

GCE SOFTWARE SYSTEMS DEVELOPMENT

Assessment Unit A2 1

Systems Approaches and Database Concepts

TIME

2 hours

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.

Answer all questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 100.

Quality of written communication will be assessed in questions 3, 5 and 6.

Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.

This paper is accompanied by a Case Study. You must not use your own annotated copy of this Case Study.

ADVICE TO CANDIDATES

You are advised to take account of the marks for each part question in allocating the available examination time,

Centre Number

Candidate Number

For Examiner's use only			
Question	Marks Available	Marks	Remark
1	9		
2	11		
3	13		
4	6		
5	14		
6	15		
7	19		
8	13		
Total	100		

PerfectPrice

The Price family has been in the retail trade for at least three generations. The business started as a corner shop owned by William Price, grandfather of the current owner Charlie Price. The success of the original shop was due to a number of factors. It provided a local service to the community; it stocked a good range of products at fairly competitive prices and customers always felt known and valued. Another feature of the shop was that it allowed customers to operate small credit accounts once they were established as regular customers. As the business passed from father to son, these principles were upheld.

When Charlie took over the business from his father John in 1998, he realised that having a well stocked local shop was invaluable to people who needed the accessibility of somewhere near to their homes. He was also aware that many people just did not want to use or indeed travel to large supermarkets. Charlie relocated the shop to larger better equipped premises and extended the product range based on local demand.

Being an astute business man, Charlie also began to see the possibility for expansion. With his brother Ed, he researched other similar residential areas to determine the likely demand for the type of outlet he could provide. In 2005, he established a second shop in a suburb three miles from the current shop and in 2007 a third shop on the other side of town. Along with these developments and based on his research, Charlie invested in two mobile shops that had particular routes worked out in rural areas with fewer retail resources. Charlie named the business PerfectPrices and made his brother Ed a partner. Profits have increased year on year and the business appears to be thriving.

When there was just one shop, all the procedures associated with its management were just about manageable. Charlie had a reasonably clear picture of his stock and ordering system, his profit, the money owed by customers availing of his credit facility and his accounts. However now that the business has grown considerably, the management of all of these things has become a serious problem. There are

now 22 staff, employed to run the shops and vans as well as a secretary and 4 cleaning staff. Each shop has a manager, store, counter and cleaning staff on rotas during opening hours throughout the week. The manager is responsible for the day to day running of the shop. The manager must report to Charlie and must oversee all staff schedules, money reconciliation and stock issues. The manager must provide Charlie with daily details of staff hours worked as well as well as stock reports and till receipt summaries. This information is not always ready when it is required. The secretary must record all of the information and present it in a suitable format for Charlie. There is considerable pressure on the secretary to have it all ready when required and when any of the managers or the secretary are off sick or on holiday, the work cannot be done and the system breaks down

When there was just one shop, Charlie operated a very simple manual stock control system which he tried to extend to the new outlets and vans. This literally amounted to counting items in the storeroom and going to the Cash and Carry once a week to restock or sending orders to other wholesalers and awaiting delivery.

When stock items were counted by the storeroom staff, the current totals were recorded in a notebook along with the date. Following this procedure, Charlie would review the situation and either go to the Cash and Carry or see that order forms were created for the wholesalers. Charlie took on the ordering process himself. The order forms designed by the secretary were simple documents bearing the PerfectPrice name and logo and a simple layout for recording the date of the order and writing the item name, brief description and quantity required. On occasion because of the sheer volume of work, some orders were not placed at all.

As soon as new stock arrived, storeroom staff attempted to get it unpacked immediately and get shelves replenished. They were supposed to check that the delivery notes and the stock delivered matched correctly but when they were busy this was not always done and it was assumed that the deliveries were accurate. Delivery notes were stored in a box file in no particular order. The secretary was meant to check delivery notes with the order made and update the notebook by crossing off the order. This frequently did not happen so even if the amount delivered matched the delivery note, there was no guarantee that the delivery matched the

original order. Sometimes when Charlie tried to check the notebook, the details of the original order were obscured because of the way it was crossed out.

Sometimes, when the full amount of a stock item was not delivered immediately, it either went unnoticed or when the outstanding amount was supplied there was confusion as to whether it was part of a new order or a mistake of some sort. The system was never totally accurate as on many occasions items were missed or totals were inaccurate.

These issues had a follow through impact on subsequent invoices and payments. The secretary was supposed to check invoices against orders and deliveries before payments could be issued. This was a tedious task and on many occasions discrepancies arose. This meant 'stock outs' and disputes over invoice amounts. While these problems were manageable on a small scale, once the original shop expanded and the other two shops opened along with the mobile facilities, the whole stock system got out of control.

The mobile shops simply replenished their stock from whichever of the three outlets they were closest to at the end of the day. The van drivers were supposed to do a stock check on the van at the end of each day and record their requirements on a van stock request form which they gave in to their chosen outlet. While this might have worked if it had been managed properly, what really happened was that the van driver, keen to finish his work and be ready for the morning might not record his own stock position and simply pick up items from the outlet leaving minimal information instead of adjusting the record for that day in the stock notebook.

As each new facility became available, Charlie thought he could extend the same procedures to each and then centralise the overall ordering system on a weekly basis. It was his intention to collect all order requests and generate overall orders for the Cash and Carry and the Wholesalers. He wanted to make one attempt at reordering each week and allocate the deliveries and update the records himself. He wanted to remain totally in charge of the whole process himself so that he would know exactly what was going on.

This has become totally out of control and is beginning to impact on the business especially when items are out of stock. Order requirements are frequently confused between outlets and vans and many customers are very dissatisfied with the service provided because basic items might not be available. The counter staff are continually dealing with dissatisfied customers and are placed in a very difficult position because they have no information regarding the stock position as they have no way of knowing when an item of stock is unavailable or when it is likely to be delivered.

In addition, Charlie is now struggling to maintain his credit facility to customers. The customer base has increased significantly and he has had difficulty moving from his single operation to a multiple system where sometimes payments are not recorded accurately and customers may not be reliable. The secretary is responsible for administering this system.

The original system in place simply recorded the customer name and address along with the dates and purchase value of the goods in the Customer Notebook. The Customer Notebook was checked daily and after two weeks the secretary would write out reminder notices and decline further credit if the amount outstanding exceeded £50. He now realises that many customers are in arrears and that he has not even made them aware of their situation because he does not know himself.

Charlie did try to fix the situation by designing a range of forms to improve his record keeping for stock, orders and deliveries and customer records. He tried to get the manager in each shop and the delivery men to complete them as necessary. The system did not work efficiently however as the forms were sometimes not completed at all or not accurate, illegible, or even mislaid in transit. The movement of forms between premises was also problematic and delays frequently occurred in processing the orders.

Charlie and the secretary are frequently at odds with each other and there have been some unpleasant exchanges. He considers that she should be much more efficient and he does not fully appreciate the volume of work involved; especially now there are three outlets and two mobile vans. Recently the managers have complained as well about several matters including the fact that the procedures for

restocking the vans is totally inappropriate and it is becoming very difficult to provide Charlie with all the information he needs.

It is becoming very difficult for Charlie to keep up with everything and he realises that he must get things sorted out urgently. Charlie is aware that he must find a way of sorting out these problems before there is any further impact on the business. He really believed he could develop a good manual system but has finally realised that this is not going to work. Charlie is prepared to pay for proper advice and realises that he now needs to bring his systems up to date with available technology. He realises that this will involve a significant investment but he wants the best possible outcomes.

Charlie has decided to call upon the services of the consultancy firm SolveIT Solutions to assist him in finding solutions to his problems. SolveIT Solutions is a new company with modern ideas and have approached the situation with very clear ideas, positive thinking and up to date strategies. They have suggested a range of approaches to help Charlie.

1. The Systems Analysts at SolveIT Solutions are keen to involve Charlie and his staff in determining the correct way forward. They have started by asking PerfectPrice to:

- identify **three** Users of the **current** system;
- explain why each can be identified as a User of the current system in terms of their current role;
- provide **one** reason why each would like to see a new system in place.

Complete the table below.

USER	ROLE AS USER OF THE CURRENT SYSTEM	WHY THIS USER MIGHT WANT A NEW SYSTEM

2. SolveIT Solutions offer a range of approaches to the solution of business problems. They have considered the possibility of using a methodology called DSDM in the development process. The analyst in charge has explained some key features of this methodology to Charlie and the managers in PerfectPrice. He wants to make sure they understand the principles he has explained and has asked them the following questions.

(a) Complete the following table to show which of the following statements is true or false.

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

[5]

9b) An important feature of DSDM is training. Complete the following statement:

A Time box

[2]

(c) In DSDM, the acronym MoSCoW is used to define the priorities of assigned requirements. Complete the following statements:

‘**M**ust have’ means _____

‘**S**hould have’ means _____

‘**C**ould have’ means _____

‘**W**ant to have’ means _____

[4]

4. The Systems Analysts at SolveIT Solutions have explained to Charlie and Ed that they must try to identify requirements of any proposed new system to assist the development process

Explain what is meant by the following terms giving two examples of each relating to PerfectPrice.

(a) A functional requirement is _____

[1]

Examples of functional requirements at PerfectPrice are:

(i)

[1]

(ii)

[1]

(b) A non- functional requirement is: _____

[1]

Examples of non- functional requirements at PerfectPrice are:

(i)

[1]

(ii)

[1]

5. The Systems Analysts at SolveIT Solutions want Charlie and Ed to understand that the delivery of completed projects can sometimes be problematic.

(a) Suggest what you think the Systems Analysts would say to Charlie and Ed to explain the problems listed below and how best to minimise their impact on the final project outcomes.

(i) Poor communication between users and developers

[3]

(ii) Poor project management

[3]

(c) Allocate each of the following tests to the appropriate testing type.

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

[4]

(d) A test plan is needed to test data within any new system. A possible structure of an ORDER table for a new system is shown below.

Field	Data type	Description	Required
Order Number	Number	This is the primary key and should consist of four digits	Yes
Shop name	Text	This should be a valid facility name	Yes
Supplier	Text	This should be a valid supplier name and exist in the supplier table	Yes
Date	Date /Time	A valid date which is less than or equal to today's date	Yes
Invoice total	Currency	This should be automatically calculated and be a total of the individual items ordered. The total should amount to more than £50	yes

(e) The table below shows orders which have been rejected by the new system. Complete the table by giving a reason for the rejection of each order.

Order Number	Shop name	Supplier	Date	Invoice total	Reason for rejection
1001	Perfect Prices	Makro	1/12/2012	£1000.00	
1005	Perfect prices	Makro	1/8/2011	£20.00	
102	Perfect Prices	Makro	1/9/2011	£2000.00	

[3]

7 (a) An option for Charlie is to implement a database system to keep track of the orders made to the cash and carry from each shop. The systems designer designed the following computerised form in order to record the order

Perfect Prices Cash & Carry Order				
Order Number	027			
Shop	Perfect Prices 1			
Shop Address	Belfast Branch			
Supplier	Wholesalers			
Date	1/October/2013			
Item code	Description	Quantity	Item cost	Amount
013	Skimmed Milk	50	£0.75	£37.50
024	White loaf	25	£1.00	£25.00
Total	£62.50			

Each shop can generate many orders depending on demand. The same goods can be purchased by a number of different shops.

(a) Using the above description, produce an E-R model that does not contain a many to many relationship. [7]

(b) Complete the following statements.

(i) The rule for first normal form is

[1]

(ii) The rule for second normal form is

[1]

(iii) The rule for third normal form is

[1]

c) Normalise the data in the Order Form to third normal form showing your working out at each stage

[9]

8 (a) The system designer wishes to create a table in SQL that will store customer details.

The fields he wishes to include are:

customer_id
firstname
lastname
address1
address2
postcode
tel_no
customerjoindate

Generate a SQL statement to create these fields.

[6]

(b) When designing and creating tables, SQL Server requires the creation of table/field constraints as well as describing table fields (i.e. providing field names and setting data types).

Complete the following statement

(i) A constraint is

[1]

(ii) The function of a constraint is

[1]

(iii) Types of constraints include

[4]

(c) State a constraint that should be included in the statement in (a) in order to complete the table definition.

[1]