



**General Certificate of Education
20XX**

Software and Systems Development

A2.1: Systems Approaches and Database Concepts

SPECIMEN MARK SCHEME

1.

USER	ROLE AS USER OF THE CURRENT SYSTEM	WHY THIS USER MIGHT WANT A NEW SYSTEM
Charlie	Charlie uses the current system to exercise complete control over all aspects of the business. He uses information from the system all the time including information relating to orders, deliveries, accounting information and staffing. He makes decisions based on information he gathers from the business. These are at a range of levels including strategic decisions.	Charlie might want to: improve overall customer service; collect accurate information for decision making; improve efficiency in stock control; improve accounting procedures; obtain accurate current information to assist business opportunities; improve staff relations; have information readily available even when key staff are absent.
Secretary	The secretary uses the current system to check delivery notes against orders, update the notebook and match invoices against orders and delivery notes. The secretary is responsible for administering the credit system for customers. The secretary is responsible for collating and summarising data collected from the managers of each outlet including	The secretary might want a new system to: relieve the pressure of work; maintain accurate information relating to delivery notes, orders, and invoices; to assist in the organisation and management of the credit system; to assist in the collection and presentation of the data collected from the shop managers.
Manager	The manager uses the current system to manage staff schedules, money reconciliation and stock issues.	The manager might want a new system to: Relieve the pressure of work; Ensure staff data is properly recorded; Ensure that money reconciliation is correctly managed; Manage stock properly in the outlet.
Storeroom staff	The storeroom staff use the current system to manage stock. They identify and record low stock items. They accept and record new stock items and replenish shelves	The storeroom staff might want a new system to: assist in their stock handling procedures; provide a better way of recording low stock; provide a better way of recording new stock items.
Counter staff	The counter staff interface with the customers and use the current system to answer enquiries. They are also responsible for managing their tills.	The counter staff might want a new system to: help manage enquiries from customers regarding stock; ensure that their transactions are correctly recorded; that there are no issues regarding till reconciliation.

1 mark x 3 for each acceptable User of the current system. This should not include cleaning staff. **3 marks**

1 mark x 3 for each valid reason of the role as a user of the current system. **3 marks**

1 mark x 3 for each valid reason why this user might want a new system. **3 marks**

2. (a)

STATEMENT	TRUE/FALSE
In DSDM, user involvement is not encouraged	False
Products are delivered frequently throughout the development.	True
Iterative development is encouraged throughout the development process.	True
Changes during the development process are not reversible.	False
Testing occurs at the end of the development process.	False

1 mark x 5 for each correct answer [5]

(b) A timebox is when a developer sets aside a defined amount of time to complete a set of tasks and stops at the end of that period of time regardless of whether the tasks are fully completed or not.

1 mark x for each of two correct points [2]

(c) **'Must have'** means that the identified requirements are absolutely essential for the system and that the system would function without them

'Should have' means that the identified requirements should be present but that the system could function without them. They may be achievable in a situation that is less limited by time.

'Could have' means that the identified requirements could be left out in this particular stage of the development.

'Want to have' means that the identified requirements are desirable but can wait until a later development can take place.

1 mark x 4 for each correct explanation [4]

3. (a)

	Waterfall	Agile
Changing requirements are acceptable even late in the development cycle		√
The software product is built using a linear approach.	√	
All project requirements must be identified at the beginning of the development process.	√	
The project can be assessed throughout the development lifecycle		√
Working software is delivered frequently and early in the development process		√
Every phase of the project must be completed before the next can commence.	√	
Software is tested at end of the development process	√	

(b)(b) Mark Band ([0]-[2])

Candidate provides a basic answer showing limited understanding of the Scrum Team and the Daily Scrum Meeting.

Limited knowledge and understanding of the roles and functions displayed.

Basic reference to the Scrum Team, the Daily Scrum Meeting and the roles and purposes involved.

Basic written communication.

Mark Band ([3]-[4])

Candidate provides a competent answer showing a reasonable understanding of project planning and management of resources.

Some knowledge and understanding of the roles and functions displayed.

The Scrum Team, the Daily Scrum Meeting and the roles and purposes involved described in reasonable detail.

Good level of written communication.

Mark Band ([5]-[6])

Candidate provides a very competent answer showing thorough understanding of the range of project planning and management of resources.

Very good knowledge and understanding of the roles and functions involved demonstrated.

The Scrum Team, the Daily Scrum Meeting and the roles and purposes involved described in thorough detail.

Very effective written communication.

[6]

Points to be noted

The Scrum Team is made up of a small number of developers, 4-7.

- Everyone in the team has ownership of the work required and there are no set roles.
- The team is self organising.

- The team is totally responsible for how it achieves the work to be done.
- The team also includes a Product Owner (largely responsible for identifying and prioritising the product backlog) and a ScrumMaster (largely responsible for leading the team and helping it progress effectively).

The Daily Scrum Meeting is a short daily meeting during which every team member must report on:

- What they did the day before;
- What they intend to do today;
- What obstacles they encountered.
- The meeting may require team members to stand up. The ScrumMaster will make sure the meeting is properly conducted. The meeting helps all involved to be fully aware of the developments and to reconsider issues such as work allocation.

4. (a) A functional requirement is a requirement of the system that enables a user to perform a specific action. A functional requirement must be included to fulfil the objectives of the business. It is usually defined by an action statement

[1]

Examples of functional requirements at PerfectPrice are:

- (i) A new system must provide daily reports for Charlie
- (ii) A new system must have a stock control system linked to order processing.
- (iii) A new system must process invoices and provide monthly financial reports.
- (iv) Secure login (note that security could be regarded as Non functional as well)

1 mark x 2 for any valid functional requirement [2]

(b) A non- functional requirement is a requirement of the system that reflects the qualities that the user would like to have included in the system. It is usually defined by a descriptive statement. Non functional requirements define attributes and qualities [1]

Examples of non- functional requirements at PerfectPrice are:

- (i) The ease of use of the new system interface.
- (ii) The security of the new system
- (iii) The performance of the new system

1 mark x 2 for any valid functional requirement [2]

5. (a) (i) and (ii)

Poor communication between users and developers

- Limited understanding of the scope of the project
- Incorrect or incomplete information between the two parties
- Project has poor, vague or uncertain user requirements
- Project outcomes may not meet expectation
 - Use an appropriate approach to systems development that reflects the user group involved.
 - Document, agree, review and prioritise requirements
 - Listen to users and revise accordingly
 - Involve users in the process
 - Involve users in testing

1 mark for explaining why this is a problem [1]

1mark x 2 for how to minimise the impact [2]

Poor project management

- Lack of realistic aims and objectives
- Plan is not properly monitored or controlled
- Unrealistic deadlines, deadlines which are constantly changed
- Resources are not properly identified
 - Identify project manager
 - Identify project team and associated roles
 - Set out aims and objectives
 - Identify resources
 - Set achievable targets that can be achieved
 - Identify problems quickly and react
 - Agree fallback options in advance

1 mark for explaining why this is a problem [1]

1mark x 2 for how to minimise the impact [2]

(b) Mark Band ([0]-[3])

Candidate provides a basic answer showing limited understanding of project planning and management of resources.

Limited knowledge and understanding displayed.

Basic reference to planning, management of resources and constraints.

Basic written communication.

Mark Band ([4]-[6])

Candidate provides a competent answer showing a reasonable understanding of project planning and management of resources.

Some knowledge and understanding demonstrated.

Planning, management of resources and constraints described in reasonable detail.

Good level of written communication.

Mark Band ([7]-[8])

Candidate provides a very competent answer showing thorough understanding of the range of project planning and management of resources.

Very good knowledge and understanding demonstrated.

Planning, management of resources and constraints described in thorough detail.

Very effective written communication.

[6]

Points to be noted

A successful project will be achieved through effective planning and the continual management of available resources.

Planning

- Project management team

- Use project management software

- Milestones can be set and measured against progress

- Scope of the project clearly defined and set out in advance

- Risks can be identified

- All tasks clearly defined can and set out in advance with available resources

- Finance planned and contingencies considered.

Managing resources

- Physical and human resources need to be handled properly

- Use appropriate software to maximise usage

- Control needs to be used over resource use

- Performance should be monitored

- Change control may be necessary

Constraints of project

- Poor requirements defined

- Poor risk management

- Project too complex

- Finance

- Interference

- Changing requirements

6 (a) (i) and (ii)

Costs in excess of the original budget established at the time of initial contract

The time taken to modify the software may cost the business in lost sales

Loss of customer satisfaction

The software may not meet the customer's needs and so they may take their business elsewhere. Loss of business

It will not meet their needs

it will lack the required functionality and perform as expected

1 mark x 2 for each valid consequence properly explained.

[2]

(b)

Mark Band ([0]-[2])

Candidate provides a basic answer showing limited understanding of testing types. Limited knowledge and understanding displayed. Some alternative types of testing noted. Basic written communication.

Mark Band ([3]-[4])

Candidate provides a competent answer showing a reasonable understanding of a range of testing types. Some knowledge and understanding demonstrated. Alternative types of testing described in reasonable detail. Reference made to the personnel involved with each testing type. Good level of written communication.

Mark Band ([5]-[6])

Candidate provides a very competent answer showing thorough understanding of the range of testing types. Very good knowledge and understanding of the range of testing types demonstrated. Alternative types of testing described in thorough detail. Personnel involved with each type of testing correctly identified. Very effective written communication.

[6]

Points to be noted

- Program testing this is carried out by the programmer
- Responsible for ensuring that program unit performs according to system specification before being integrated with other program modules
- It allows problems/bugs to be isolated at an early stage.

- System testing this is performed by the system developer/analyst
- This testing is responsible for ensuring that the whole system functions according to the system specification.
- Integration testing this is performed by the system developer/analyst
This is performed after program testing is complete.
- Individual program modules are executed together.
- To ensure they interact/communicate correctly with one another.
-
- Acceptance testing this is performed by the end user when system testing is complete and the software is ready for release.
- They will test the system in its real environment with suitable volumes of data and specific circumstances.

Candidates may also refer to unit testing, black box testing or white box testing.

(c)

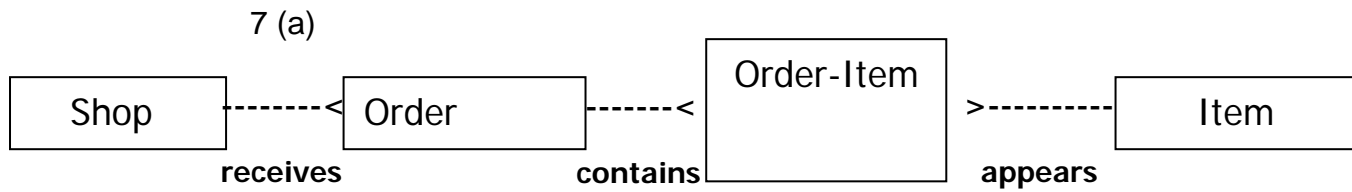
	Testing type
Test to be performed	Program
Check that the system meets user requirements	acceptance
Check that price is multiplied by quantity accurately	program
Check that an order to the cash and carry can be recorded in full.	system
Check full integration of all parts of the new system	integration

[4]

(d)

Order Number	Shop name	Supplier	Date	Invoice total	Reason for rejection
1001	Perfect Prices	Makro	1/12/2012	£1000.00	The date is in the future and therefore invalid
1005	Perfect prices	Makro	1/8/2011	£20.00	The total is outside the range acceptable
102	Perfect Prices	Makro	1/9/2011	£2000.00	The order number is not four digits in length

[3]



1 mark x 4 for each correct entity [4]

1 mark x 3 for each correct relationship [3]

- (b) (i) 1NF – Remove Repeating Groups [1]
- (ii) 2NF- Part Key Dependencies [1]
- (iii) 3NF – Independent Items [1]

1st Normal Form

Order (Order Number, Shop name, address, supplier, date, invoice total)

Order -Item (Order No, item Code, description, quantity, item cost, amount)

1 mark for each entity

2nd Normal Form

Order (Order Number, Shop name, address, supplier, date, invoice total)

Order -Item (Order No, item Code, quantity, amount)

Item (Item Code, Description, item cost)

1 mark for each entity

3rd Normal Form

Order (Order Number, Shop name, supplier, date, invoice total)

Shop (Shop name, address)

Order -Item (Order No, item Code, quantity, amount)

Item (Item Code, Description, item cost)

1 mark for each entity

[9]

8 (a) Definition/Function of a Constraint
A constraint is a restriction put on one or more columns in a table.

[1]

If there are no constraints it may be difficult to ensure consistency of the database. Constraints will ensure consistency

[1]

Types include Primary, Foreign, Unique, Check , Not Null)

1 mark x 4

[4]

(b) CREATE TABLE customer

(customer_id SMALLINT UNSIGNED,

firstname VARCHAR(25),

lastname VARCHAR(30)

address1 VARCHAR (30)

address 2 VARCHAR (30)

postcode VARCHAR (20)

tel_no

customerjoindate smalldate);

[6]

(c) CONSTRAINT pk_customer PRIMARY KEY (customer_id)

[1]