Centre Number

Candidate Number

cea

Rewarding Learning

ADVANCED

General Certificate of Education

2018

Software Systems Development

Unit A2 1:

Systems Approaches and Database Concepts

A2S11

[A2S11]

FRIDAY 1 JUNE, AFTERNOON

TIME

2 hours.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
This paper is accompanied by a Pre-release Case Study. You must **not** use your own annotated copy of this Case Study.
Write your answers in the spaces provided in this question paper.
Answer **all ten** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 100.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
Quality of written communication will be assessed in **questions 2, 4 and 6**.

For Examiner's use only			
Question	Marks available	Marks	Remark
1	10		
2	6		
3	6		
4	8		
5	10		
6	10		
7	8		
8	15		
9	6		
10	21		
Total	100		

11572

1 Horizon Solutions intend to conduct a systems investigation in order to fully assess the current situation at Connected Works.

(a) Explain why a range of users of the system should participate in this investigation. Consider the input likely to come from Stephen, John and the office staff.

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_____ [6]

2

Horizon Solutions will clearly apply a range of fact-finding techniques to their investigation. It has been suggested that observation could be used as a way to obtain relevant information.

(b) (i) Give one advantage and one disadvantage of using observation as a suitable fact-finding technique at Connected Works.

(ii) Describe an instance of how this technique could be applied at Connected Works.

[4]

11572   **3**   **[Turn over**

2 Although Connected Works is a very successful business, there are many problems relating to the administrative procedures. These can involve a wide range of people and could affect the continued success of the business.

Discuss problems you have identified relating to the administrative procedures and their likely impact on the business. Illustrate your answer with examples from the case study.

[6]

11572

4

3 Horizon Solutions is keen to ensure that Stephen and John understand why the use of a methodology might be considered in the development process.

Outline **three** benefits of using a systems development methodology at Connected Works.

1. _____

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2. _____

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3. _____

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_____ **[6]**

5

[Turn over

4 Discuss and evaluate the key characteristics of **prototyping**, indicating why this might be an appropriate approach in the development of a new system at Connected Works. Your answer should explain how prototyping could be applied in the development process.

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_____ [8]

5 Thorough testing is critical to the success of any project. Complete the paragraphs below relating to testing by selecting the correct words or phrases from the selection provided. Words or phrases may be used more than once.

programmer	white-box	manager	users	alpha
test-data	system	analyst	black-box	analysis
design	product	prototype	sub systems	errors
program	acceptance	project	procedures	test plan
methods	test	beta	methodology	analysts
integration	description	plan	corrective action	

Testing is conducted in order to find errors in a software system. Testing takes place all through the development life cycle and commences at the _____ stage. Finding errors at an early stage in the development is important as this can reduce time and save money. The product must be fit for purpose.

Testing sections of code in isolation to ensure that they function correctly is known as _____ testing. This type of testing is conducted by the _____.

Where the whole system is treated like a black box and the internal working of the code is not checked the type of testing is called _____ testing. This involves testing a complete _____ with all the _____ integrated together.

Every systems specification should contain a test plan. This plan should contain a description of each test, _____, expected outcome, actual outcome and _____.
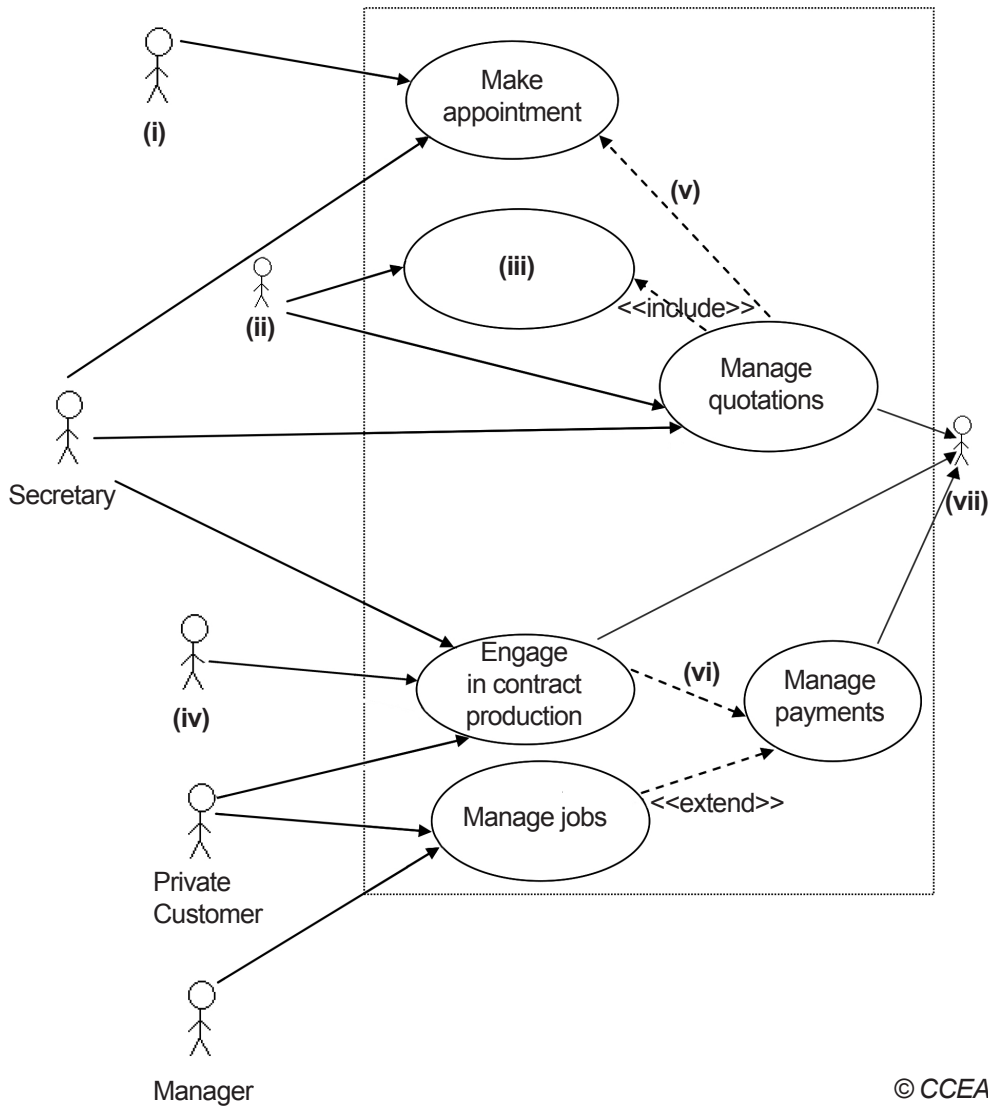
Testing conducted by _____ at the end of the development cycle is called _____ testing. [10]

6 Unified Modelling Language (UML) is a modelling technique used to represent systems. Evaluate the use of 'Use Case Diagrams', 'Class Diagrams' and 'Sequence Diagrams' in the development of a new system at Connected Works.

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_____ [10]

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(Questions continue overleaf)

7 Using UML, Anne the analyst has begun to develop a diagram to represent processes associated with private customers.
Complete the partial UML diagram she has started below.

© CCEA

(i) _____

(ii) _____

(iii) _____

(iv) _____

(v) _____

(vi) _____

(vii) _____

Identify Type of UML diagram

(viii)_____ [8]

11572

10

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(Questions continue overleaf)

8   Robert, one of the software development team, is designing the database structure for the new system at Connected Works. He uses a variety of documents gathered from the current system for the normalisation process.

Using the sample quotation document given in the case study Robert has identified the derived fields and the non-atomic data.

(a) (i)   Give an example of a derived field that does not need to be included in the normalisation process.

_____ [1]

(ii)   Give an example of a **non**-atomic field indicating the breakdown required.

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_____ [2]

Robert has also noted the repeating groups (nested) and devised the table names required for 1NF. The un-normalised data identified by Robert is shown below.

QuotationNo, QuotationDate, StaffNo, StaffSurname, StaffForename, CustomerNo, CustomerSurname, CustomerForename, CustomerAddress1, CustomerAddress2, Customer TelNo, {JobNo, JobType, Duration, {MaterialNo, Material, QtyRequired, Price,}} LabourCost

12

(b) Complete the transformation of the data into third normal form showing:

- 1st Normal Form (Attribute names may be abbreviated)

QUOTATION

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QUOTATIONJOB

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_____

_____

QUOTATIONJOBMATERIAL

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13

- 2nd Normal Form

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- 3rd Normal Form

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_____ [12]

15

[Turn over

9 The tables below form part of the proposed database system.

CONTRACT

field	Data Type
ContractNo	int
StartDate	Date
EndDate	Date
CustomerNo*	int
FeeNo*	int

CONTRACTJOB

field	Data Type
ContractNo*	int
JobNo*	int
Frequency	char
DateLastCarriedOut	date

JOB

field	Data Type
JobNo	int
JobType	Varchar(30)
SkillNo*	int

STAFF

field	Data Type
StaffNo	int
StaffSurname	varchar(20)
StaffForename	varchar(20)
Salary	Decimal(8,2)
SkillNo*	int

SKILL

field	Data Type
SkillNo	int
Skill	Varchar(25)
Cost_hr	Decimal(5,2)

The team must ensure that one or more suitably skilled staff members are allocated to a contracted job.

Clearly identifying the primary key and foreign keys, complete the table CONTRACTJOBSTAFF given below to support this requirement.

CONTRACTJOBSTAFF

field	Data Type
ContractNo	int

[6]

16

10 Assuming the CUSTOMER and FEE tables exist with primary keys CustomerNo and FeeNo.

(a) Write SQL scripts to complete the creation of the table CONTRACT with constraints where:
* ForeignKey is CustomerNo in the CUSTOMER table;
* ForeignKey is FeeNo in the FEE table;
* StartDate is current or in the future;
* EndDate is later than the StartDate.

```
CREATE TABLE CONTRACT (
ContractNo        int,
StartDate         DATE,
EndDate           DATE,
CustomerNo        int,
FeeNo             int,

constraint PKContract PRIMARY KEY (ContractNo),
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_____ [5]

11572   **17**   **[Turn over**

(b) (i) Stephen requires a list of all non-urgent contract jobs to be carried out in the coming week and has indicated some of the criteria for the coder:

- DateLastCarriedOut is null;   or
- Frequency is weekly denoted by W;   or
- Frequency is monthly denoted by M and DateLastCarriedOut is 23 or more days ago.

Write the SQL scripts to create a list of jobs. The list should include the customer's name and address, job type and skill required. It should be ordered by JobNo.

[11]

(ii) Name **one** other criterion that should be implemented.

[1]

18

(c) Write the SQL script to count the number of new contracts for each fee number. A new contract has a start date in the future.

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_____ [4]

THIS IS THE END OF THE QUESTION PAPER