THE BCS PROFESSIONAL EXAMINATIONS
Diploma

April 2007

EXAMINERS' REPORT

Systems Analysis

Question 1a

Draw a Top Level Current Logical Data Flow Diagram for the [Parklands Garden Supplies]
scenario.   **(16 marks)**

Answer pointers & marking scheme

See diagram on the following page (other suitable notation was accepted).

Marking Scheme:
|	
Processes:	1 each up to 7
Data Stores	0.5 each up to 2
Data Flows	0.5 each up to 5
External Entities	1 each up to 2
	Total: 16 marks

Examiners comments

Most candidates produced a competent DFD. However, closer attention could be paid to naming:
Processes: begin with an imperative verb; processes should be *doing* something (e.g. 'Check stock availability' rather than 'order' or 'stock process').
Data flows: these tend to be particularly careless, with either no name at all or with a name more appropriate for a process; they should be clearly labelled with the data that is being transferred (e.g. 'stock level' or 'verified order' and not 'read stock level' or 'verify order').
Data stores: on a logical DFD should refer to the data held without reference to its format (e.g. 'orders', 'plants' and not 'order file' or 'plant records').
External entities: those who provide data to, or receive data from, the system being modelled, not those who simply carry out the tasks (e.g. in the Parklands Garden Supplies, the Greenhouse Manager and the Shops – not the administrative staff).

Parklands Garden Supplies (Level 1 Diagram)
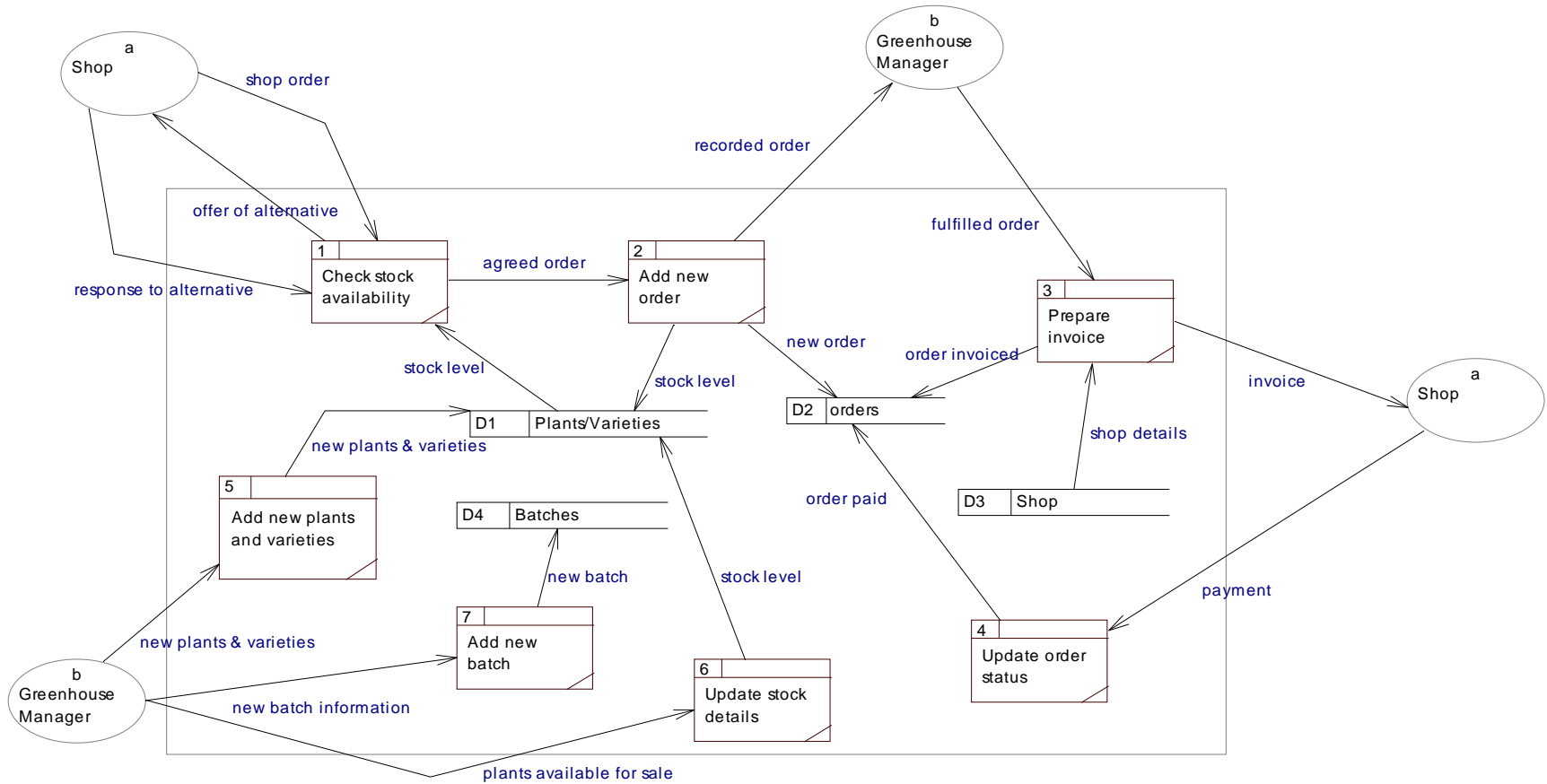
Question 1b

Produce an Entity Relationship Diagram (Logical Data Structure) and a set of normalized tables for the Parklands Garden Supplies] scenario. DO NOT show evidence of the normalisation process. **(20 marks)**

Answer pointers & marking scheme

See diagram on following page (other suitable notation was accepted) and table types below.

Marking Scheme:

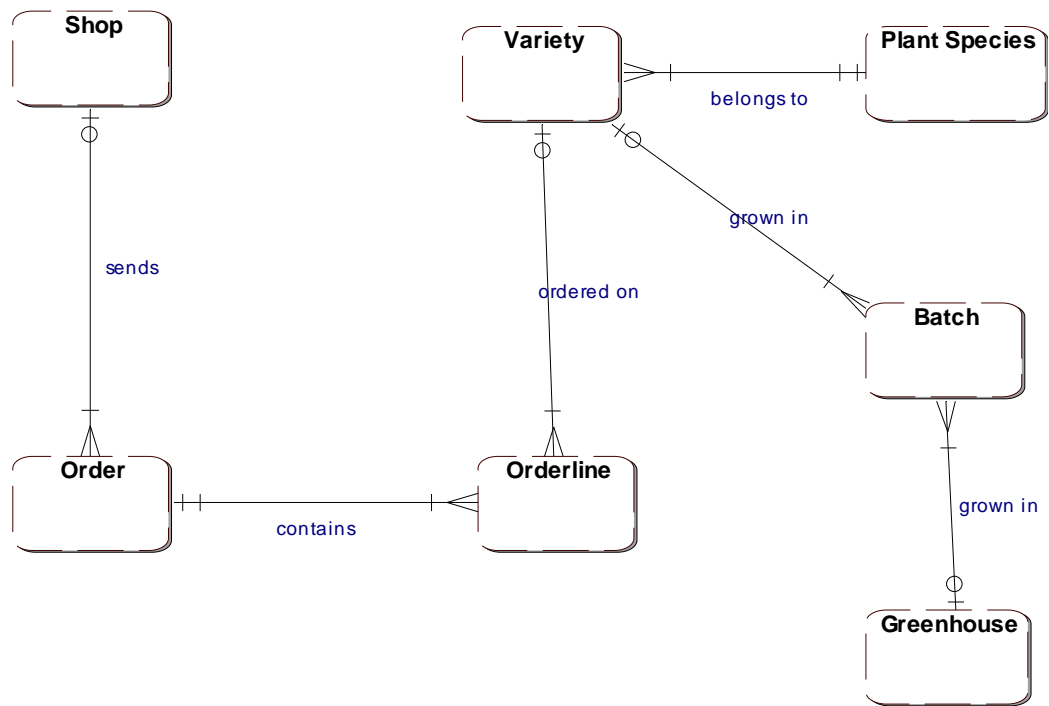|	
Entity types:	1 mark each to max of 6
Relationships with appropriate degrees & membership classes:	1 mark each to max of 5
Table types, consistency with ERD + appropriate PK:	0.5 each to max of 3
FK postings:	0.5 each to max of 3
Other attributes placed to result in well-normalised tables:	3
	Total: 20 marks

Sample Tables in BCNF

Shop	(shop_code, shop_name, shop_address, shop_telephone_no)
Order	(order_no, order_date, *shop_code*, order_status)
Orderline	(*order_no, variety_no*, quantity_required)
Plant Species	(plant_code, botanical_name, common_name, description)
Variety	(variety_no, variety_name, *plant_code*, price, growing_notes, quantity_in_stock)
Batch	(batch_no, *variety_no*, date_planted, *greenhouse_no*)
Greenhouse	(greenhouse_no, atmosphere_notes)

Examiners comments

Most candidates produced a competent ERD. Candidates must remember to label the relationships.

Entity Relationship Diagram

Shop

Variety

Plant Species

belongs to

sends

grown in

ordered on

Batch

Order

contains

Orderline

grown in

Greenhouse

Question 1c

An alternative to developing a set of levelled Data Flow Diagrams is to develop a Use Case Diagram to model the functionality of a system.

i)   Explain what is meant by an 'Actor' on a Use Case Diagram.   **(3 marks)**

ii)   Give an example of ONE Actor from the Parklands Garden Supplies scenario. Identify TWO use cases that this Actor carries out, and show how these would be modelled in UML notation.   **(6 marks)**

iii)   To support the Use Case Diagram, a Use Case Description is developed. Explain what a Use Case Description should include.   **(5 marks)**

Answer pointers & marking scheme

i)   An Actor is any *person*, *device* or *another system* with which the system being developed interacts.
        1 mark for identifying each of the 3 things an Actor may be = 3

ii)   An example of an Actor would be the administrative staff; 2 use cases could be chosen from any of the processes on the DFD.
        Correctly identifying an actor: 1
        Representation of actor on use case diagram: 1
        Correctly identifying and representing use cases: 1 each = 2
        Association of actor with use cases: 0.5 each = 1
        For including any appropriate include/extend stereotypes: 1

iii)   Use Case Description should include: the name of the use case; its purpose (what it is intended to achieve); the inputs to the use case; the output, or system response to the use case; a description of the processing carried out; any alternative paths through the use case; any pre-conditions and post-conditions.

        1 mark each for any 5 of these = 5

        Total: 14 marks

Examiners comments

i) & ii)
Many candidates equated an 'Actor' with an 'External Entity'. However, it should be noted that at Actor is a person, device or system that *directly interacts* with a use case. In the Parklands Garden Supplies scenario, the only actor is the Administrative Staff – these are the people who enter the updates supplied by the Greenhouse Manager, although credit was given for the latter. (Although not mentioned in the scenario, it would be possible for a new Information System to allow the Greenhouse Manager to enter data directly instead of via the administrative staff.) The Shops are *not* actors – although they would be if there was an e-business link that allowed them to check available stock and enter their own orders. Similarly, a use case is a piece of functionality to be carried out by the system; so this would include 'add new order' or 'update stock level' – but not 'send order' or 'notify plants ready for sale'.

iii)
Although some candidates clearly understood what a use case description should include, others were less certain, and described the components of a use case diagram. It should be noted that a use case diagram is of limited use without the detail provided by the accompanying use case descriptions.

Question 2

a)   Avison and Fitzgerald present a range of systems analysis techniques and classify them as either 'process techniques', 'data techniques' or 'holistic techniques'. The techniques they list under these headings include:

Rich Pictures   Data Flow Diagrams   Entity Modelling
Conceptual Models   Structured Walkthroughs   Action Diagrams
Normalisation   Decision Tables   Cognitive Mapping
Structure Diagrams   Root Definitions   Matrices

From the techniques listed above, identify those that would be classified as 'holistic techniques' and those that would be classified as 'process techniques'.

(10 marks)

b)   Explain how an Activity Diagram is used to describe processes. Illustrate your answer with a suitably labelled diagram using UML notation.   **(15 marks)**
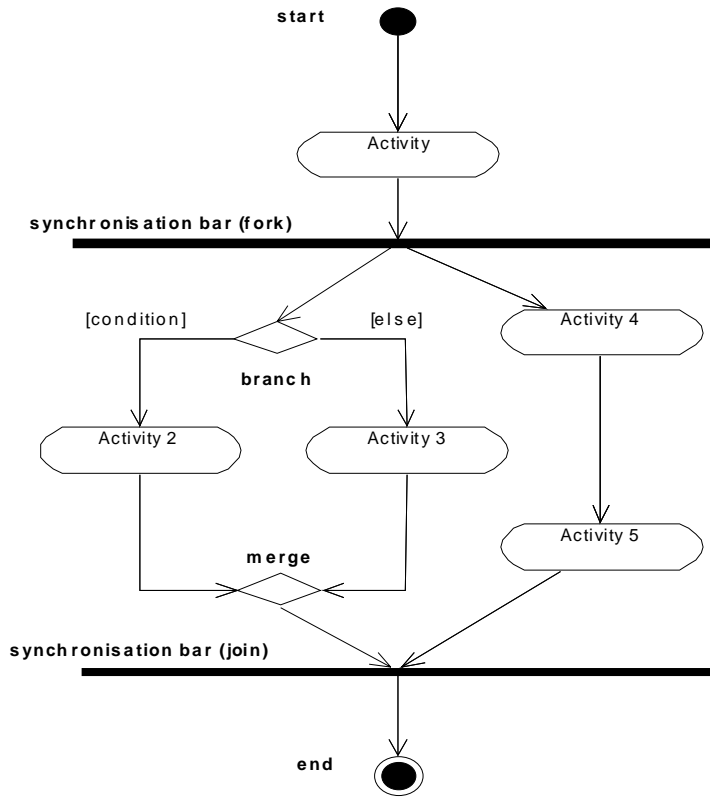
Q2a Answer pointers

Holistic	Process
Root Definitions	Data Flow Diagrams
Rich Pictures	Structure Diagrams
Conceptual Models	Matrices
Cognitive Mapping	Action Diagrams
	Structured Walkthroughs
	Decision Tables

Q2a Marking pointers

1 mark for each correctly identified within the right category to max of 1*10 =   10 marks
                                                                   Q2a = 10 marks

Q2b Answer pointers

AD show the flow from activity to activity during a process as part of modeling the dynamic aspects of systems. Useful for modeling workflow and or operations. The contain activity states and action states, transitions and objects. AD are particularly good at showing 'parallelism', conditions, branching, forking and joining. Swim lanes can be used to highlight and or represent organizational units responsible for processing.

Labels may include, initial states, action states, guard expression, sequential branches, concurrent fork, concurrent join, object flow and final state.

Q2b Marking pointers

5 marks for explaining how an activity diagram describes processes	5 marks
5 marks for an accurate diagram	5 marks
5 marks for correctly labeling components, i.e. 5*1 to max of	5 marks

Q2b = 15 marks

Total for Q2 = 25 marks

Examiners comments

Most students identified the well known techniques and correctly identified the category to which they belong. The identification of process techniques was particularly strong,

Some very good Activity Diagrams were produced and appropriately labelled. Some candidates, however, incorrectly made a link between 'activity' and 'human activity' and went on to produce a Rich Picture instead of an Activity Diagram.

Most candidates attempting this question did well in one of the parts and less well in the other, only a few did well in both parts.

Question 3

a)   Based on the scenario outlined in question 1 briefly describe the main fact-finding techniques that may be used during systems analysis and evaluate their usefulness in supporting the fact-finding stage of the development.   **(10 marks)**

b)   When seeking to identify 'user interface requirements' the systems analyst may use 'structured approach', an 'ethnographic approach' or a 'scenario based approach'. Explain each of these approaches and assess their appropriateness for use in supporting the development outlined in question 1.   **(15 marks)**

Q3a Answer pointers

SQUIRO expected, prototyping will also feature and is acceptable.
To support the fact-finding for this scenario it is expected that interviews, observation and reading/document review are strongest candidates.
Least likely are questionnaires, participant observation and sampling – but if a strong case is made these may be permissible.
Note: many students at this level may suggest questionnaires to get the views of the 'shops' about the level of service provided by PGS. This is unrealistic and unnecessary and as such will be regarded as incorrect unless supported by the view that PGS has a large number of recipients for a questionnaire.

Q3a Marking pointers
1 mark for describing each technique to a max of 5*1   5 marks
1 mark for each correctly evaluated with regard to suitability for use at PGS 5*1   5 marks
                                                                                                        Q3a = 10 marks

Q3b Answer pointers

'**structured approach'-**
- Based in SSAD - same benefits for HCI - Integrates SSAD and Structured HCI
- Methods include - 'Studio' / 'Respect'. Studio uses: task hierarchy diagrams, knowledge representation grammars, task allocation charts and state charts. Perhaps the strongest candidate for use in supporting the PGS system.

'ethnographic approach'
- Ethno - basis in social sciences and has a huge impact on method of enquiry, involving working together to 'fully' understand, participant observation & empathy, video, interview, discussion & revision. It is participative and collaborative. Perhaps the least strong candidate for supporting the PGS development – too time consuming and the interface needs are perhaps not overly challenging or unknown.

'scenario based approach'.
- 'Middle road' in terms of formality and makes extensive use of Scenarios which are step-by step descriptions of a user's actions.
- Used in requirements capture for interface design and evaluation
- Scenarios can be either textual narrative or story boards

A case could be made to use this approach.

Q3b Marking pointers
4 marks for correct explanation of approaches to max of 3*4   12 marks
1 mark for each evaluated appropriately to support this development or not 3*1   3 marks
                                                                                                        Q3b = 15 marks
                                                                                                Total for Q3 = 25 marks

Examiners comments

This was a popular question with candidates, perhaps due to the popularity of Fact Finding questions in examinations at this level. However, the choice of this question by many candidates appears to have been a pragmatic compromise in that many candidates did not attempt part B at all and presumably were relying on gaining high marks in part A. For many candidates this strategy worked but for others it did not.

It was clear in many answers to part A that candidates really did try to focus their answers on the specific requirements of the question, i.e., 'describe' and 'evaluate'. This was very pleasing and these candidates often scored maximum marks. A significant number, however provided answers that listed the main fact-finding techniques and their advantages and disadvantages, thereby leaving the reader to relate the answer to the question; this is a frequent and serious error. All candidates should seek to identify the specific requirements of a question (by focusing on the key words in the question) and ensuring that their answers explicitly address those requirements. This question required candidates to briefly 'describe' the technique, i.e., say what it is, its main features, specific uses, etc and then 'evaluate' the extent to which it supports the specific fact-finding needs of the PGS development.

Part B was answered well by some candidates but many candidates produced answers that were informed guesses, but in doing so were correct in identifying some of the main features of each approach. Most candidates correctly associated:
1. the 'structured approach' with SSADM type practices,
2. the 'ethnographic approach' with cultural and social aspects of systems, and
3. 'scenario approaches' with the identification of a 'processing scenario' as being important.

This means that even though specific and technical awareness of the three approaches was low candidates did still manage to score some marks.

Question 4

a)   Briefly explain how each of the following can be used during systems analysis:
        i) Organisation charts   **(4 marks)**
        ii) Historical documents   **(4 marks)**
        iii) Feasibility Study Report   **(4 marks)**

b)   Describe the contents of a Requirements Specification and explain how it differs from a Feasibility Study Report.   **(13 marks)**

Q4a Answer pointers

i)   **Organisation charts-** Shows the structure of an organisations in a relatively static manner. Usually top-down it shows the hierarchy of reporting and control and may include lateral interfaces and relationships. Used in SA to understand the context a development and the network of possible interfaces that may be required to provide and or support in terms of accesses and data. Mostly however it's a standard item to request during any SA process to enable the analyst to better understand the organisation and its structures.

ii)   **Historical documents-** May be of several types. Previous records of transactions or transaction periods can be used to check that current reported figures are appropriate, to identify peaks and troughs, to identify data that is stored and processed, etc. Historical documents may also give insights into company history and therefore its current and future profile and aspirations. Other historical documents may provide insights into the design and implementation of current systems and procedures that are relevant to informing current developments.

iii) **Feasibility Study Report -** A FS is a study to assess the feasibility of a proposed project/development. It considers the present system, its problems and ways of solving these problems. It is undertaken to assess if the project is worth developing further following a preliminary study. A FS proposes several solutions and makes a firm proposal with regard to which option should be implemented if the project is recommended to continue. It provides an outline functional specification for the proposed solution. Specific areas that a FS should consider include, legal, organisational/social, technical and economic feasibility. Used in SA as the key point when the decision is taken to go ahead or not. A major SA responsibility.

Q4a Marking pointers

Up to 4 marks for each good explanation that includes how it's used in SA to max of 3*4 =
12 marks
Q4a = 12 marks

Q4b Answer pointers

Requirement specification will include a list of functional and non-functional requirements. Depending on the methodology used, these could be documented in a number of ways, including: Requirements catalogue, data model, process model (structured method such as SSADM), use cases, analysis class diagram (OO method such as Unified Process). Non-functional requirements such as system performance, reliability, security issues etc, should also be included. It may also include an outline of constraints, eg. hardware, software, environmental and operational.

Differs from FS report in that the content of a FS report focuses on exploring and or proving the feasibility of the proposed development whereas the RS is provided to document and record the precise requirements that will be designed into a system. The content of the RS will not be concerned with, legal, organisational/social, technical and economic feasibility.

Q4b Marking pointers

Up to 10 marks for describing the content of a RS   10 marks
Up to 3 marks for explaining the difference in the **REPORTS!!**   3 marks
Q4b = 13 marks
Total for Q4 = 25 marks

Examiners comments

Part A was usually well answered with knowledge of the feasibility study being particularly strong. Most candidates scored high marks for part A of this question.

Whilst many candidates answered part B of this question quite well, some restated, in greater detail, their description of the feasibility study that they had produced in part A of this question. Candidates should seek to address the specific requirements of the question, which in this instance was to "describe" the contents of a requirements specification and "explain the difference" between that and feasibility study. A disappointingly high number of candidates described the contents of the requirements specification report and then the contents of the feasibility study report but failed to draw out and explain the differences between the two.

Question 5

a)   What are the main criticisms of the traditional Information Systems Development
        Life Cycle?   **(10 marks)**

b)   Explain the main features of EITHER Dynamic Systems Development Methodology
        (DSDM)   OR Extreme Programming (XP) and describe how it may help overcome
        some of the problems   outlined in your response to question 5a.   **(15 marks)**

Q5a Answer pointers

Fails to meet user requirements	Instability	Inflexible
Problems of documentation	Incomplete systems	User dissatisfaction
Problem with the 'ideal' approach	Lack of control	Maintenance workload
Emphasis on 'hard' thinking	Applications backlog	

Q5a Marking pointers
1 mark for each criticism correctly identified to max of   10 marks
                                                                  Total for Q5a = 10 marks

Q5b Answer pointers

Main Features of DSDM (A&F p439)	Main Features of XP(A&F p443)
Formalised prototyping framework developed out of RAD. Five phases: Feasibility study, Business study, Functional Model Iteration, Systems Design and Build and Implementation. Uses Time-boxing and JAD. The 'team' is a central concept to DSDM and they must be empowered to make decisions. Frequent deliveries of products is a feature of DSDM as is fitness for purpose, all changes are reversible, requirements are 'frozen', testing is integrated throughout the project and finally collaboration and cooperation are also key to DSDM.	A 'lighter' methodology that is suitable for small to medium developments, i.e. 3-10 programmers. Defined as a discipline of software development with values of simplicity, communication and courage'. It's more of a set of principles than a step-by-step methodology. Incremental development strategy with aim of quick implementation and incremental release of code. Focus on collaborative teamwork. Teams include developers, managers and users. User stories feature prominently. Stages include; planning, design, development, productionalizing and maintenance.
How DSDM and XP overcome SDLC problems	
Quick time to delivery and frequent delivery of systems components Users involved in JAD and project teams User centred approach Ambassador and Visionary Users in DSDM More flexible Smaller teams and product targets make the projects easier to control Softer issues can be identified and responded to Full involvement of users and focus on deliverables means that requirements are more likely to be met. Etc.	

Q5b Marking pointers

10 marks for explaining the main features of either DSDM **OR** XP   10 marks
5 marks for relating the features to the criticisms of the SDLC they have outlined   5 marks
**(Note: if candidates provide answers to both DSDM and XP the first
one presented in their answer books will be marked**)   **Total for Q5b = 15 marks**
                                                                  Total for Q5 = 25 marks

Examiners comments

Part A was generally well answered with the standard criticisms being correctly identified. Part B was less well answered. DSDM was the preferred approach described in response to part B and candidates generally made a reasonable attempt to relate the features of DSDM explicitly to the criticisms identified in part A. Pleasingly the features of DSDM are widely understood amongst candidates.