

**BCS, The Chartered Institute for IT
Level 5 Diploma in IT**

September 2018

**EXAMINERS' REPORT
Systems Analysis and Design**

Section A

General Comments

Question 3 was by far the most popular of the three questions in this section. This was also the question that attracted the highest marks but the difference in marks across all three questions was not significant.

Question Number 1

Learning Outcomes:

4. Use appropriate methods and techniques to produce an analysis of a given scenario
6. Provide suitable documentation for systems analysis and design activities.

Question

A.1

- a) List the processes and the external entities that should be included on a top-level data flow diagram (DFD) of the Flying Feathers Badminton Club. (You do not need to draw the DFD).
(9 marks)
- b) Produce an activity diagram with swim lanes to represent the badminton club's activities and processes.
(9 marks)
- c) Explain the differences between a DFD and an activity diagram. Use your answers to parts (a) and (b) to illustrate your points. (You should not compare the notation).
(7 marks)

Examiners' Guidance Notes

This question was attempted by 51% of the candidates in this cohort with an average mark of 11.6 being awarded.

The evidence shows that the answers to (a) were overall good. A significant minority of students provided a DFD although this was not asked for. The answers to (b) were more varied with many candidates failing to use swim lanes or confusing activity diagrams with flowcharts, statecharts or sequence diagrams. There was some confusion with (c) as many candidates struggled to distinguish "processes" in DFDs from "activities" in the AD or to discuss the importance of swim lanes. The difference between the flow of data in DFDs and the sequencing of activities in ADs was also missed by many candidates.

Question Number 2

Learning Outcomes:

2. Discuss various approaches to systems analysis and design and explain their strengths and weaknesses.
3. Evaluate the tools and techniques of systems analysis and design that may be used in a given context.

Question

A2.

- a) Produce a list of requirements for a system to support the Flying Feathers Badminton Club's business processes shown in the scenario. ✓ (9 marks)
- b) Explain the difference between business, user and functional requirements. Use examples related to part (a) to illustrate your answer. (6 marks)
- c) Describe a technique for prioritising requirements and explain why it may be helpful to the development of a system to prioritise requirements. (10 marks)

Examiners' Guidance Notes

This question was attempted by 45% of candidates with an average mark of 10 being awarded.

There is evidence that the answers to (a) were mixed, many candidates did not identify unambiguous and testable requirements that would support the key business processes. Most candidates were able to make the distinctions asked for in (b) but many did not illustrate them with examples from (a). Very few candidates raised MOSCOW prioritisation in (c) but many did discuss the importance of devoting more attention and time to the most important tasks in order to ensure that deadlines are met and stress is minimised.

Question Number 3

Learning Outcomes:

2. Discuss various approaches to systems analysis and design and explain their strengths and weaknesses.

Question

A3.

a) Explain the purpose of a Requirements Definition and when in the system development life cycle it should be produced. **(5 marks)**

b) Systems analysts use a variety of techniques to search for requirements. Identify FOUR of these techniques and explain any strengths and weaknesses they may have. **(20 marks)**

Interview

Examiners' Guidance Notes

This was the most popular question attempted by 83% of candidates. The average mark obtained for this question was 12.

The evidence shows that many candidates had good answers for this question, particularly in (b) where a wide range of techniques were discussed sometimes in great detail. These included: document analysis, interviewing, questionnaires, observation, prototyping and Requirements Workshops.

Section B

General Comments

Questions 4 and 5 were much more popular than Question 6. The best results were achieved for Question 4. The Question 5 results were worse but reasonable while the Question 6 results were particularly weak.

Question Number 4

Learning outcomes:

5. Use appropriate methods and techniques to produce a design for a given scenario
6. Provide suitable documentation for systems analysis and design activities

Question

a)

This question refers to the case study described above – Flying Feathers Badminton Club. The table below shows an example of a list of playing courts, corresponding playing sessions, and members who booked these sessions.

Court No.: C1	Court Info.: outdoor				
	Session No: S23	Session Time: 11.00	Session Date: 12/4/16	Member No.: 17	Member Name: Smith John
	Session No: S68	Session Time: 13.00	Session Date: 11/5/16	Member No.: 62	Member Name: Jones Adam
			
Court No.: C2	Court Info.: indoor				
	Session No: S45	Session Time: 14.00	Session Date: 1/5/16	Member No.: 17	Member Name: Smith john
			
Court No.: C3	Court Info.: indoor				
	Session No: S12	Session Time: 10.00	Session Date: 25/3/16	Member No.: 35	Member Name: Davis Bob
	Session No.: S97	Session Time: 15.00	Session Date: 27/5/16	Member No.: 42	Member Name: Baird Tom
			

Normalise the table to produce a set of relations in the Third Normal Form. You must show all of your working explaining each step.

18 marks

b) Draw an entity relationship diagram (ERD) based on the relations produced in part a). **7 marks**

Answer Pointers/Model answer

a) The steps of normalisation are shown below:

UNF	1NF	2NF	3NF	Relations
Court No Court Info	<u>Court No</u> Court Info	<u>Court No</u> Court Info	<u>Court No</u> Court Info	Court
Session No Session Time Session Date Member No Member Name	<u>Court No</u> <u>Session No</u> Session Time Session Date Member No Member Name	<u>Court No</u> <u>Session No</u> <u>Session No</u> Session Time Session Date Member No Member Name	<u>Court No</u> <u>Session No</u> <u>Session No</u> Session Time Session Date Member No*	Court/Session Session
			<u>Member No</u> Member Name	Member

N.B. 2NF Solutions with Member No, Member Name in the second group are also acceptable

For correct 1NF with explanation (remove repeating groups) **5 marks**

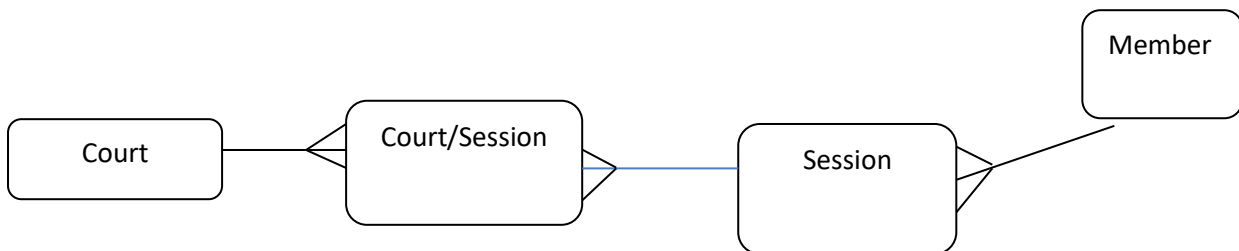
For correct 2NF with explanation (remove part key dependencies) **5 marks**

For correct 3NF with explanation (remove non-key dependencies) **5 marks**

For correct relations **3 marks**

Question 4a - 18 marks

b)



For correct relationships and their multiplicities

5 marks

For correct entities

2 marks

Question 4b – 7 marks

Examiners' Guidance Notes

Nearly 97% of candidates attempted this question and the substantial majority of them achieved a pass mark for their answers.

There is evidence which shows that many answers for part (a) were good and the majority of candidates were able to practically demonstrate the normalisation process. Some candidates however did not provide suitable explanations and did not show primary and foreign keys.

Part (b) was generally answered well. Some candidates had problems with relationships (with cardinalities of relationships in particular). Some candidates produced ERDs which were inconsistent with the normalised relations/tables.

Question Number 5

Learning outcomes:

2. Discuss various approaches to systems analysis and design and explain their strengths and weaknesses.
5. Use appropriate methods and techniques to produce a design for a given scenario
6. Provide suitable documentation for systems analysis and design activities

Question

- a) Consider the following extra information about the Flying Feathers system described above:

“There are two types of members: permanent members and visiting members. The following data should be stored about each permanent member: *Member no.*, *Member name*, *Member tel. no.*, *Date of registration*, *Date of birth*. The attributes of each visiting member are: *Member no*, *Member name*, *Member tel. no.*, *Date of registration*, *Expiry date*, *‘One off’ payment*.

Permanent members are required to submit their CVs. A CV consists of a header, a number of CV lines, a member’s signature.”

Explain the following relationships between classes using examples from the Flying Feathers system (based on the original scenario and the extra information above) to illustrate your answers:

- (i) Association,
- (ii) Aggregation or Composition, and
- (iii) Generalisation/Inheritance.

The examples should show relevant fragments of a class diagram.

15 marks

- b) Discuss briefly the similarities and differences between Class Diagrams and Entity-Relationship Diagrams (ERDs).

10 marks

Answer Pointers/Model answer

- a) Explanation of association **2 marks**
Example of association (e.g. between Team and Member).
A corresponding class diagram is required. **3 marks**

Explanation of aggregation **2 marks**
Example of aggregation (e.g. object of class CV 'consists' of Header, iteration of cv lines, Signature).
A corresponding class diagram is required **3 marks**

Explanation of inheritance/generalization **2 marks**
Example of inheritance/generalization (e.g. Member – superclass with two subclasses: Permanent and Visiting).
A corresponding class diagram is required. **3 marks**

3 marks
Question 5a – 15 marks

b) Similarities:

- Both diagrams show the structure of data in the system i.e. 'things' (entities, objects) about which data should be stored
 - Both diagrams show the relationships between these 'things'
- (5)**

Differences:

- In Class Diagrams there are 3 types of relationships: associations, aggregations and inheritance while in ERDs relationships correspond to associations
- Classes of course are semantically 'richer' than entities – as they encapsulate both the attributes and operations (entities encapsulate attributes only)

(5)
(5 marks * 2)

Question 5b – 10 marks

Examiners' Guidance Notes

This question was attempted by approximately 83% of candidates but only 40% of them achieved a pass mark.

There is evidence that part (a) was answered by some candidates who were unable to give suitable and correct examples of relationships between classes. A number of candidates also had problems with definitions/explanations of relationships between classes (association and aggregation in particular). Also, a small number of candidates did not draw relevant fragments of class diagrams.

With part (b) some candidates identified similarities and differences, but many candidates did not answer correctly.

Question Number 6

Learning outcomes:

3. Evaluate the tools and techniques of systems analysis and design that may be used in a given context.
5. Use appropriate methods and techniques to produce a design for a given scenario
6. Provide suitable documentation for systems analysis and design activities

Question

a) Explain briefly how to check consistency between Use Case diagrams, Sequence diagrams and Class diagrams.

5 marks

b) Produce a sequence diagram for the use case 'Cancel session booking' in the Flying Feathers system described above. A brief description of this use case is given below.

"A member enters his/her number and the system displays the member's details. Next, the system displays a list of all sessions booked by this member. The member selects one of the sessions and the system cancels this session's booking and displays the corresponding confirmation message."

12 marks

c) Produce a state machine/chart for the class Session in the Flying Feathers system described above.

8 marks

Answer Pointers/Model answer

a) Possible checks will include:

- Each use case has a corresponding sequence diagram (and vice versa)
- Each sequence diagram refers to class(es) which are in a Class Diagram (and vice versa i.e. each class should be included in one or more sequence diagrams)
- Messages between classes on sequence diagrams should correspond to relevant class operations

Question 6a – 5 marks

b)

The sequence diagram should have the following elements:

Actor – Member

2 marks

Classes/Objects: Member, Session, possibly Booking.

4 marks

Right messages/operations

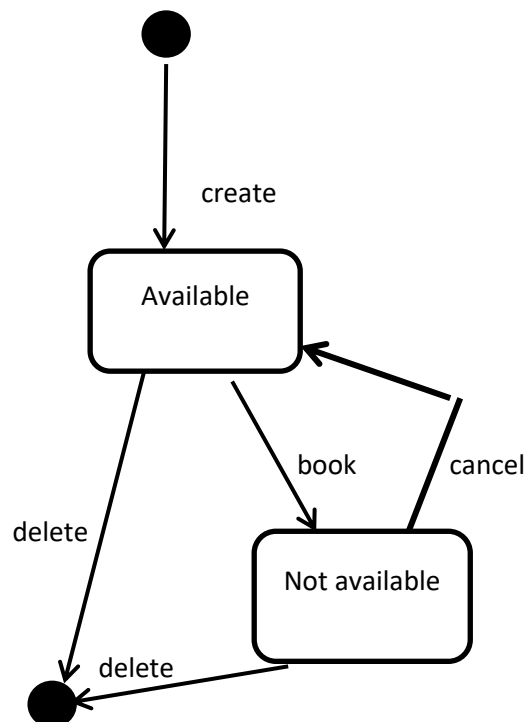
4 marks

Loops (to show lists displayed by the system)

2 marks

Question 6b– 12 marks

c)



correct state nodes
initial and final states
correct transitions

2 marks

2 marks

4 marks

N.B. Solutions with the state Played (as a result of transition 'session has been played') are also acceptable.

Question 6c -8 marks

Examiners' Guidance Notes

Only a small number of candidates (30%) attempted this question. Some answers were adequate, but many answers were weak.

There is evidence that for part (a) only a handful of answers provided by candidates were adequate.

Most candidates who answered part (b) identified the right actor, but only a small number of candidates identified the right classes/objects and messages. In general answers were adequate.

For part (c) only a small number of candidates produced reasonable state charts/state machines. Many candidates produced 'activity diagrams' instead.