website.

Question 6

(6 Marks)

Steven did not complete the Use Case Diagram for the member upgrade module. Using the information provided in the case study, complete the use case diagram below by labelling all actors and use cases and showing all associations.

Question 7

(4 Marks)

Using the information provided in the case study, state four functional requirements of all the upgrades to the Vic Emergency app and website.

Functional requirement 1 _____

Functional requirement 2 _____

Functional requirement 3 _____

Functional requirement 4 _____

Question 8

(2 Marks)

Select and justify an appropriate data structure to use when storing the Digital Degrees GPS data for locating fires, members and firetrucks.

_____

_____

_____

_____

Question 9

(9 Marks)

When location data is read into the new system validation is very important. Decimal degrees contain the size of the object identified on the map, as well as its location, for example Melbourne has only one decimal place to identify it is a large area and it has the latitude and longitude identified by the two values: -37.8, 144.9. Individuals require 6 decimal places if google maps are able to locate them accurately for rescue crew to find them.

Member ID	DD
Member 23874	-38.2020, 145.521728
Member 93737	-38.202812, 145.521728
Member 23498	-38.20, 145.52
Member 23483	-38.202812, 145.521

The pseudocode for this algorithm has been started. Complete the pseudocode below to ensure that all data in the sample set of data will be correctly identified as valid or invalid data.

Begin

    Input Longitude ← string
    Input Latitude ← string

End

Question 10

(6 marks)

Justin has scheduled useability tests to occur using the new upgrades after all of the main development has been completed.

Describe how useability testing might be conducted for the mobile phone application that will be used by rescue crews and members of the app.

_____

_____

_____

_____

_____

_____

Question 11

It has been discussed with Fire Chiefs that we should rely on google data directly, rather than wasting resources adding validation before entering the location DD into the system. Fire Chiefs want to minimise the amount of real time delay between the app member's decision that they need assistance and for their correct location to be made available on the map for rescue teams to identify.

(3 Marks)

a) Justin understands that relying directly on Google for location data can reduce costs in development. Explain how this can reduce development and operation costs. Provide examples in your explanation.

_____

_____

_____

b) However, Justin is fearful at the data used by this software will be relied up to save lives and is concerned about being completely reliant on Google data for the day to day operations.

(3 Marks)

Explain Justin's concerns in terms of data integrity.

c) Identify possible consequences if Justin's concerns about data integrity occur during an emergency.

(2 Marks)

Question 12

(4 Marks)

During one of the meetings with volunteer fire fighters, it came to light that some members of the fire crews would like to have access to the data of members in their region, so they can canvas for wider membership within the community. Justin has some concerns about who has access to the membership data.

Outline the legal and security concerns that Justin should consider before agreeing to the volunteer's proposal.

END OF QUESTION AND ANSWER BOOK

Insert for Section C – Case study

Please remove from this booklet during reading time

Vic Emergency

After the success of the Vic Emergency mobile app to support those affected during the recent bush fire catastrophe in East Gippsland, the Victorian State Government has decided to update the app and the website to be more interactive and to assist in the management of deploying fire fighters where they are needed. Currently the app and website update a google map with icons such as the one above to identify the location and intensity of active fires. All data displayed on the app is updated by the emergency authority which can be slightley delayed from what is happening on the ground.

Justin is managing the up-grade to include the following features:

- Victorian citizens can create a member profile, login and update observations of fire and other emergency situations as they occur.
- Members can also report the number of people in need of evacuation and their location in GPS coordinates.
- Each Fire Response team has a profile and can update their status during a fire event.
- Each Fire Response vehicle can be tracked on the map (in a similar way to Uber Drivers) to ensure people manaing the emergency and those who are affected by the emercency can see where assistance is located.
- In the instance of a high level emergency, members can make their location visible on the map so they can be seen by rescue teams, friends and family in order to indicate they need assistance.

The new system will interact with the Global Positioning System which makes use of lines of latitude and longitude to pinpoint a particular location on the Earth's surface. It is given as geographical coordinates called GPS. The space between each line of latitude or longitude representing 1° is divided into 60 minutes, and each minute is divided into 60 seconds. An example of this format is: 41°24'12.2″N   2°10'26.5″E

However a digital format is required when validation and calcuation in digital systems is expected. An example of this Digital Degree (DD)format is:

4124.2028, 210.4418

The system will need to manage DD data from Google Maps to locate entities in the system, calculate distances and time differences.

The table below is from Wikipedia and it outlines the level of detail in a Digital Degree GPS coordinant and how it relates to normal degree, minutes and seconds (DMS)

decimal places	decimal degrees	DMS	Object that can be *unambiguously* recognized at this scale
0	1.0	1° 00′ 0″	country or large region
1	0.1	0° 06′ 0″	large city or district
2	0.01	0° 00′ 36″	town or village
3	0.001	0° 00′ 3.6″	neighborhood, street
4	0.0001	0° 00′ 0.36″	individual street, land parcel
5	0.00001	0° 00′ 0.036″	individual trees, door entrance
6	0.000001	0° 00′ 0.0036″	individual humans

Digital Degrees for latitude and longitude coordinates for the following objects at different scales:

- State of Victoria: -37 - -38, 144 - 146
- Melbourne: -37.8, 144.9
- Traralgon: -38.19, 146.54
- Traralgon Fire Station: -38.2028, 146.5219