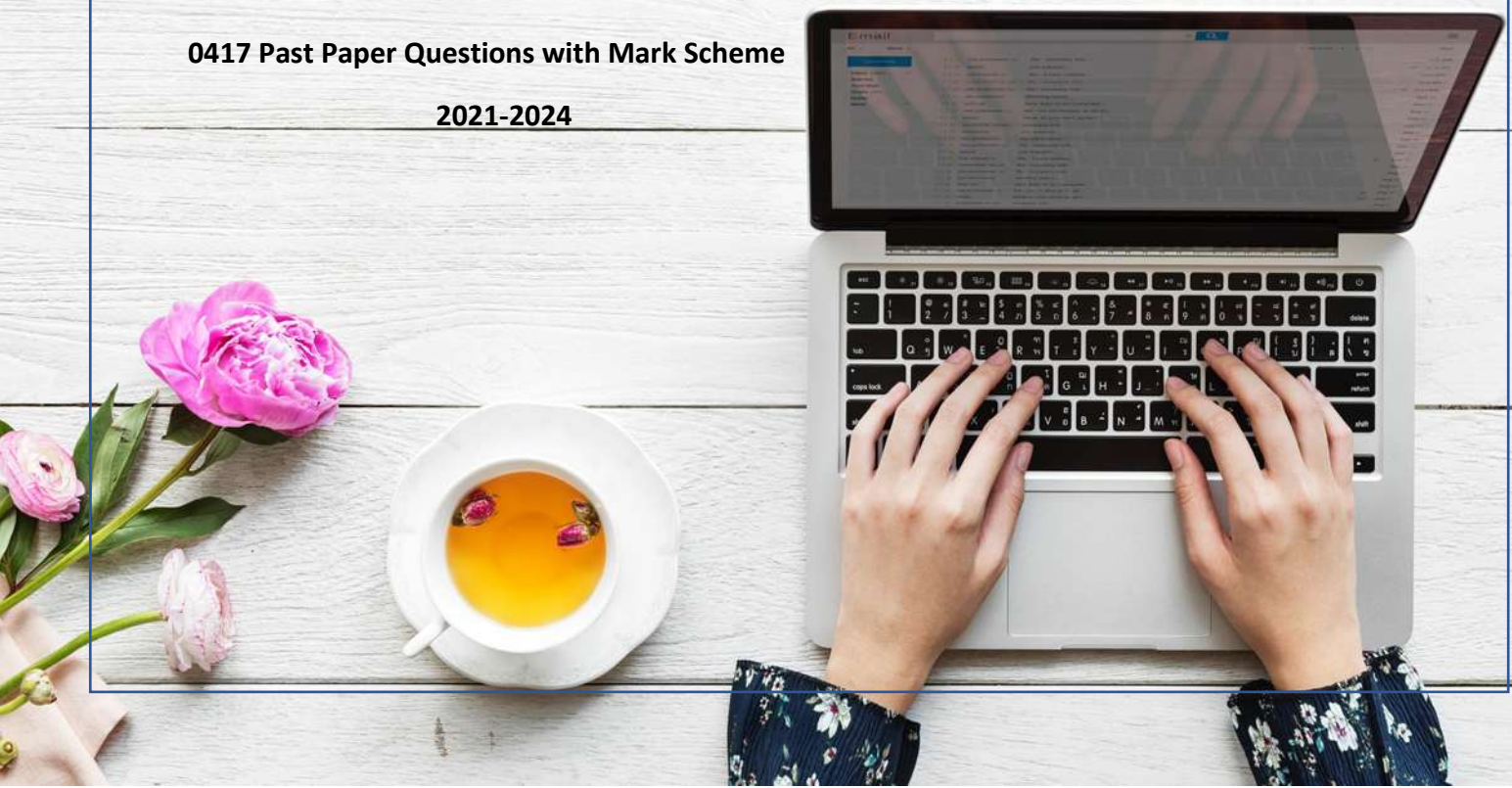
Information and Communication Technology

-0417-

Chapter Seven: The Systems Life Cycle

0417 Past Paper Questions with Mark Scheme

2021-2024



1 The owner of a bookshop has a database of all the books she has in stock. As some of the data is being entered into the database it is checked using validation checks.

An example of some of the records in the database is shown.

Field name	Example data
Name of book	Brotherhood of Wisdom
Name of author	Colin Turner
ISBN	471837951
Date of purchase	25/02/2021
Number of copies	10
Type of book	E
Name of book	The Fourth Man
Name of author	Aadha Khatri
ISBN	0718121753
Date of purchase	18/03/2019
Number of copies	53
Type of book	H
Name of Book	Indian Temples
Name of author	Vihaan Laghan
ISBN	978147183215
Date of purchase	12/02/2019
Number of copies	30
Type of book	H

Explain, using a field name and examples of the data stored in that field in the database, why validation checks must be appropriate to the data that is being checked.

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2 Tick (✓) the most appropriate method of implementation to match the statements below.

	Direct (✓)	Parallel (✓)	Pilot (✓)
All of the benefits are immediate.			
If the new system fails the whole of the old system is still operational.			
This is the cheapest implementation method.			
The system is implemented in one branch of the company.			

[4]

3 The owner of Tawara Hotels is planning a new computerised booking system. There are ten Tawara Hotels throughout the world. The current booking system allows people to book rooms in any of the Tawara Hotels. He has employed a systems analyst to research the current system and then install the new system.

(a) When analysing the current booking system, the systems analyst must identify the user requirements.

Explain why it is important for the systems analyst to do this.

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(b) Tick (✓) the relevant stage of the systems life cycle for each of the following activities.

Activity	Analysis (✓)	Development and testing (✓)	Evaluation (✓)
Identifying the problems with the current system			
Comparing the solution with the original task requirements			
Create the file structure			
Identify limitations to the new system and improvements to be made			

[4]

(c) Before the new booking system is installed, the systems analyst has to decide on a method of implementation. One method of implementation is pilot running.

Name **two** other methods of implementation and describe **two** benefits of each.

Name.....

Benefit 1.....

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Benefit 2.....

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Name.....

Benefit 1.....

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Benefit 2.....

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[6]

4 Tick (✓) whether the following descriptions of analysing a system refer to **Interviews**, **Observation** or **Questionnaires**.

Description	Interviews (✓)	Observation (✓)	Questionnaires (✓)
This method gives a more reliable overview of the whole system.			
This is more time-consuming than the other methods.			
Questions on this method cannot be expanded upon when being asked.			
With this method the worker cannot remain anonymous.			

[4]

5 Tick (✓) whether the following advantages of analysing a system refer to **looking at existing paperwork**, **observation** or **questionnaires**.

	Looking at existing paperwork (✓)	**Observation (✓)**	**Questionnaire (✓)**
This method gives the systems analyst an overall view of the system			
Individuals can remain anonymous			
This method allows information to be collected that cannot be obtained from any other method			
This method gives the quickest analysis of the data			

[4]

6 Tawara Tours has created a new online booking system to allow customers to book holidays. The system was written using modules.

(a) Describe how the new system could be tested prior to it becoming operational.

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Chapter Six

(b) Tawara Tours used to book holidays using a manual booking system. This used a pen and paper to make the bookings.

Discuss the advantages and disadvantages of using online booking systems rather than a manual booking system.

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7 When a system is being planned, analysis needs to take place.

Questionnaires and interviews are examples of methods of researching existing systems.

Evaluate, by weighing up the advantages and disadvantages, each of these methods.

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8 A system can be analysed using different methods.

Discuss the advantages and disadvantages of analysing a system by interviewing staff rather than using questionnaires.

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9 Different methods can be used to analyse a system.

Discuss the benefits and drawbacks of analysing a system by observing staff rather than looking at the current systems documentation.

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10 Name an appropriate validation routine for each statement. Each answer must be different.

(a) The last digit in a code used to ensure the other digits have been entered correctly.

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(b) This validation routine ensures a password is always 8 characters.

..... [1]

(c) This validation routine ensures data has been entered into a field.

..... [1]

(d) This validation routine ensures that a date is entered as DD/MM/YYYY.

..... [1]

11 The manager of a cinema has purchased a new booking system. There are 26 rows in the cinema with 20 seats on a row. Each seat is identified by a unique ID. The seat ID consists of the row letter followed by the position of the seat on the row. An example of the seat on row F position 12 would be F12.

He is setting up a test plan to test the system.

Write down **one** example of each of the following types of test data. The answers must be different in each case.

Normal .....

Abnormal .....

[2]

12 A teacher is setting up a database which she will use to record her student's exam marks.

(a) The teacher is planning to test the mark range using different types of test data. The range of marks that the teacher can award is 0 to 100.

(i) Write down **one** example of extreme test data that the teacher can use to check the range.

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(ii) Extreme test data is one type of test data. The teacher uses two other pieces of test data.

Write down the type of test data for each of the examples.

TEN .....

55 .....

[2]

(b) Part of the database is shown.

Student_name	Date_of_birth	Gender	Exam_mark	Average_mark
Seth	25/02/2007	M	22	43.4
Adom	17/07/2007	M	67	73.1
Maria	02/05/2007	F	78	67.9
Lesedi	15/12/2006	F	45	50.0

Write down the field name which is the most appropriate for the data type, based on the data shown in the table. Your answers must be different in each case.

Boolean .....

Numeric: integer .....

Numeric: decimal .....

Alphanumeric .....

[4]

13 Peter needs to create a validation check for product numbers. Three examples of product numbers he needs to check are:

977135120127916

976143148163921

845132120651166

Identify **two** validation checks he could use to check the numbers.

1 .....

2 .....

[2]

14 A school has employed a systems analyst to help update its computerised examination system.

(a) The systems analyst researches the current system to see what will be required in the new system.

State the methods of researching the current system that are described:

(i) talking to the network manager and examinations officer about the current system

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(ii) watching the users operating the current system

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(iii) forms sent out to all users to complete and return.

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(b) After completing the analysis, the new system needs to be designed. One item that needs to be designed is a file structure.

Identify **three** other items that would need to be designed.

1 .....

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[3]

15 Compare a test strategy with a test plan. Your answer should include similarities and differences.

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16 A company is designing a new computer system. After the system has been created and tested, it will be implemented.

(a) Compare parallel running and direct changeover. Your answer should include both similarities **and** differences.

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(b) There is new software in this computer system that has to be evaluated.

Describe what needs to be considered when evaluating new software.

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17 There are safety issues related to bringing laptop computers into the college. The Network Manager has decided to produce a paper-based certificate for students to prove that their laptop computer is safe to use.

Describe the main features that should be considered for the design of this certificate.

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[4]

18 A company with many branches is implementing a new system. The manager is planning to implement the new system either by pilot changeover or parallel running.

(a) Contrast pilot changeover and parallel running.

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(b) When the system is implemented, technical documentation is produced.

State **three** components that would be included in the technical documentation.

1 .....

2 .....

3 .....

[3]

19 Parallel running can be used as a strategy to implemented new systems.

(a) Describe what is meant by parallel running.

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(b) Describe the benefits and drawbacks of using parallel running.

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20 A company is planning a new computer system. The current system needs to be analysed.

Identify **two** methods of analysing the current system.

1 .....

2 .....

[2]

21 Analysis includes identifying the hardware and software requirements of a new system.

(a) Describe other tasks involved in analysis.

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(b) The identification of hardware and software requirements forms part of the system specification.

Explain what is meant by the system specification.

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(c) After analysis of the system, the file and data structures are designed.

State **three** elements that need to be designed as part of the file and data structures.

1 .....

2 .....

3 .....

[3]

22 The manager of a plant nursery has asked a systems analyst to create a new database system to store information about his plants. This new database system needs to store the following data.

- the unique reference number for each plant
- the common name for each plant
- if the plant is scented or non-scented
- the price of each plant on a range from $10 to $100
- the maximum height of the plant in metres

Part of the database is shown:

Ref_No	Name_of_plant	Scented	Price ($)	Height (m)
HT134	Rose Peace	S	12.99	1.20
WO016	White Oak	N	98.00	5.24
SP345	Spindle Tree	S	25.99	9.00

(a) For each of the fields shown, state and describe the most appropriate validation check that could be used on the data. Your answers must be different in each case.

(i) Ref_No

Validation check .....

Description .....

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[2]

(ii) Price ($)

Validation check .....

Description .....

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[2]

(b) In the table, state the most appropriate data types to create the database using the information given before. For any numeric field, specify the type of number.

Field name	Data type
Name_of_plant	
Scented	
Price ($)	
Height (m)	

[4]

Mark Scheme

Question	Answer	Marks
1	Max **two** examples, for each example: 1 mark for a correct field names and data examples 1 mark for the reason Matched pairs Type of book Can use length/lookup check as only one letter is input for example E or H Cannot use a type check as only one letter used ISBN Can use check digit as a way of checking that digits are not transposed Cannot use a length check as they are different lengths Date of purchase Can use a format check as all dates are the same format. Number of copies Can use a range/limit check as the lowest number is 1 Can use a type check as only numbers are accepted Name of book/Name of Book Cannot use a length check as names can be any length Cannot use a type check as any character can be used Name of author Cannot use a length check as names can be any length	4

Question	Answer				Marks
2		**Direct**	**Parallel**	**Pilot**	4
	All of the benefits are immediate.	✓			
	If the new system fails the whole of the old system is still operational.		✓		
	This is the cheapest implementation method.	✓			
	The system is implemented in one branch of the company.			✓	

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>3a</td><td>Three from:
The systems analyst is creating a system that is just for the client
Important to meet the needs of the user; so it is customised
Reduces the costs if the new system matches the existing hardware and software
More efficient system is produced that does what the users require</td><td>3</td></tr>
<tr><td>3b</td><td>
<table>
<tr><th>Activity</th><th>Analysis</th><th>Development and testing</th><th>Evaluation</th></tr>
<tr><td>Identifying the problems with the current system</td><td>✓</td><td></td><td></td></tr>
<tr><td>Comparing the solution with the original task requirements</td><td></td><td></td><td>✓</td></tr>
<tr><td>Create the file structure</td><td></td><td>✓</td><td></td></tr>
<tr><td>Identify limitations to the new system and improvements to be made</td><td></td><td></td><td>✓</td></tr>
</table>
</td><td>4</td></tr>
<tr><td>3c</td><td>Direct changeover – 1 mark
Two from:
Benefits are immediate
Costs less as fewer staff are needed
Costs less as only one system is required
Less likelihood of malfunction as system is fully tested

Parallel running – 1 mark
Two from:
If new system fails, old system can be used as a back up
Possible to gradually train staff

Phased changeover – 1 mark
Two from:
If the new system fails, only one part is affected
Easier to ensure that part of the system is fully operational before moving onto the next part
Possible to train staff in one part of the system, therefore less costly than parallel
Possible to gradually train staff</td><td>6</td></tr>
</table>

Question	Answer	Marks
4		4

	Interviews	Observation	Questionnaires
This method gives a more reliable overview of the whole system.		✓	
This is more time consuming than the other methods.	✓		
Questions on this method cannot be expanded upon when being asked.			✓
With this method the worker cannot remain anonymous.	✓		

Question	Answer	Marks
5		4

	Looking at existing paperwork	Observation	Questionnaire
This method gives the systems analyst an overall view of the system		✓	
Individuals can remain anonymous			✓
This method allows information to be collected that cannot be obtained from any other method	✓		
This method gives the quickest analysis of the data			✓

Question	Answer	Marks
6a	**Six** from: Each module is tested separately Modules are tested by the programmers Modules/system are tested with live data Errors and problems are noted Improvements are made to the module The module/system is retested Modules are combined and tested together System is tested as a whole System is tested to meet the user's requirements	6
6b	**Eight** from: **Advantages** Prevents double booking The customer can see immediately when the holiday has been booked Bookings can be made 24/7 No need to travel to the booking office/queue up so saves time Can be booked from any location Saves cost of travelling to the booking office Tickets are usually sent online and therefore paperless//Saves printing and postal costs Usually cheaper as lower/fewer overheads Customers can more easily see the tours that are available **Disadvantages** Setting up is expensive//maintenance is expensive Internet access is needed to run the booking system therefore the cost may be increased More reliant on server/network Booking mistakes can be more easily made Mistakes are more difficult to rectify due to the speed of booking If the system crashes during the booking the booking may not be made **To gain full marks there must be at least one advantage and one disadvantage**	8

Question	Answer	Marks
7	**Six** from: Quicker method of answering the questions for questionnaires Questionnaires can be completed in the respondents own time whereas interviews have to be undertaken at a set time In interviews need to pay for time off work/employing an interviewer which is expensive Respondents can remain anonymous on questionnaires whereas interview they cannot Analysis of the results can be quicker with questionnaires With interviews the interviewer can direct the questions to give answers they want People tend not to hand questionnaires back as they can be anonymous Inflexible in the answers on questionnaires whereas interviews allow for expansion on the answers from the previous question If the respondent gets stuck with a question, there is no easy way to ask for clarification in questionnaires If they do not understand the question then they may answer differently to what was needed in questionnaires In questionnaires questions cannot be modified whereas interviews can add extra questions or go into more depth The analysis of the data in a questionnaire can be displayed easier/graphed Both can gather information that can be used for later analysis Both methods may not be answered honestly	6

Question	Answer	Marks
8	**Interviews** **Advantages** Questions can be explained if they are misunderstood this cannot happen withquestionnaires Questions can be asked relating to the answers given previously More detailed answers can be given More complex questions can be asked Questions can be changed to suit the person being interviewed The person being interviewed tends to answer all the questions Can see body language **Disadvantages** They are not anonymous whereas questionnaires are Takes far longer to complete than a questionnaire The interviewer and interviewee must be available at the same time More expensive as the interviewer has to be hired and interviewee needs time off Answers may not be honest//more honest with a questionnaire as the person isanonymous Answers may be skewed by the interviewer Answers in a questionnaire can be analysed quicker through OMR Questionnaires tend to be sent to more people **To gain full marks the discussion must have correct answers for both interviews and questionnaires**	6

Question	Answer	Marks
9	**Observation** The analyst sees it with their own eyes Get a complete picture of the whole system Cheaper as it does not take the worker away from work Description of the Hawthorne effect The quality and accuracy of information is highly dependent on the skill of the observer **Examining documents** Can see exact details of inputs, processing and outputs Saves time as there could be copies of previous analysis Allows the analyst to predict the size of the new system by analysing the amount of data Very time consuming to look through all the documents Very expensive to pay for an analyst to look through all the documents **To gain full marks the discussion must have correct answers for both observation and examining documents**	6

Question	Answer	Marks
10a	Check digit	1
10b	Length check	1
10c	Presence check	1
10d	Format check	1

Question	Answer	Marks
11	**Normal** Any seat from A1 to Z20//Any letter from A to Z inclusive followed by any number 1 to 20 inclusive **Abnormal** Any incorrect seat row or number/Any character other than A to Z and/or any number outside range 1–20 or anything that's incorrect	2

Question	Answer	Marks
12a(i)	**One** from: 0 100	1
12a(ii)	Abnormal Normal	2
12b	**Boolean** Gender **Numeric: integer** Exam_mark **Numeric: decimal** Average_mark **Alphanumeric** Student_name	4

Question	Answer	Marks
13	**Two** from: • Check digit • Range check • Character/type check • Length check • Type check	2

Question	Answer	Marks
14a(i)	Interview	1
14a(ii)	Observation	1
14a(iii)	Questionnaires	1
14b	**Three** from: • Data structure • Input format • Output format • Validation routine	3

Question	Answer	Marks
15	*Similarities* Max **two** from: Both are used in design Both are documents produced by the developers The results generated affect the implementation of the software *Differences* Max **five** from: Test plan is about the test being carried out It is a short term plan whereas a test plan is a long term plan Used on one piece of software whereas a test plan can be used on multiple pieces of software Shows the test objectives Carried out by the test manager/team whereas a test plan is carried out by the project manager Test plan describes how to test/when to test/who will test Test strategy is more detailed Shows the methods to be used to test it The test strategy is a set of instructions/guidelines which explain the test design The test strategy determines how the test should be carried out States what type of technique to follow and which module to test Created before the test plan	6

Question	Answer	Marks
16a	Max **two** from: **Similarities** Both are methods of implementation Both involve the changing of the whole of the old system to a new system Max **three** from: **Differences** With parallel running both systems operate together until the old one is removed With direct changeover the new system is implemented immediately With direct changeover benefits are immediate With parallel running the changeover is safer as the old system is still operating for a while With direct changeover costs are reduced as only one set of staff need to be employed/as there is only one system in operation With direct changeover the system has to be more thoroughly tested before becoming operational	4
16b	Max **four** from: Compare the final solution with the original task to ensure that all elements of the solution have been met Identify any limitations of the software these are the problems that may have occurred during the testing/implementation Identify any necessary improvements that need to be made following testing and implementation, errors may be found that need to be improved Evaluate the user's responses to using the new software following the beta testing the users report back and these comments need to be taken into consideration	4

17	**Four** from: Text size should be easy/large enough to read Font style should be easy to read Make good use of white space so data fills the certificate Enough space in which to enter the answers in the text boxes Make good use of colours to make it easy to read Use an organised layout to make it easy to read All information needs to be clearly visible Use of tick boxes to make data entry quicker/easier	4

Question	Answer	Marks
18a	**Five** from: **Parallel running** Both systems operate together until the old one is removed Staff can be trained on the whole system gradually More time consuming to enter data into two systems If the new system fails then the old system is there for a while to be used It is more expensive as two sets of staff are needed It is more expensive as two systems are needed **Pilot Changeover** Each branch is implemented separately Each branch changing over only uses the new system Costs are reduced as only one branch is affected at a time If there is an error in the new system only one branch is affected Staff can be trained in the branch being implemented The changeover is easier to manage	5
18b	**Three** from: Purpose of the system Limitations of the system Program/coding listing Program/coding language Program flowcharts Algorithms System flowcharts Hardware requirements//Software requirements File structures List of variables Input format Output format Sample runs/test runs Validation routines	3

Question	Answer	Marks
19a	Parallel running is running both systems together until the new system works properly/fully implemented When the new system works the old system is removed	2
19b	Max **four** from: ***Benefits*** If the new system fails the old one is still available for a time to be used Less data will be lost during implementation Training is gradual New system can be easily tested with live data Max **four** from: ***Drawbacks*** Implementation is expensive as two sets of staff are needed Two systems are needed therefore more expensive There will be duplication of data entry which can cause differences in the output of the two systems More time consuming to enter data into two systems Two systems take up more physical space	5

Question	Answer	Marks
20	**Two** from: Observation Interview Questionnaire Document analysis	2

Question	Answer	Marks
21a	**Four** from: Collecting data about the current system Establishing the problem that the customer needs solving Identifying the inputs, processing, outputs of the current system Producing a cost-benefit analysis Finding the problems with the current system Identifying the user requirements of the new system	4

21b	**Three** from: This describes the configuration for the system Used in the production of the system specification document It is a mutual agreement of what the client wants and what the developer can offer States the performance requirements of the system Specifies the security requirements of system Specifies overall functions of the system i.e. what it is to be used for	**3**
21c	**Three** from: Field length Field name Data type Primary key Foreign key	**3**

Question	Answer	Marks
22a(i)	**One** mark for check and **one** mark for description Format check The data must be in the format LLNNN Length Check The data must contain 5 characters Presence check The field must contain data / cannot be null	**2**
22a(ii)	**One** mark for check and **one** mark for description Range check The price must be in the range of 10–100 Type / character check The field only contains number	**2**
22b	Name_of_plant — **Alphanumeric** Scented — **Boolean** Price — **Numeric: currency** Height — **Numeric: decimal**	**4**