COMPUTING: SOFTWARE DEVELOPMENT

Units 3 & 4 – Written examination

TSSM™
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2017 Trial Examination

SOLUTIONS & RESPONSE GUIDE

SECTION A- Multiple-choice questions (1 mark each)

Question 1
Answer: A

Explanation:
She requires a simple interface and functionality as she is not confident with the use of technology. Response rate is important as it must count each step accurately to calculate the number of calories burnt and kilometres walked/jogged.

Question 2
Answer: D

Explanation:
Number of steps are whole numbers. While calories and km could be decimal values.

Question 3
Answer: A

Explanation:
Popular languages start indexing an array from 0 while the last index is the array length minus 1. While this is usual to most developers, not all programming languages follow this convention. In Fortran the array index starts at one. However, the array index should start at zero because it relates to computer science concepts and it has a strong relation to language design. Most programming languages have been designed this way, so indexing from 0 is pretty much inherent to the language.

Question 4
Answer: A

Explanation:
Option B is floating point data type while options C and D are considered string data type.

Question 5
Answer: B

Explanation:
It is a compiler/interpreter component that breaks data into smaller elements for translating the data into another language. For instance, the Java compiler parses source code of .java file and creates tokens that match the java grammar. The result of compilation is .class format that includes platform-neutral Java bytecode.

Question 6
Answer: A

Explanation:
This is the aim of the analysis phase. Options B and C are isolated parts of this stage. Analysis must be the first stage to fully understand the current information system.

Question 7
Answer: B

Explanation:
Option A has a selection and iteration structure. Option C is a sequence and option D is repetition and selection.

Question 8
Answer: C

Explanation:
It is a fixed loop as it repeats actions 1 and 2 a specific number of times.

Question 9
Answer: D

Explanation:
'For Count, Next Count' indicates the presence of repetition while *Action 1* and *Action 2* shows a sequence of steps.

Question 10
Answer: B

Explanation:
'n' is the number of array elements being sorted. It is the number of passes less the total number of array elements. This applies for both passes and swaps.

Question 11
Answer: B

Explanation:
Total number of array elements minus 1. This set contains 8 elements.
n-1 swaps
8-1 = 7 passes

Question 12
Answer: A

Explanation:
The analysis stage must consider the whole information system to produce a detailed SRS

Question 13
Answer: A

Explanation:
If a section of code accepts parameters, manipulates them and returns a value it is known as a function.

Question 14
Answer: D

Explanation:
It is a program that processes source code and turns it into machine language that a computer's processor uses.

Question 15
Answer: D

Explanation:
A bridge connects different physical networks together only if they use the same protocol while routers can connect LANs and WANs together even if they use different protocols. A repeater amplifies a network signal. Network configuration can be P-2-P or Client-Server. LAN and WAN refer to network size.

Question 16
Answer: B

Explanation:
Option A, C and D refer to effectiveness measures of the solution.

Question 17
Answer: D

Explanation:
When developer and client have agreed on the design of a new solution but later the client decides to add extra features to the program while it is in the development stage. This delays the whole process as the design stage would have to be revisited.

Question 18
Answer: A

Explanation:
This constrain would be identified in the analysis stage. Therefore, during the design process, the developer will need to consider the staff members' skills as some of the teachers have limited skills.

Question 19
Answer: B

Explanation:
An SRS contains four sections:
- An introduction
- A description of the proposed software solution, which contains the constraints
- Specific requirement of the software solution
- A description of the environment within which the solution will operate

Question 20
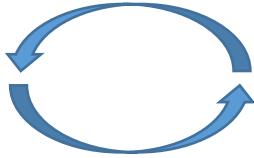*Answer:* C

Explanation:
There a finite number of steps to follow to achieve a solution. In this case, it will be the product of an even and odd number.
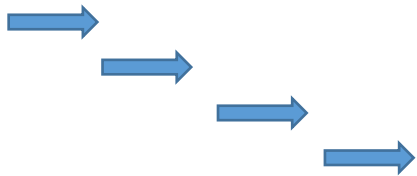
SECTION B: Short-answer questions

Question 1 (4 marks)

a. Sample answer. Students may provide a different graphic to demonstrate the difference.

Agile model

Linear model

<div align="right">2 marks</div>

b. Models:
In the agile model, the developer will only move to the next stage if the previous one has been completed to a satisfactory standard. This may involve the client's feedback which could also include revisiting previous stages. On the other hand, the linear model follows a specific order from stage one to stage four. It does not revisit previous stages.

<div align="right">2 marks</div>

Question 2

a. It is a technique used to minimise the entry of inaccurate data. It is a check to ensure that the data entered is reasonable.

b. It is existence check. The asterisk denotes required field (compulsory). The red text reinforces the fact that the user has not entered data and therefore they have to fill it in.

c. Data type.

d. Validation techniques are used to minimize user input errors while testing is checking that the solution is free from errors.

<div align="right">4 x 1 = 4 marks</div>

Question 3 (3 marks)

a. It is a security system that requires more than one method of identifying the user's identity for a login.

1 mark

b. Answers will vary. One method could be based on a username and password and a code sent to the user's mobile number which they must enter to access the system. Other sample answers:

- Swiping a card and entering a PIN.

- Swiping a card, scanning a fingerprint and answering a security question.

- Attaching a USB hardware token to a desktop that generates a one-time passcode and using the one-time passcode to log in.

2 marks

Question 4

a. Iteration   1 mark

b. 8 times   1 mark

c. The first value is 2 and the last one is 8   2 marks

Question 5 (6 marks)

Students may discuss any of these features such as

- Self-modification:
  Some viruses have the ability to change their identity, look and feel.

- Self-Encryption
  Viruses encrypt themselves to avoid signature detection.

- Polymorphic virus
  These viruses contain what is known as a polymorphic or mutating engine. This engine functions like a unique re-coding agent that modifies the virus on every infection or when certain criteria are met.

- Metamorphic viruses
  A metamorphic virus rewrites itself each time it infects a new device or if it fits some defined criteria.

Question 6

Sample answer:
Start
    Sum ← 0
    Count ←0
  While (Count <4)
     Number← Enter a number
     Sum ← sum + Number
     Count ← Count + 1
       If count < 4
         Continue;
        Else
          Print sum
         End if
  End While
Stop

Mark allocation:
- The use of Start/Stop or Begin/End   (1 mark)
- The use of ←   (1 mark)
- Initiation of Sum and Count (1 mark)
- Correct statements (Sum and Count (2 marks)
- Correct If statement (1 mark)
- Indentation (1 mark)

SECTION C: Case Study

Question 1 (6 marks)

| Collection Method	Justification
Interview	Interview Nicole to obtain qualitative data on the deficiencies of the current system and clarify functional and non-functional requirements of the solution
Survey	To gather data from staff members and clients and ask them about satisfaction levels i.e. the efficiency and effectiveness of the booking process. This can be in a multiple choice or scaled responses format.
Observation	To see how the assistant operates the system and interactions that take place. Matt can take notes about his observations.

3 x 2 = 6 marks

Question 2 (15 marks)
- Five actors 5 x 1 = 5 marks
- Four use cases 4 x 1 = 4 marks
- Two <<includes>> 2 marks
- Four associations 4 marks
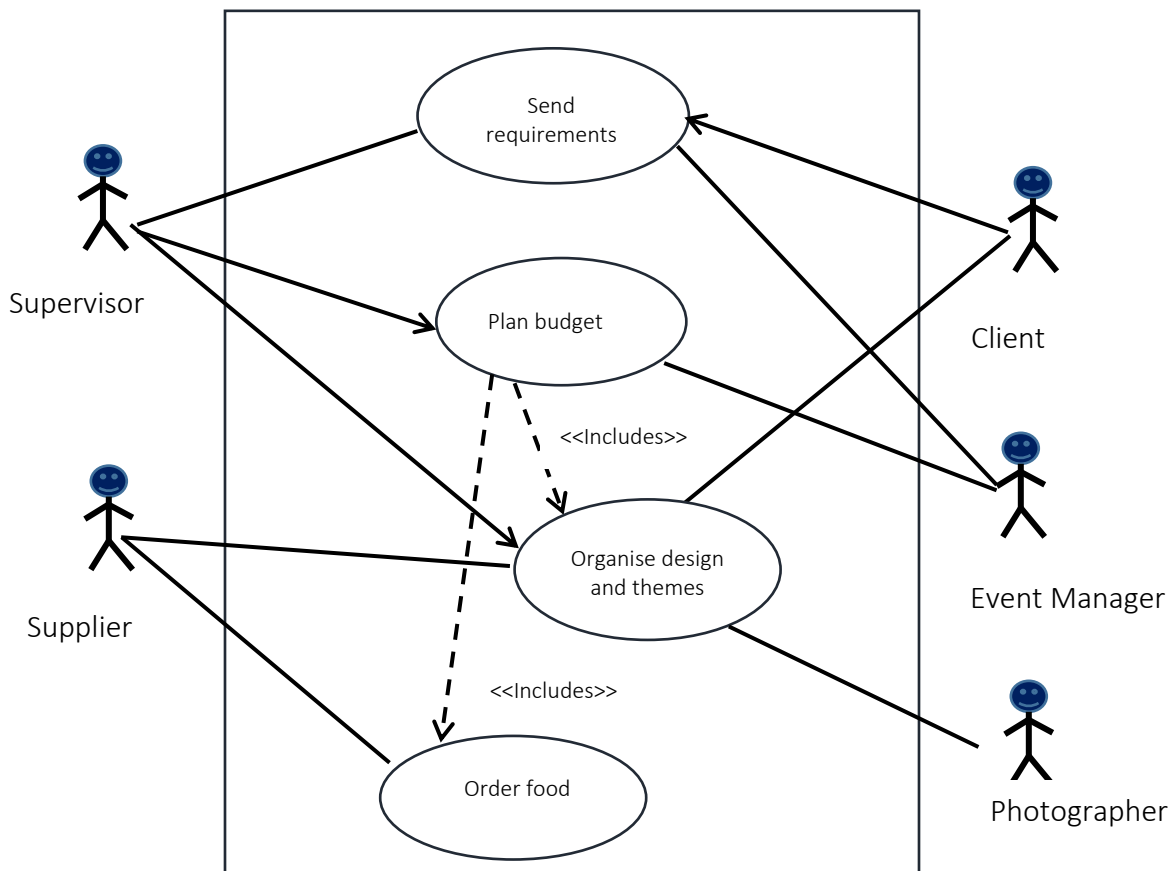
Question 3 (15 marks)
a. The use of a combo box to select the event, the use of a calendar to select the date, the use of radio buttons to estimate number of guests. This is a quick method to enter data

2 marks

b. The use of standard icons for the login and entry data screen. This makes it clear to use.

2 marks

c. Improvements: The use of labels to aid the use of icons to enter data as some users may not be quite familiar with technology icons.

2 marks

d. The design should contain:
- Heading
- Event type
- Event date
- number of people

Each object should have annotations indicating the purpose of each object on the screen

5 marks

e. Answers may vary. Sample Criteria
    Efficiency:

- Are clients able to complete a booking quickly?
- Can the client move from one screen to the other quickly?
- Are steps within the booking form easy to follow?
- Do staff have more time to prepare for the event rather than handling bookings?

    Effectiveness:
- Is the information produced complete or does the user need to access more information to complete a task?
- Is the output easy to read?
- Is the UI design appealing?
- Is the solution output accurate?
- Are features of the UI easy to find?
- Is the output produced in a timely manner?
- Is the output relevant to the task?
- Is the information produced easy to interpret?

4 marks

Question 4 (4 marks)
- Usability
- Reliability
- Portability
- Robustness
- Maintainability

Students may select two of them. The discussion must be in reference to the case study.

Question 5 (2 marks)
Students may identify other advantages. These are sample answers.
- XML lets you separate form (appearance) from content.
- Stores and transports data between different types of software.

Question 6 (4 marks)
Answers will vary. The following is a sample answer:

Cloud services
- Advantage: 24/7 access from any device anywhere
- Disadvantage: requires Internet connection, system may be down and therefore no access.

SAN
- Advantages: data into one single storage appliance. A SAN solution is a collection of storage disk drives which run on a LAN or a WAN network. The best part of SAN is that in the event of one disk failure, with the help of RAID technology, this storage system will be able to rebuild data from the faulty disk onto a spare disk.

- Disadvantages: The initial cost of a storage area network is high so it may not be an efficient solution for a small scale business.

Question 7 (2 marks)

This is used to send large amounts of data/information across the Internet. This is encrypted using a 'secret key' and then sent to the recipient who will decrypt it using the same key.

Question 8 (2 marks)

This testing involves the management of the company, in this case, Nicole. She will have to ensure that everything is operating as expected. She can then provide feedback to the developers on any problems or faulty procedures.