TSSM™
Creating VCE Success

2022 Trial Examination

STUDENT NUMBER

Letter

SOFTWARE DEVELOPMENT
Unit 3 and 4 – Written examination

Reading time: 10 minutes
Writing time: 120 minutes

EXAMINATION BOOK

Structure of book

Section	Number of questions	Number of questions to be answered	Number of marks
A	20	20	20
B	5	5	20
C	11	11	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 book of 23 pages

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
Select one answer for each question
Circle your answer on the Multiple Choice Answer Sheet, DO NOT answer multiple choice questions in this booklet

Question 1

Sophie is defining a variable to store the answer to the question "Is your birthdate on or after 01/01/2000?". What data type is most suitable for this new variable ?

A. String

B. Integer

C. Character

D. Boolean

Question 2

Results of a single test are to be stored, one result for each student. The results are not identified by student, they are simply stored for the purposes of calculating averages and other statistics from them. Which data structure is best suited to this purpose ?

A. One-Dimensional array

B. Associative array

C. Record

D. Any of the above

Question 3

The difference between a function and a procedure is generally

A. A Function returns a value and a Procedure does not

B. A Procedure returns a value and a Function does not

C. Both Functions and Procedures return values, there is no difference

D. Function take input parameters and Procedures do not

Question 4

"WHILE …. DO ….." is an example of which type of control structure ?

A. SELECTION

B. SELECTION with post testing

C. ITERATION with post testing

D. ITERATION with pre testing

Question 5

A pivot is used in a:

    A. Linear Search

    B. Binary Search

    C. Selection Sort

    D. Quick Sort

Question 6

Which of the following is NOT a data validation check ?

    A. Existence Check

    B. Syntax check

    C. Range check

    D. Type check

Question 7

Which of the following is a Functional Requirement?

    A. Users are easily able to understand the meaning of buttons on the screens

    B. Users are easily able to find buttons on the screens

    C. Users are responded to within 0.5 seconds of pressing a button on any screen

    D. Users can check the weather forecast by pressing a button on the home screen

Question 8

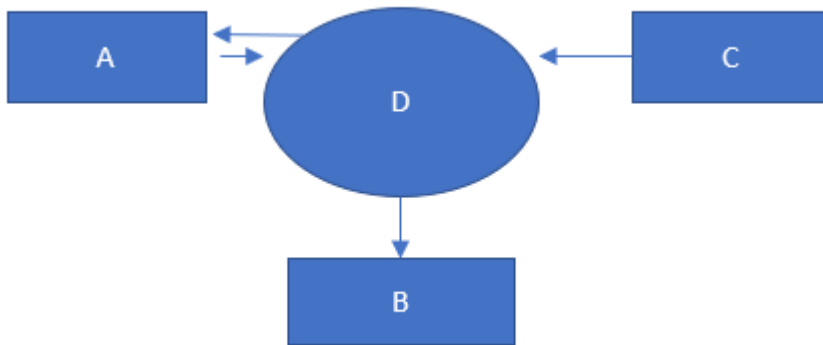Which of the following best describes the scope of a project?

    A. A high-level description of what the system will and will not do

    B. A list of the factors that limit the solution

    C. A detailed list of the attributes the solution will have

    D. A description of the organisation goal of the client for the project

Question 9

The design tools 'Data Dictionary, Pseudocode and UI Mockups' are used to document the design of (in order):

    A. Variables, Algorithms, Screens

    B. Objects, Algorithms, Screens

    C. Variables, Objects, Algorithms

    D. Objects, Algorithms, Variables

Question 10

Which of the following best describes the information conveyed by the Data Context Diagram (DCD) above ?

    A. Process D receives data from entities A and C and sends data to entities A and B

    B. Processes A, B, C send data to and receive data from entity D

    C. The information that flows from A to D also flows from D to B

    D. The system has 3 main algorithms (code blocks A,B,C) and 1 user group (user(s) D)

Question 11

Which statement about Evaluation Criteria is true ?

    A. Evaluation Criteria are used to evaluate the solution during the Evaluation Stage Only

    B. Evaluation Criteria are used to assess different Design Options to support selection of the best Design and are used to evaluate the solution during the Evaluation Stage after the solution has been in use for some time

    C. Evaluation Criteria are used to test the detailed functionality of the system

    D. Evaluation Criteria are assessed based on input from the project team members after the solution goes live

Question 12

Which of the following is an example of the design principle 'affordance' ?

    A. Hash functions are used to encrypt sensitive data items

    B. The Solution will not exceed its project budget

    C. The Solution will require less than 3 Mondays per month ongoing maintenance

    D. The meaning of all Buttons and Boxes on all GUIs will be intuitive and self evident

Question 13

A data context diagram is used to show

- **A.** What data flows into and out of a Solution to/from external entities
- **B.** What data flows into and out of a Solution to/from external entities and between processes within the Solution
- **C.** Actors interacting with a Solution
- **D.** All of the above

Question 14

Which of the following is NOT an example of an Evaluation Criteria

- **A.** FR1 (functional requirement 1) has been met
- **B.** NFR7 (non-functional requirement 7) has been met
- **C.** The solution meets its interoperability targets
- **D.** 5 user groups were identified to participate in the Evaluation of the project

Question 15

A project is following the Spiral Development model, which of the following is true of this project ?

- **A.** The project is following the PSM executing each stage once in order, once each stage is completed it is signed off and is not revisited.
- **B.** The project has split the requirements into smaller cohesive sub-components, working on one sub-component at a time. The PSM is followed for each sub-component, the client is able to participate in user-acceptance testing as each sub-component approaches release.
- **C.** The project is working on the whole scope in a series of versions with increasing levels of quality. The PSM is followed for each version, users are involved in testing each version as it is released. The system is not "turned on" until a version which meets agreed quality criteria is produced.
- **D.** The PSM is not used.

Question 16

An email sent from an electrician to one of his customers, is intercepted. The BSB and account details are changed (to those of the interceptor), the email then continues its transmission to the customer. This type of cyberattack is known as:

- **A.** Xpath
- **B.** XSS
- **C.** MITM
- **D.** DoS

Question 17

SQLi cyberattacks involve:

    A. Social engineering, enticing users to impart sensitive information

    B. Trojans, code that purports to be one thing but is actually another

    C. Websites which are not encrypted with HTTPS

    D. User input to database queries

Question 18

A Solution has been built on a contract basis for a small not-for profit organisation commissioned by the State Government to provide First Aid Training to Victorian State School staff. The Solution records the personal details of staff that have received the training. Which of the 4 legal Acts in the Study Design apply ?

    A. Copyright Act, Privacy and Data Protection Act, Privacy Act, Health Records Act

    B. Copyright Act, Privacy and Data Protection Act

    C. Health records Act, Privacy Act

    D. Privacy Act, Copyright Act

Question 19

Digital systems have automated tasks which were done manually as paid work for human beings prior to the introduction of technology. This changes the nature of work and the profile of the work force. Considering the social implications of new technology and weighing the benefits versus negative impacts is known as:

    A. Ethics

    B. Legal considerations

    C. Cyber security risks

    D. Design considerations

Question 20

The best way to store data (outside of RAM) which requires speed of retrieval is:

    A. SSD

    B. Internal HDD

    C. External HDD

    D. The Cloud

SECTION B – Short Answer Questions

Instructions for Section B

Write your answer in this booklet in the space provided for each question.

Question 1

The text "Ben Jerry Cat Dog" is stored in two files, namely a DSV file where the delimiter is space " " and a TXT file (no delimiter). Explain the difference between the coding approach to read data in from the two files and search for the word "Cat".

_____

_____

_____

_____

_____

_____

_____

4 marks

Question 2

Review the following algorithm

1. *Find the smallest value. Swap it with the first value.*
2. *Find the second-smallest value. Swap it with the second value.*
3. *Find the third-smallest value. Swap it with the third value.*
4. *Repeat finding the next-smallest value, and swapping it into the correct position until all values have been processed.*

   i.   What type of search or sort is performed by this algorithm ?

_____

   ii. Does the algorithm use a pivot ?

_____

2 marks

Question 3

Consider the following algorithm

```
1 BEGIN
2        DISPLAY("Enter a numeric value")
3        the_value ← INPUT()
4        IF IsNumeric(the_value) = FALSE THEN
5                PRINT("Your entry was not numeric")
6                GO TO END
7        list ← [22,1,3]
8        found ← FALSE
9        FOR item IN list:
10               IF the_value = item THEN
11                       PRINT("The value is in the list")
12                       found = TRUE
13               ENDIF
14       ENDFOR
15       IF found <> TRUE
16               PRINT("The value is not in the list")
17 END
```

The table on the left is a trace table to test the logic of this algorithm by executing the code for the input value '2'. Complete a similar trace table (using the blank table on the right) for the input value '3'.

Line	item	The-value	found
2		2	
3		2	
4		2	
5		2	
6		2	
7		2	FALSE
8	22	2	FALSE
9	22	2	FALSE
10	22	2	FALSE
11	22	2	FALSE
8	1	2	FALSE
9	1	2	FALSE
10	1	2	FALSE
11	1	2	FALSE
9	3	2	FALSE
10	3	2	FALSE
11	3	2	FALSE
12	3	2	FALSE
13		2	FALSE
14		2	FALSE
15		2	FALSE

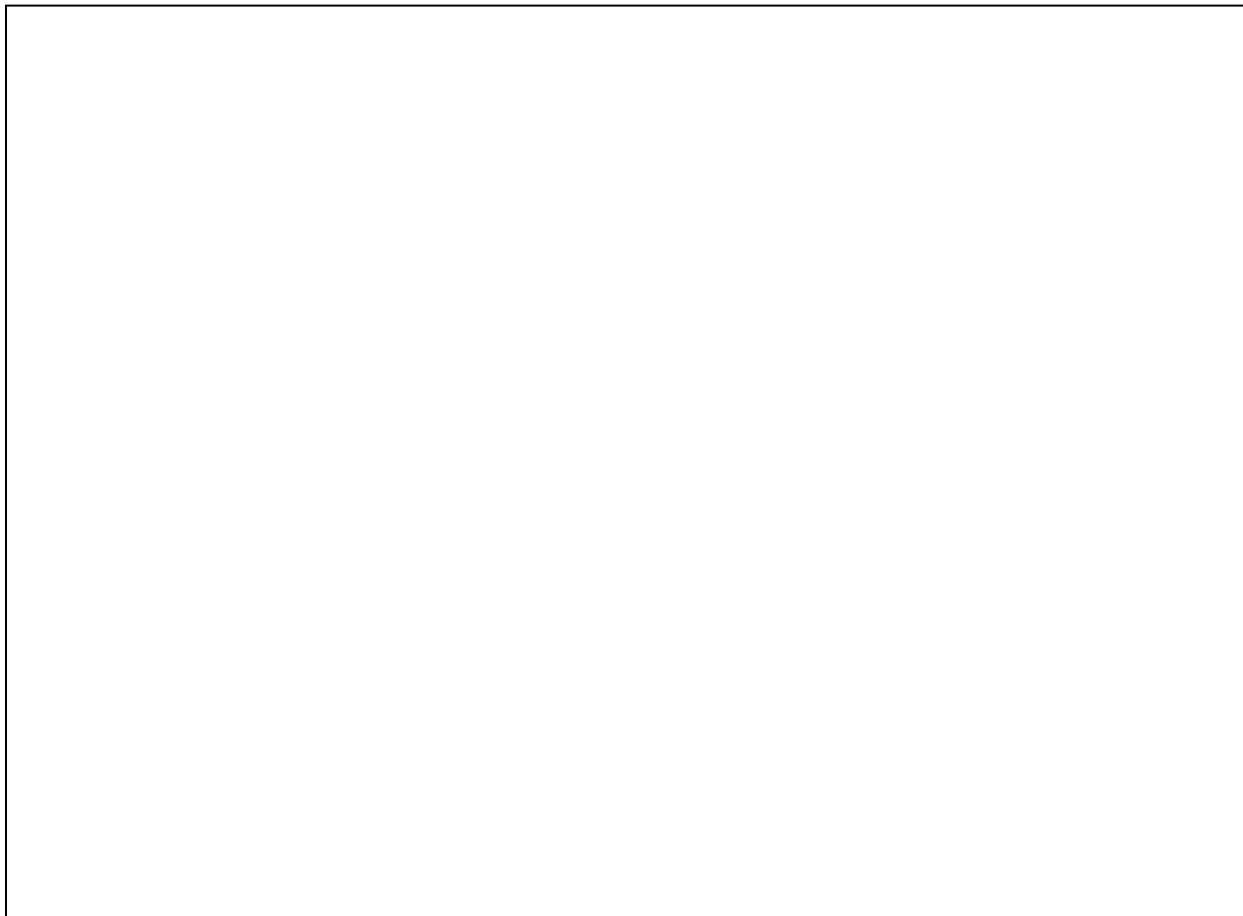| Line	item	The-value	found
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
8			
9			
10			
11			
9			
10			
11			
12			
13			
14			
15			

3 marks

Question 4

Construct a Data Flow Diagram for the following scenario.

- Borrowers from an online Library of e-books enter the ISBN of the book they wish to download.
- The e-book library Solution then:
  o Searches the catalogue for that ISBN
  o Returns a message to the Borrower telling whether their book has been found
  o If the ISBN has been found:
    ▪ the e-book is downloaded to their device as a PDF
    ▪ the "Download History" file is updated with the name of the borrower and the ISBN of the book they downloaded

Include External entities, Internal processes, Data Stores and Data Flows using standard shapes and symbols for these elements of a DFD.

4 marks

Question 5
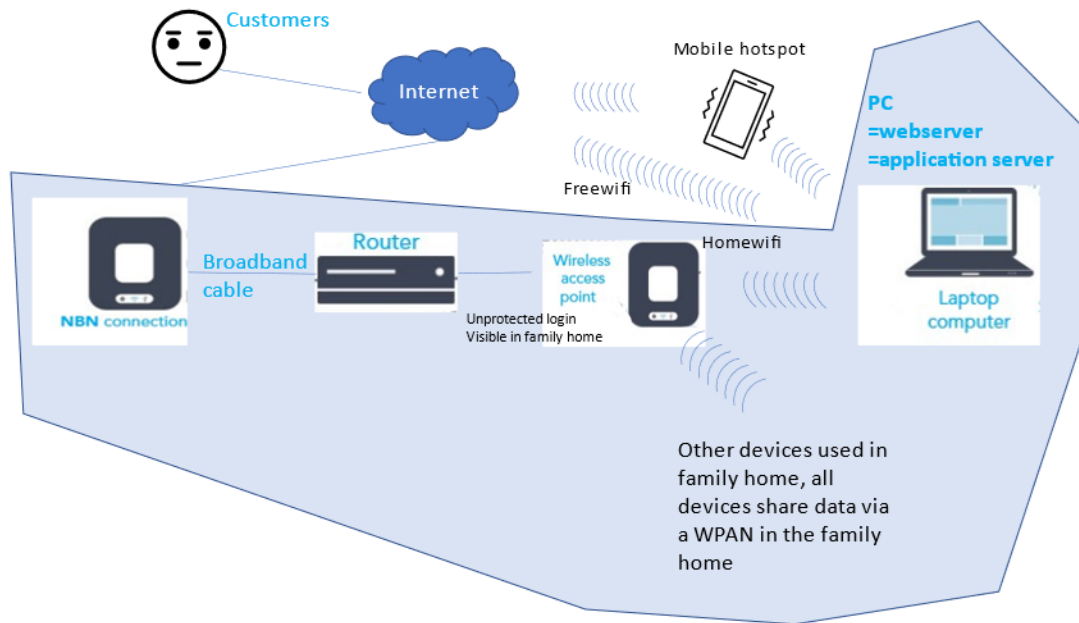
The diagram above shows devices in a family home (in the shaded blue box), these devices connect to the internet via a WAP through a router and NBN connection. One of the devices is used as a webserver for a business owned by one of the family members. Other devices in the home include additional laptops, tablets, mobile phones that use wifi, a smart TV, smart fridge and smart airconditioner. The webserver laptop provides web services via a mobile hotspot when the NBN is down and via public wifi when the laptop is taken out of the family home to business events.

a) Identify 2 cybersecurity vulnerabilities as a result of the connections used by the webserver laptop

_____

_____

_____

_____

b) Identify a cybersecurity risk associated with other devices in the home sharing data with the webserver

_____

_____

_____

c) Identfiy 3 steps that could be taken to reduce cybersecurity risk.

_____

_____

_____

_____

_____

_____

(2 + 1 + 3 = 6 marks)

Question 6

Two pieces of legislation protect "personal information", namely the Data Privacy Act 1988 and the Data Privacy and Protection Act 2014. Describe 2 key differences between these two legal Acts.

_____

_____

_____

_____

_____

_____

1 mark

SECTION C – Case Study Questions

Instructions for Section C

Please remove the INSERT FOR SECTION C from the back of this book during reading time.

Answer all questions for section C in the space provided in this book.

Question 1

    a) Explain which of the Legal Acts applies to the new functions required by AMSA.

_____

_____

_____

_____

_____

_____

    b) In which section of the Software Requirements Specification (SRS) would the legal aspects be covered ?

_____

_____

<div align="right">(2 + 1 = 3 marks)</div>

Question 2

Describe 3 security measures to protect personal information that should be included in the design of the new functions
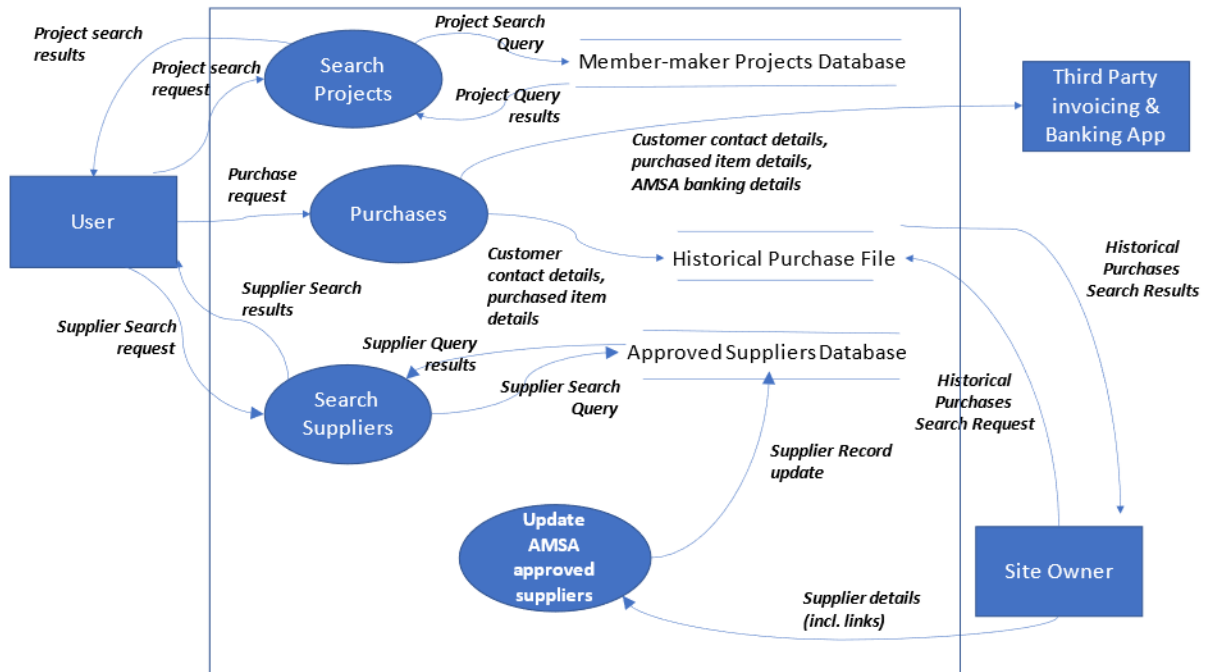
    i.

_____

_____

_____

ii.

_____

_____

_____

iii.

_____

_____

_____

3 marks

Question 3

The Data Flow Diagram above shows the main processes for the new functions on the AMSA website.

    i.   Identify two 'external entities' shown on this diagram.

_____

_____

    ii.   Identify two 'data storages' shown on this diagram.

_____

_____

    iii.   According to the data flows on this diagram, will purchase requests that fail during third party processing at the invoicing or banking stage be recorded in the Purchase History File ? Give reasons for your answer.

_____

_____

_____

(2 + 2 + 2 = 6 marks)

Question 4

During the Analysis Stage, data is collected to formulate detailed functional and non-functional requirements. As part of this exercise you have been asked to collect data in the following areas:

  i.   Usability and appearance requirements – more detail about the current system as the additional functionality must seamlessly integrate with the existing Web App.

 ii.   Purchase History requirements – more detail about exactly what the Site Manager needs to know about purchase history and more detail about the legal requirements concerning the storage of personal information.

iii.   Integration requirements – more information about the interface between the Web App and the Third party Invoicing Application. Specifically you will be checking that the third party application abides by all legal requirements.

Identify which form of Data Collection would be appropriate and why it is appropriate for each of the 3 requirements above.

  i.   _____

       _____

       _____

 ii.   _____

       _____

       _____

iii.   _____

       _____

       _____

6 marks

Question 5

Referring to the information in the case study, identify:

Four Functional Requirements

    i.   _____

    _____

    ii.   _____

    _____

    iii.   _____

    _____

    iv.   _____

    _____

One non-Functional Requirement

    v.   _____

    _____

One Constraint

    vi.   _____

    _____

Two Scope statements, including one inclusion and one exclusion from scope

    vii.   _____

    _____

    viii.   _____

    _____

8 marks

Question 6

An excerpt from the Pseudocode for the "search project" process is shown below

```
#
# User inputs the maker to search for
#
DISPLAY(List_of_makers)
DISPLAY("Choose a maker from the list")
Search_maker ← INPUT()
#
# User inputs up to 5 keywords to search for
#
Bool_Control_Characters_Found ← FALSE
DISPLAY("Enter up to 5 search terms separated by + eg: wood+table+coffee")
Search_keywords ← INPUT()
CALL Parse(Search_keywords)                    # function separates into individual words
Parsed_keyword_array = RETURN Parse()          # separate words are stored in an array
FOR item IN Parsed_keyword_array
     CALL Check_for_Control_Characters(item)    # this function checks for control characters
     Bool_Control_Characters = RETURN Check_for_Control_Characters()
     IF Bool_Control_Characters = TRUE THEN
             Bool_Control_Characters_Found ← TRUE
     ENDIF
ENDFOR
IF Bool_Control_Characters_Found = FALSE THEN
     DISPLAY("Your keywords contain no control characters – they are valid")
ELSE
     DISPLAY("Your keywords contain control characters – they are invalid")
```

a) Name two types of control structure used in the pseudocode above

_____

_____

b) Which type of array would be used to store the 5 separate keywords in

Parsed_keyword_array ? why ?

_____

_____

_____

c) Why is the user input variable Search_maker not subject to the same checks that the user

input variable Search_keywords is ?

_____

_____

d) How many times is the DISPLAY instruction executed ?

_____

_____

_____

e) What is the purpose of the # hash symbol in this pseudocode, why has it been used ?

_____

_____

(2 + 2 + 2 + 2 + 2 = 10 marks)

Question 7

a) Add 3 useful Test data values to the following test table, pay particular attention to testing both valid and invalid inputs.

Test	Test Data Value	Expected Result	Actual Result
Control Characters are detected when present in Pattern Keyword Inputs		" …. Valid ….." message	
	Wood+!STOP	" …. Invalid ….." message	

b) There are in the order of 30 control characters to check for which may slow the performance of the "Search Projects" function. Describe an alternative design to eliminate the need for these checks ?

_____

_____

_____

_____

(3 + 1 = 4 marks)

Question 8

The traditional Waterfall Development Model is chosen for this project. Explain the model and show it in a diagram and give 3 reasons why this is an appropriate choice.

_____

_____

_____

_____

(2 + 1 + 3 = 6 marks)

Question 9

Identify an appropriate design tool for each of the following elements of the solution. Give a brief reason for each choice.

    i.   Individual user interface screens

_____

_____

    ii.   Records in the Purchase History File

_____

_____

    iii.   Processing logic in the "Search Projects" process

_____

_____

    iv.   Detailed inputs to, processing and outputs from the "Search Projects" process

_____

_____8 marks

Question 10

The 3 data stores (the project database, supplier database and purchase history file) can be stored in the Cloud or on a local server. Cloud storage is cheaper than the cost to store locally. Which storage location would you recommend for each, give reasons for your choice.

    a) Project database – contains information about member-maker projects with a pseudonym for each maker

_____

_____

_____

    b) Supplier database – contains information about recommended suppliers with links to their websites

_____

_____

_____

    c) Purchase History file – contains information about customers purchases including customer contact details for targeted marketing

_____

_____

_____

3 marks

Question 11

The Disaster Recovery Plan (DRP) for each data store involves backup, archival and destruction of data. Recommend an approach for each data store and give your reasons (referring to legal requirements if appropriate)

    a) Project database

_____

_____

_____

b) Supplier database

_____

_____

_____

c) Purchase History file

_____

_____

_____

3 marks

<div align="center">**CASE STUDY**</div>

The Australian Men's Shed Association (AMSA) is a collective of keen tradespeople, AMSA provides venues for members to work on trades projects in a social setting. Their group has steadily grown nationally, they have an existing website which shares information about meetings, locations and membership details. AMSA sell the projects that members make, these vary in price from a few dollars per item, to several thousands of dollars per item. In the last year the AMSA has raised over 3 million dollars from their sales. They have decided to add functions to the existing website to enable users to view suppliers of materials and equipment to men's sheds and to enable online sales of men's shed finished products. These new functions introduce the need to process financial information for the first time.

AMSA would like their application to run on the internet and be accessible via laptop, tablet and smart phone. They want to be able to:

- Display a list of benefactors to AMSA

- Display a list of AMSA recommended suppliers of tradesman's tools and materials based on a search for key words and/or location

- Provide links to AMSA recommended supplier websites

- Display photographs and descriptions of members finished projects based on a search for keys words and/or the member-maker's online pseudonym

- Offer products made by AMSA members for sale online by:
  - Linking to an automated online invoicing and payment application provided by a third party
  - Passing the price, unique product identifier and description and AMSA banking details to the third party invoicing app

- AMSA want to keep records of users who have purchased their products so they can send targeted marketing information to these users when new projects are completed by members. The marketing itself is not done via the AMSA web application.

- AMSA want to keep records of the member-makers of each item sold (including their contact details and banking details) so they can re-imburse them for a percentage of the sale. The new solution will record which member made each item using a pseudonym for the maker. All financial details for the makers and the re-imbursement will be performed via online banking, NOT through the AMSA website.

- AMSA will not provide members personal information directly to customers – customers only know the pseudonym of the member-maker who made their purchase.

- All financial transactions will pass through the AMSA organization – AMSA sells to customers, AMSA re-imburses member-makers.

AMSA have set aside a reasonable budget for the project with assistance from a federal government grant. AMSA's existing website is professionally designed, they want the additional functions to adopt the same appearance, usability and quality standards

You have been asked to help AMSA prepare a project plan and manage the project from start to finish.