SCOTTISH
QUALIFICATIONS
AUTHORITY

2005 Information Systems

Advanced Higher

Finalised Marking Instructions

These Marking Instructions have been prepared by Examination Teams for use by SQA Appointed Markers when marking External Course Assessments.

No.	Commentary	
1.		
Source	Question	Marking Instructions
	Blue Mountain Zoo keeps paper records containing the following information about each of the animals: • Animal ID • Name of animal • Breed of animal • Date of birth • Gender • Animal diet • Whether born in zoo • Mother's name (if known) • Keeper name • Keeper pager number • Medical treatment description • Date of treatment • Visiting vet name • Vet practice address • Vet practice postcode • Vet practice telephone number	

No.	Commentary	
1.		
Source	Question	Marking Instructions
	(a) Using Animal ID as your primary key at UNF, normalise the attributes listed above to create a solution in third normal form. You should show all stages of development, from UNF through INF, 2NF and 3NF. The following should be considered when developing the solution: • No new attributes should be introduced - use only the attributes listed above. • All animals of the same breed have the same diet. • Each animal is the responsibility of one particular keeper. • Sick animals may require several treatments but only receive one treatment per day. • Each time an animal requires medical treatment, one single vet will be called out.	**Note that a candidate's INF, 2NF and 3NF should be based on the candidate's UNF, 1NF and 2NF. Consequential errors that occur as a result of an error made at an earlier stage of the normalisation process should not be penalised twice.** **Correct UNF is given below:** **<u>Animal ID</u>** **Name of animal** **Breed of animal** **Date of birth** **Gender** **Animal diet** **Whether born in zoo** **Mother's name (if known)** **Keeper name** **Keeper pager number** ***<u>Animal ID</u>** **<u>Date of treatment</u>** **Medical treatment details** **Visiting vet name** **Vet practice address** **Vet practice postcode** **Vet practice telephone #** **Award 1 mark for correct UNF (primary key and repeating data must be indicated).** **Award 1 mark for applying 1NF processes correctly – based on candidate's UNF. Repeating data must be removed to a separate entity and PK/FK must be correct to receive the mark. Note that if repeating data had not been shown at UNF, candidate's INF cannot receive any marks.** **Award 2 marks for applying 2NF processes correctly – based on candidate's 1NF. Note that in the correct solution, 2NF = 1NF since there are no partial dependencies.** **Award 2 marks for applying 3NF processes correctly – based on candidate's 2NF. To receive these 2 marks, all non-key dependencies must be removed to create separate entities. Also, award 2 marks for correct PK/FK to uniquely identify and link each new entity. If candidate has 1 error in PK/FK, award only 1 mark for keys; 2 or more errors in PK/FK, award 0 marks for keys. Note that in vet and keeper entities, accept vet name and keeper name as primary.**

No.	Commentary	
1.		
Source	Question	Marking Instructions
	(b) If normalisation is not carried past 1NF, there may be problems in the resulting implementation. Describe **two** problems that would arise if the *Blue Mountain Zoo* system was implemented at 1NF rather than 3NF.	For example: Duplicate vet information could lead to update anomalies since the vet details would need to be repeatedly updated every time they changed; details of a new keeper can't be added to the system until the keeper has been assigned an animal ie insert anomaly; if an animal dies and its details are removed from the system, it is possible that the only reference to the animal's keeper could also be removed ie delete anomaly; Duplicate data stored unnecessarily could lead to inefficient processing and querying of details; Duplication of details will lead to inefficient use of memory. **Award 1 mark for each problem clearly identified and described. Max 2 marks. Two different types of anomaly are acceptable but must be described correctly and must relate to candidate's 1NF solution.**

No.	Commentary
2.	

Source	Question	Marking Instructions
	The following information is a summary of an initial interview with Mr Charlie Burton, the owner of 'New Snow Video and DVD Rentals'. The interview was conducted by an analyst who had been asked to develop a new database system to record details of rentals. "We aim to provide the best video and DVD rental service possible. Stock levels are currently just over 3500 VHS videos and 5000 DVDs. We rent items for any period of up to one week with a nightly charge. If an item is rented for a week then a 10% discount is applied to the total rental charge for the item. Videos cost £1, £2 or £3 per night and DVDs are charged at a standard rate of £4 per night. Customers can hire more than one item per rental but are not allowed to have any more than six items out at any one time. We want the new system to record a rental in the following way: 1. check if the items required are in stock; 2. check that the customer is registered with us using the customer code on their card; 3. check that the customer has not exceeded the maximum number of rental items; 4. create a new rental for the items being rented; 5. calculate the total charge of the rental; 6. if a customer is unable to pay the charge, the rental is cancelled; 7. when the customer returns a rental item, the rental item is marked as returned; 8. the rental details are archived at the end of each month."	

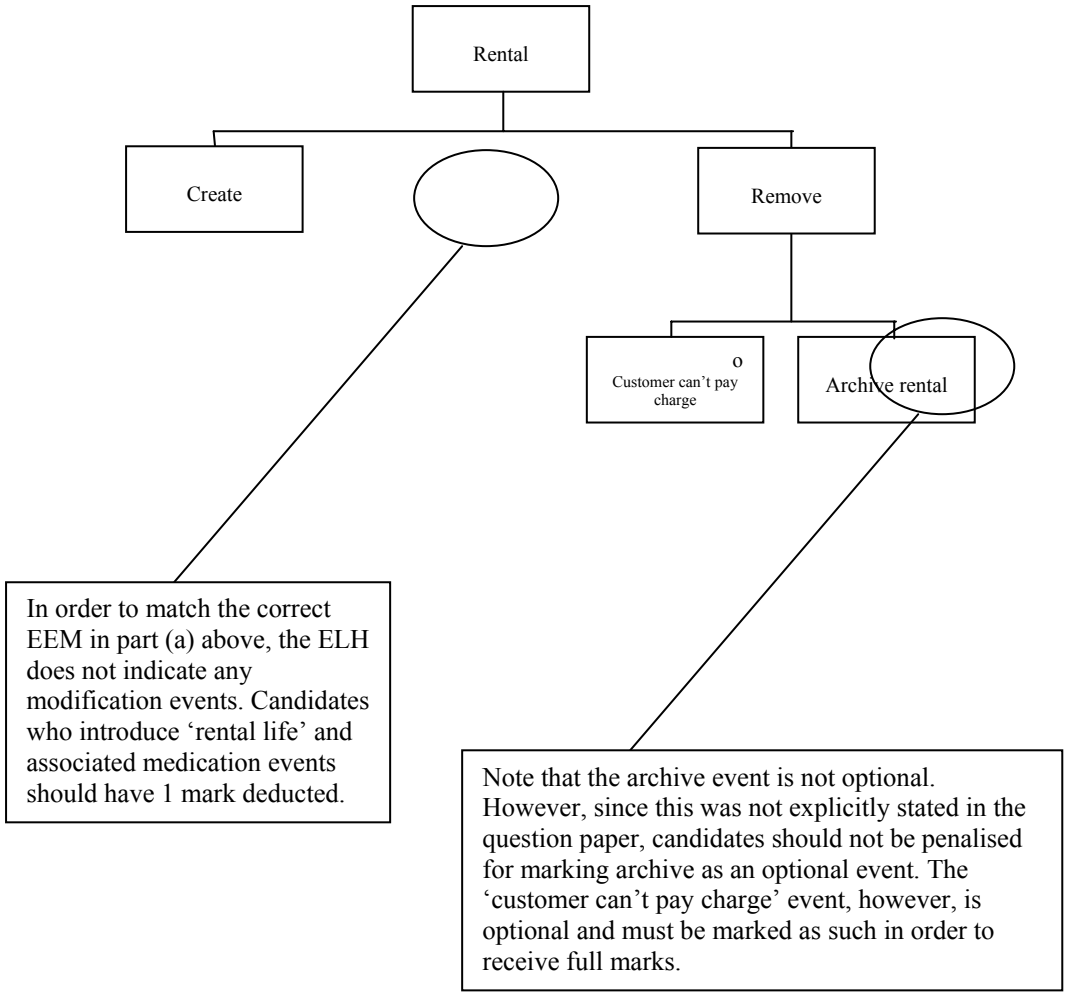
	Customer	Rental	Rental Item	Item
1. check if the item is in stock		(R)	(R)	R
2. check that the customer is registered with us using their customer code on their card	R			
3. check that the customer has not exceeded the maximum number of items	R	R	R	(R)
4. create a new rental for the items being rented	R	C	C	R (M)
5. calculate the total charge of the rental	(R)	R	R	R
6. customer unable to pay charge		D	D	
7. when the customer returns an item the rental item record is flagged as returned			M	(M)
8. the rental details are archived at the end of each month				
	(R)	D	D	(R)

No.	Commentary	
2.		
Source	Question	Marking Instructions
DB 2 (d)	(a) Create an entity/event matrix which includes only the events list 1-7 in the interview text above.	Answers shown in brackets are additional acceptable responses. Candidates should not be penalised for omitting these bracketed answers. All answers that are not bracketed are essential. • **Award 3 marks for 7/8 correctly recorded events** • **Award 2 marks for 5/6 correctly recorded events** • **Award 1 mark for 3/4 correctly recorded events** • **Award 0 marks if <3 correctly recorded events**
DB 2 (e)	(b) Create an entity life history for the Rental entity using the entity-event matrix that you created in part(a) above.	See next page for solution based on correct EEM. Note that candidate's life history **must** match candidate's matrix produced in part (a) above. No additional C, M, D events should be introduced to the ELH that were not stated in the candidates EEM. Similarly, events in the candidate's EEM must not be omitted from the candidate's ELH. **Award 2 marks for correct ELF (based on candidate's EEM). Deduct 1 mark for each error. Maximum 2 errors.**
DB 1	(c) The following is a sample from the data dictionary constructed for the rental system. This data dictionary shows only an incomplete list of attributes for each entity.	

Entity	Attribute	Type/Size	Description.	Validation	Index
Rental	CustomerCode	A(5)	Foreign	Existing	Y (FK)
RentalItem	Rental Ref.	N	Foreign	Existing	Y (FK)
RentalItem	ItemCode	N	Foreign	Existing	Y (FK)

B 1	(i) Using the information presented in the data dictionary and the entity relationship diagram above, create **three** data dictionary entries for each of the necessary *foreign keys* in this system.	See above for correct solution. **Award 3 marks for correct solution. Note that the following columns <u>MUST</u> be correct for each attribute: Entity, Attribute, Type/Size, Description, Validation. Deduct 1 mark for an error in any column (maximum deduction is 1 mark per column). Maximum 3 marks to be deducted. Note also that Description column could indicate use of look up – this would be an acceptable alternative to that shown above.**

No.	Commentary	
2.		
Source	Question	Marking Instructions
	(ii) Although the result of a calculation would not normally be stored in a database, the data dictionary above indicates that the value of RentalItemCharge is stored after it has been calculated. Suggest **one** reason why the value of RentalItemCharge is stored in this system.	For example: Discounts or offers may vary from time to time; Details must be stored for auditing/accounting purposes; Suggestion of use for historical record keeping or archiving Note that any description of a result/value that could be generated using a query is unacceptable. **Award 1 mark for any reasonable suggestion.**
PJ 1(e) 2(b) DB 2(b)	(iii) The system must determine whether or not a customer has taken out the maximum number of rental items. Describe how this could be done without adding any additional fields to the database.	A query/macro/script would be created. This would be based on the rental item entity and would search for unreturned items. **1 mark for full description of query/macro/script**



No.	Commentary	
3.		
Source	Question	Marking Instructions
	Paul is a big fan of a cartoon series called *Oobie Duh* and has downloaded a number of episodes of the cartoon from various unofficial web sites. The video files he has downloaded are DVD quality. Paul has a colour palmtop computer which uses a 124 Mb memory card. He wants to convert the DVD video files to fit into the memory and play on the screen available on his palmtop computer.	
MM 2 (c) 3(a)	(a) (i) Other than using file compression, state **three** actions which Paul could take to reduce the size of the file to enable it to be played on the target device.	• Eliminate unnecessary graphics. • Reduce resolution of graphics. • Reduce sound and video components. • Reduce sampling rate/sampling resolution for sound components. • Reduce frame rate of video components. **Any 3 correctly stated - award 1 mark**
MM 2 (c) 3(a)	(ii) For each of these actions, explain how playback would be affected.	Suitable explanation of each file change ie reducing frame rate will produce a smaller file size but will result in fewer frames per second and therefore a poorer image movement since images will appear jerky **Award 1 mark each explanation, maximum 3 marks. Note that answers that simply state 'there will be a reduction in quality' without an explanation of why quality is reduced, will receive no marks.**
MM 1(d)	(b) Paul uses media player software on his palmtop to play the video. The media player software on Paul's palmtop uses a "cassette player" metaphor as shown above. Explain **one** benefit of using a cassette metaphor for: (i) The user	Interface is familiar to users. Design metaphors provide a familiar environment for accessing multimedia. The user is familiar with the functions of the environment and therefore does not need to learn how to use the environment. **1 mark (or other valid answer)**

No.	Commentary	
3.		
Source	Question	Marking Instructions
	(ii) The developer	The design metaphor provides a set of predefined operations, such as opening a file, which the designer can incorporate in the product without having to design from scratch. **1 mark (or other valid answer)**
	(c) Paul also downloads a restaurant finder application for his palmtop. This software provides details of restaurants in any location specified by Paul. The restaurant finder application includes digital photographs of some of the restaurants. The restaurant finder application makes use of multiple orientation cues to indicate the user's position in a product.	
MM 1 (d)	(i) A page heading is an example of an orientation cue. Describe **two additional** orientation cues with which you are familiar and explain how they could be used in the restaurant finder application.	• Status bar • Tabs across the top of the page • Hierarchy/tree structure • Embedded hyperlink buttons that indicate current position **Correct description of any two of the above, 1 mark each, max 2 marks**
MM 1 (d)	(ii) Suggest why it is appropriate to use more than one orientation cue in a multimedia product.	Multiple orientation cues can each point to a different orientation aspect. to cater for special needs/disabilities; to provide a choice of interfaces to ensure that at least one is familiar to each user **1 mark for suitable suggestion/explanation**
MM 1 (d) 1 (e)	(iii) Interface transparency is a term used to describe user interfaces which are natural to use. Explain why a restaurant finder application that makes use of a cassette metaphor can be said to demonstrate interface transparency.	The user can use the system without consciously thinking about the operation of the user interface; the interface is intuitive; user can use software without having any awareness of the technology. **1 mark for suitable explanation. Note that answers that simply repeat the 'familiar interface' should receive no marks.**

No.	Commentary	
4.		
Source	Question	Marking Instructions
	Interactive Learning is a company that produces CD-ROM based tutorials to support courses that are taught in Scottish schools. The CD-ROM for Information Systems covers each unit taught at Advanced Higher, Higher and Intermediate 2 levels. An interactive quiz is included with each CD-ROM.	
	(a) When selected, the quiz asks 20 questions relevant to the unit being studied by the student. The questions asked are selected from a database containing 5000 questions. Each of the 5000 questions tests knowledge of one unit in the course. Explain how 20 relevant questions will be automatically selected from the database.	Macro/Script based on user input/selection to select only 20 relevant/appropriate questions **Award 1 mark for identifying script/macro; award 1 mark for acknowledgment that number of questions selected must be restricted to 20. Note that answers that suggest querying are not acceptable.**
	(b) Many of the images included in the CD-ROMs as created using layers. Explain the benefit to the designer of using layers with the graphic.	• Ability to name, hide, show, and change the stacking order of layers and objects • Ability to merge bitmaps and apply bitmap masks. • Add and delete layers • Each layer may be exported as a separate image file • Layers can be shared across frames in an animation **Award 1 mark for each valid point. Max 2 marks.**
	(c) Background music is to be added to each tutorial. The developers must decide whether to use MIDI sound files or MP3. Which type of sound file would you choose? Give **two** reasons to support your choice.	MIDI: • Allows for real-time capture of musicians work • Can be of any length • Can be edited using text editor • Do not require large amount of system resources • MP3 requires codec/special software to playback • Professional musicians familiar with format. MP3: • Use of compression • File size up to 12 times smaller than standard digitised version. • MIDI playback quality depends on playback resources available • MP3 may be converted if required. **Award 2 marks for each of 2 supporting answers; no marks to be awarded for the choice of midi or mp3**

No.	Commentary	
4.		
Source	Question	Marking Instructions
	(d) Once the products have been completed, the developers must decide whether or not to embed the fonts in each product.	
	(i) Explain why the developers may wish to embed the fonts in each product.	The product may appear differently on the user's computer if the fonts are not embedded. **Award 1 mark**
	(ii) State **two** considerations that may be taken into account before embedding the fonts.	• Some fonts may be protected by copyright laws • Font files can be very big / file size increases (eg Ariel normail, bold or italic takes about 1MB). **1 mark each, max 2 marks**
	(iii) When the product is viewed on a smaller high resolution monitor, the fonts appear too small to read. Name and describe **one** technique that may improve the ability to read the fonts.	• Anti-aliasing • Curved/diagonal edges produce staircase effect; if the colour of the edges is blended with surrounding, effect is minimised. **Award 1 mark for correct name and description; award 0 marks for simply stating name of technique**

No.	Commentary	
5.		
Source	Question	Marking Instructions
	EasyHomes Ltd is a new business who wish to open an online estate agency specialising in selling homes using the World Wide Web. The system will offer clients the opportunity to view properties online and make offers on the purchase price. The site will also offer legal and mortgage advice The design team, who have been commission to produce the online system, have prepared several project plans to present to EasyHomes Ltd. for consideration. Two extracts from these plans are shown below: (a) The project plans assist the design team with the production of the online estate agency.	
MM 2(b)	(i) Compare each of the project plans above. Discuss the relative advantages and disadvantages of each as a planning tool.	PERT shows the relationships between tasks whereas Gantt clearly indicates float/slack time. Gantt chart shows the time of tasks relative to a time line but does not show how tasks relate to each other. Gantt more clearly indicates concurrency whereas Pert better shows critical path. **Award 1 mark each for any 3 relevant points discussed. Maximum 3 marks.**
MM 2(b)	(ii) The above project plans make some assumptions about the resources available for the project. Discuss any resource implications identified in the project plans.	• Availability of staff/hardware at particular points in the development **Award 1 mark for identifying staff/hardware resources**
MM 4(a) 4(b) 4(c)	(b) The design team produce a *prototype* of the online estate agency to show EasyHomes Ltd. Give **two** reasons why a client might wish to see a prototype of the final product early in the production process.	• To ensure that the product meets their requirements • To be reassured that project development is progressing as expected. • Other valid answer **1 mark each bullet, maximum 2 marks**

No.	Commentary	
5.		
Source	Question	Marking Instructions
MM 3 (c) 3 (d) PJ	(c) The final system must be systematically tested. Describe **in detail** a test strategy for the on-line estate agency.	For example: Test for consistency/continuity of interface Test links from one page to another/test for dead ends Test any facilities such as a search facility Use of independent test group Acceptance testing by client Test product works under different OS/browsers **Award 1 mark each for any 2 issues discussed. Maximum 2 marks**
	(d) After the online estate agency has been operating for a number of months, a user feedback survey is commission by EasyHomes Ltd to evaluate the success of the system produced by the design team.	
MM 4(a) 4(b)	(i) Why would a user feedback survey be carried out rather than a technical evaluation of the solution?	User feedback gives details of user experiences/ problems/ difficulties Also accept description of specific examples such as user opinions of interface or access time **Award 1 mark for any valid answer that highlights user perspective**
MM 4(c)	(ii) Describe the purpose of the user feedback survey in terms of the future development of the online estate agency.	Feedback from users will direct future developments; it will provide focus and direction for any future maintenance **Award 1 mark**

No.	Commentary	
6.		
Source	Question	Marking Instructions
	Many science fiction films depict robots that are able to understand, interpret and respond to the spoken word. The robots are able to clearly understand what is said to them, then carry out actions or speak in fluent language. This skill requires the ability to analyse the underlying structure of the language.	
NLP 2(a)	(a) The processes involved in language comprehension and production include *phonology*, *syntax*, *semantics* and *pragmatics*. Describe clearly how each of the **four** levels of structure listed above would process the sentence: "He went to the bank to fish for trout".	Phonology – sounds in the sentence Syntax – structure of sentence Semantics – meaning of sentence Pragmatics – world knowledge (river bank not financial bank) **Award 1 mark for each level of structure described correctly. Maximum 4 marks.**
NLP 1(d)	(b) Describe **two** significant differences between programming languages and natural languages.	Programming languages have been developed/created by man whereas natural languages have evolved **Award 1 mark for each of two acceptable points. Maximum 2 marks.**
NLP 4(a)	(c) Two alternatives techniques to parsing natural language are *key phrase matching* and *logic*. Describe each of the techniques key phrase matching and logic.	For example: Key phrase matching – user input is scanned for known key phrases and these are matched with a pre-determined response Logic – used in Prolog to determine the validity of user statements and determine relationships between components of natural language **Award 1 mark for each of two acceptable points [max 2]**
NLP 1	(d) Define what is meant by *knowledge acquisition* and describe **one** use that could be made of such a system.	Knowledge acquisition – use of NLP techniques to gain new information. Knowledge acquisition could be used to populate an expert system, taking input from text or human dialogue. **Award 1 mark for definition and 1 mark for description of any suitable example.**

No.	Commentary	
7.		
Source	Question	Marking Instructions
	(a) Explain the relationship between natural language processing and intelligent tutoring systems.	Intelligent tutoring systems use natural language processing to evaluate response to questions set. **Award 1 mark max for any acceptable response**
	(b) (i) Specify a grammar that will recognise the following sentences. Your grammar should include the phrase structure and lexicon. "Morag bored the students for hours." "The students yawned." "She praised the clever students and shouted at the lazy ones."	Possible solution is provided below. Note that this is not the only possible grammar. Alternative grammars that are capable of generating the sentences provided are acceptable. Sentence nounphrase verbphrase Nounphrase propernoun Nounphrase determiner noun Nounphrase pronoun Verbphrase verb adjectivalphrase Verbphrase verb prepositionalphrase Verbphrase verb Verbphrase verb adverb Adjectivalphrase determiner adjective noun Nounphrase verbphrase conjunction verbphrase Propernoun Morag Determiner the Pronoun she Verb bored, yawned, praised,shouted Preposition for, at Noun students, ones, hours Conjunction and Adjective clever, lazy **Award 4 marks for complete phrase structures and lexicon. Award max 2 marks for phrase structures and max of 2 marks for lexicon. Deduct 1 mark for any 2 errors/omissions. Max 4 marks.**
	(ii) The grammar in Part (i) above would fail to parse the sentence: "The bored students yawned loudly." Explain why parsing will fail in this instance.	Bored would require to be added to the lexicon as an adjective; loudly would require to be added as an adverb; phrase structure would require to be modified. **Award 1 mark for each of above: maximum 2 marks.**

No.	Commentary	
7.		
Source	Question	Marking Instructions
	(c) Explain why each of the following sentences contains ambiguity, and identify the type of ambiguity in each. Sheila boarded the plane for New York. Colin saw the sports centre driving to the airport. Freaky Musicians live at the Concert Hall!	Word sense ambiguity; was the plane in question a means of transport or a tool? Referential ambiguity/structural ambiguity; was the sports centre driving or was Colin? Word class ambiguity; live (the verb) or live (the adjective)? **Award 1 mark for each correct explanation of ambiguity AND identification of type; max 3 marks.**

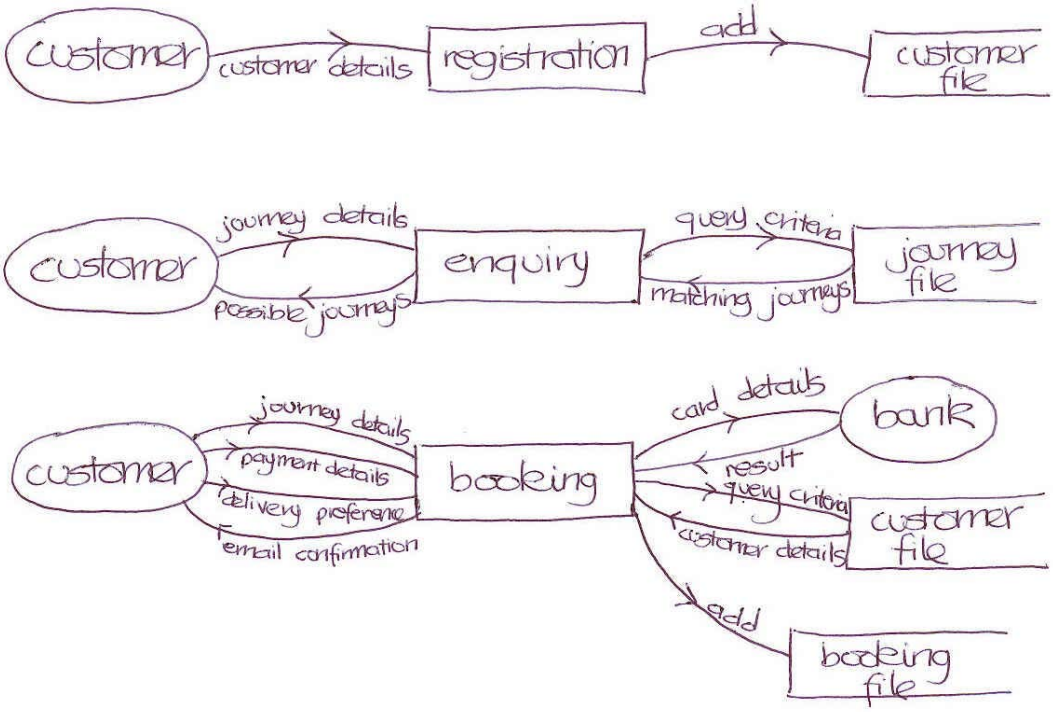
No.	Commentary	
8.		
Source	Question	Marking Instructions
	(a) Morphology refers to the creation of words from smaller components and is critical to the implementation of successful natural language processing. (i) For each pair of words given below state whether it is an example of inflectional or derivational morphology. A. bird →birds B. care → careless C. realise → realisation	A – Inflectional B – derivational C – derivational **Award 1 mark for correctly identifying all 3 types of morphology**
	(ii) For each of A, B and C above explain why it is an example of the morphology type which you have selected.	A – the word birds is the plural of the word bird. There has been no change in class. B – the word care is a verb (or noun) and the word careless is an adjective C – the word realise is a verb and the word realisation is a noun **Award 1 mark for each correct description. Max 3 marks.**
	(b) A digital library provides college students and staff with access to a large collection of multimedia resources. These resources include video clips, audio speeches and text documents that have been digitised and compressed. The digital library system provides users with a natural language interface to access the multimedia resources. It is possible for users to: • search for all resources that relate to a particular topic • restrict the type of resources that are retrieved, for example, video clips but no text documents • search video and speech resources for key phrases Several applications of natural language processing are required to provide digital library users with access to the multimedia resources. Name and describe **two** applications of natural language processing that are required in the digital library system.	Speech recognition needed to interpret user spoken queries. Information retrieval needed to fetch documents and artefacts that are related to the user request. **Award 1 mark each for any two correct application of NLP with description. Max 2 marks.**

No.	Commentary	
8.		
Source	Question	Marking Instructions
	(c) Many applications of natural language processing make use of search techniques. Two common search techniques include *depth first* and *breadth first* searching. (i) Identify a situation where depth first searching would be more appropriate than breadth first searching. Justify your answer. (ii) Identify a situation where breadth first searching would be more appropriate than depth first searching. Justify your answer.	eg when memory is restricted Depth first make less demands on memory resources **Award 1 mark for any correct suggestion** eg when you want to find the shortest path to the solution or when you want to find the solution nearest the top of the search tree Breadth first always delivers fastest soln; always delivers soln nearest the top of the tree **Award 1 mark for any sensible suggestion**
	(d) Explain the use made of templates in information extraction.	Templates contain pre-defined questions; templates specify what information is to be extracted from a text; templates are similar to empty database records. **Award 1 mark** The information extraction engine will then attempt to fill these questions with answers from the text; IE engine fills the blanks in the template as if entering details into a database fields. **Award 1 mark**

No.	Commentary	
9.		
Source	Question	Marking Instructions
	A train company operates an Internet booking system that allows customers to make inquiries about journeys and make bookings. The system is described below.	
	Customers must register the first time they use the service. During registration, customers must supply their name, home address, e-mail address and a password. These details are then stored for future use. Once registered, the system will then allow customers to: ▪ Make enquiries about journey availability without making a booking ▪ Make enquiries about journey availability and then make a booking for a particular journey When making an inquiry about journey availability, a customer provides details of where they are travelling from, where they are travelling to, the type of ticket [single/return/open return], and the date of travel. The system will check if the journey is available by comparing the customer's journey details against the database of available journeys. If suitable matches are found, the customer is provided with details of all possible train journeys including times and fares. If the customer decides to make a booking for the journey, they must indicate the time and fare they wish to book. At this point, customers will be asked for their credit or debit card details as payment. The system will check the credit or debit card payment with the bank that issued the card. If the card is valid, the transaction can proceed. Having paid for the booking, customers must indicate whether to have the tickets sent to their home or to pick them up at the station. If the tickets are to be sent to a customer's home, the customer details must be retrieved before the tickets may be sent. Once completed, the details of the booking are then stored and an e-mail confirming the details of the booking is sent to the customer.	
SAD 2(a) 2(b)	(a) The bank is an external entity in the train company booking system. Based on the information provided above, explain how this external entity may influence the performance of the booking system.	• Poor response time in processing checks may influence customer view of booking system. • Maintenance/down-time of bank system will impact on booking system. **Award 2 marks for any one point with good explanation. Award only 1 mark for suggesting that there will be a reduced response time without explaining why. Acceptable answers must be related to the <u>performance</u> of the booking system <u>rather than behaviour</u> of the system.**

No.	Commentary	
9.		
Source	Question	Marking Instructions
	(b) Draw a Level 1 Data Flow Diagram for the booking system described above.	See next page for possible solution. Note that alternative DFDs are possible and should receive appropriate marks. 15 data flows have been identified as being essential to the correct level 1 DFD. These are listed below the solution on the next page. Note that a correct data flow must indicate flow between correct components. Note also that the components of a candidate's DFD do not have to match solution identically. **Award maximum 6 marks as follows:** **14 – 15 data flows correct – 6 marks** **12 – 13 data flows correct – 5 marks** **10 – 11 data flows correct – 4 marks** **8 – 9 data flows correct – 3 marks** **6 – 7 data flows correct – 2 marks** **4 – 5 data flows correct – 1 mark**
	(c) As part of the analysis, the use of multiple representations of the user requirements may be an aid to the developer. Explain why multiple representations of the requirements will be useful.	• Reduces likelihood that something will be missed. • Increases likelihood that inconsistencies will be identified • Aids understanding of the information, functions and behaviour of the system. **Award any 2 reasonable statements 1 mark each**

Possible Level 1 DFD



List of Essential Data Flows

Data Flow	**From**	**To**
Customer details	Customer entity	Registration process
Add customer details	Registration process	Customer file
Journey details	Customer entity	Enquiry process
Query criteria	Enquiry process	Journey file
Matching journey details	Journey file	Enquiry process
Details of matching/possible journeys	Enquiry process	Customer entity
Required journey details	Customer entity	Booking process
Payment details	Customer entity	Booking process
Card details	Booking enquiry	Bank entity
Results of credit check	Bank entity	Booking process
Preference for delivery of tickets	Customer entity	Booking process
Query criteria to retrieve customer details	Booking process	Customer file
Retrieved customer details	Customer file	Booking process
Add details of booking	Booking process	Booking file
Email confirmation	Booking file	Customer entity

No.	Commentary	
10.		
Source	Question	Marking Instructions
	The GlenClyde Ski Club wants to update their current information system and has appointed a systems analyst to analyse the company requirements and design the updated system. Presently the club records member details on individual member record cards and these cards are held in a card index file.	
	(a) The analyst starts the development work by interviewing several of the club employees in order to determine the user requirements. Explain why it is important to determine the user requirements early in the systems analysis and design cycle.	For example: Requirements must be determined early in the cycle because all work subsequent to specifying user requirements concentrates on development of an appropriate system. The design, implementation and testing are specific to the system being developed. Although the cycle is iterative, the stages are carried out sequentially – it isn't possible to begin design work until after the analysis has been completed. To avoid compounding mistakes – deal with them as early as possible. **Award 1 mark each for any 2 reasonable points.**
	(b) Stephanie is one of the ski instructors at the Ski Club. She is interviewed and asked to describe the company's policy for charging joining fees of their members. Part of the transcript of the interview is provided below:	
	"When people ask about joining the Club, we check to see if they've ever been members of the Ski Club before. We often have a lot of members who return to us after a lapse. The joining fee charged depends on the status of the member. A particular member can be: • a new member • a returning member who rejoins within two years • a returning member who rejoins after a lapse of more than two years • a transferring member All new members pay a joining fee, which is presently £185. New members may bring in a discount voucher with them, and if they do, we then deduct £40 from the joining fee. Returning members get a reduction of £85 applied to their joining fee if they return within two years of their last visit. If they return more than two years after their last visit, a reduction of £50 is applied to the joining fee. Our return members only qualify for one reduction – they can't use discount vouchers. Members who are presently members of a rival Ski Club and decide to change their membership to our Club pay a transfer joining fee of £100. Transfer members who use a discount voucher get a discount of £25 applied to the transfer joining fee if they use the voucher when transferring."	

No.	Commentary	
10.		
Source	Question	Marking Instructions
	(i) Explain why Structured English is a good choice for this task.	Structured English allows the analyst to describe the processes using clear, unambiguous statements Structured English avoids use of a specific development language Nature of the task lends itself to use of structured English / procedural nature of the task Structured English is concise and straight to the point **Award 1 mark for any 2 appropriate points**

	(ii) Read the Structured English below carefully. The Structured English represents the details provided by Stephanie during the interview.
	
	Identify **two** errors in the Structured English and produce correct Structured English for each error that you identify.
		Error 1 – joining fee for repeat clients returning within two years is incorrect
		Error 2 – No Structured English for current member transferring from another centre without discount voucher
		Award 1 mark
		
		`if return member rejoins within two years then`
		`  joining fee is £100`
		`end if`
		
		`if current member transferring from another centre doesn't have discount voucher then`
		`  joining fee is £100`
		`end if`
		Award 1 mark for correct Structured English (or logical equivalent of above). Note that 2 marks should be awarded to correct rules even if the error has not been explicitly stated.

No.	Commentary	
10.		
Source	Question	Marking Instructions
	(c) Prior to implementation of the updated system, documentation for the new system is produced. The documentation will include user documentation and system documentation. Explain why both of these items are required.	User documentation is needed to tell the end users of the new system how to use the system. It may also provide help facilities and tutorials. It should be written in non-technical jargon since the intended audience aren't technical users of the system. Basic functions of the system should be described. **Award 1 mark** System documentation is used by future maintenance teams to carry out maintenance activities. It includes all paperwork generated during the development of the system. The maintenance team must have access to this documentation to enable them to fully understand how the system has been put together. They must be able to do this before starting any maintenance work. **Award 1 mark**
	(d) The analyst decides to implement the updated system by running it alongside the manual system for a month. Comment on the suitability of this method of changeover.	This form of changeover requires parallel running of the old manual system at the same time as the new computerised system. This will provide time for users to become familiar with the new system and gain confidence in how to use it. It will also allow results produced by the new system to be compared with results from the old system. Any discrepancies can then be identified and dealt with. Parallel running means that both systems must be supported by the support staff – this may put additional demands on them. Since previous system is manual with no major running costs, there should be no additional cost implication in deciding to use parallel changeover. **Award 1 mark each for any 2 appropriate points discussed**

No.	Commentary	
11.		
Source	Question	Marking Instructions
	The manager of a fitness centre wants to install a new system which will allow all staff to access client details held on a computer network. The current manual system is described below. Each new client is asked to complete and return an application form with their name, date of birth, gender, address and telephone details. One of the centre staff then adds a client ID, date of joining, and type of subscription (private or business). If the subscription is private, the client must pay at the time of application. If the subscription is business, the client's employer is invoiced for the subscription and the subscription is not processed until the invoice is paid. If the employer is not already known to the gym, a card is sent out to the company to be completed. This card holds information on the company name, address, and name and telephone number of the contact in the company. When this card has been completed and returned, the company is invoiced in the normal way. The centre employs several instructors, who are on hand to advise clients on the use of equipment, exercise technique and to give lessons. As soon as the subscription has been processed, the new client's details are assigned to an instructor. Each new client is then given an appointment with their instructor for an initial fitness assessment, which they must attend before using the facilities.	
	(a) Before any analysis is undertaken, a feasibility study is carried out. Explain reasons why the project may ***not*** be: (i) Economically feasible (ii) Socially feasible	 system may cost more to install than benefits derived or similar **1 mark** Clients may be concerned about their personal details being stored on a computer Instructors may be concerned about job losses instructors may resent proportion of working time devoted to using system or similar **1 mark**
	(b) During analysis of the current system, information must be gathered. Two methods that could be used to gather information include interviewing and questionnaires. Give **one** advantage and **one** disadvantage of each of these methods **in this situation**.	Interviewing – extremely time consuming. Good in this situation because not large number of employees and all work at one location. Questionnaires – poor response rate and not possible to follow up ambiguous responses. Save having to spend time interviewing large number of employees **Award 1 mark each for a suitable advantage and disadvantage of each method for this situation.**

No.	Commentary	
11.		
Source	Question	Marking Instructions
	(c) When designing the new system, additional information may be required in order to determine the file structures required. Identify **two** such items and explain the need for each.	Possible answers: • Frequency of updating to identify file type • Details of member, company, instructor, assessment to identify data items required • Sample data values to identify data types and sizes • Number of records would need to be known to determine file size **Award 1 mark for any 2 acceptable answers. Max 2 marks**
	(d) One of the manager's requirements is that the fitness centre has a maximum number of subscriptions permitted at any one time. The system must therefore allow a waiting list to be created. Describe **one** strategy for ensuring that a new subscription is **automatically** offered to a person on the waiting list whenever an existing subscription is cancelled.	Macro/script could be designed to check daily if membership level was below maximum - message to user if this was the case. **Award 1 mark for any sensible suggestion - must be automatic.**
	(e) During acceptance testing, one of the staff discovers that the system has allowed him to create appointments for two new clients with the same instructor at the same date and time. With reference to the development cycle, describe the work that must be carried out by the development team to remove this error from the system.	Possible answer: Review development to identify cause of error; modify system to remove error; test modified system; update documentation to include details of modification; development process is iterative **Award 1 mark for need to review earlier development work in order to identify error; award 1 mark for need to review later stages in the development process in order to fully rectify the error. Maximum 2 marks.**
	(f) After the system has been accepted, one of the instructors discovers that it is not possible to add details of two new clients who have the same name and address. What type of maintenance is required to rectify this problem?	Corrective maintenance **Award 1 mark.**

[END OF MARKING INSTRUCTIONS]