



Higher Still  
**Notes**  
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# Higher Information Systems

HSN34100  
Database Systems Specimen Questions

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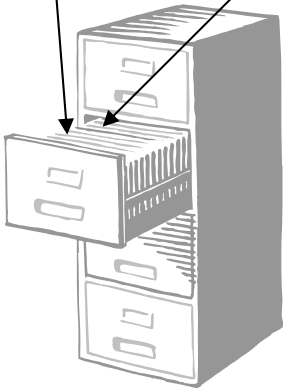
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## Database Systems Specimen Questions

1. On a hospital ward, doctors attend patients and prescribe drugs to treat their illness. All doctors in the hospital wear ID badges, and the information on these badges is also stored on a card index in the hospital office. As doctors prescribe drugs, they fill in a form at the patient's bed to keep a record of what drugs have been given. Examples are shown below.

Doctor ID	40129
Doctor Name	Harold Whelan
Department	Oncology

Doctor ID	62184
Doctor Name	Sheila MacLeod
Department	Paediatrics



Patient No.	19843	Patient Name	Mark Harris		
Date	Doctor ID	Drug Code	Drug Name	Dose	Time
10/04/02	40129	5346	Zotophen	150	8.45
11/04/02	40129	5346	Zotophen	100	9.00
11/04/02	62184	9814	Risolin	150	9.30

Patient No.	91343	Patient Name	Karen Ash		
Date	Doctor ID	Drug Code	Drug Name	Dose	Time
10/04/02	40129	3482	Kelotral	75	11.00
10/04/02	40129	5346	Zotophen	50	11.00
10/04/02	62184	3482	Kelotral	100	13.00
11/04/02	34862	5346	Zotophen	50	9.35
11/04/02	40129	3482	Kelotral	100	14.10

- Patients can receive the same drug more than once.
- Several doctors may treat one patient, but always at different times.
- Each doctor treats many patients.
- A doctor may prescribe a patient several different drugs at a time, but not different dosages of the same drug.

The hospital administration wishes to convert the paper based system to a computerised database system.

- (a) The current system must be analysed before it can be implemented on the computer system.
- (i) Write down the primary entities and their component data items in the paper-based system. 2
- (ii) State any relationships which exist between the entities. 1

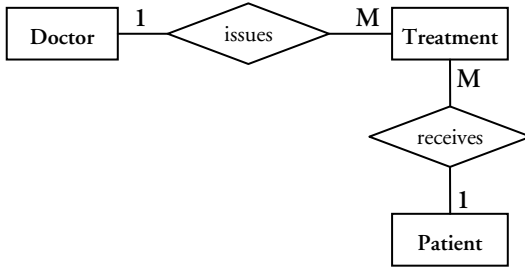
## Database Systems Specimen Questions (cont.)

- (b) From an analysis of the existing system, it is clear that improvements can be made.
- (i) Remove any repeating groups to convert the data to first normal form. 2
  - (ii) Identify the primary and foreign keys in each entity. 3
  - (iii) Construct an entity relationship diagram for the normalised system. 2
- (c) To attain second normal form, each non-key field must depend on the entire primary key.
- (i) Explain which field only depends on a part of an entity's primary key in the normalised system. 1
  - (ii) Convert the entity to second normal form by removing the partial dependency and creating a new entity. 1
- (d) The hospital will hold a large volume of personal information about its patients.
- (i) Suggest any **two** advantages of the computerised system over the paper-based system. 1
  - (ii) Describe **three** things the hospital administration must do to comply with the Data Protection Act. 2
- (15)

## Database Systems Specimen Questions Marking Scheme

(a) The current system must be analysed before it can be implemented on the computer system.	
(i) Write down the primary entities and their component data items in the paper-based system.	<p><b>Doctor</b> ( Doctor ID Doctor Name Department )</p> <p><b>Treatment</b> ( Patient No. Patient Name Date Doctor ID Drug Code Drug Name Dosage Time )</p> <p>2 marks, deduct 1 mark for each error, minimum 0 marks</p>
(ii) State any relationships which exist between the entities.	<p><b>Many</b> doctors treat <b>many</b> patients</p> <p>1 mark</p>
(b) From an analysis of the existing system, it is clear that improvements can be made.	
(i) Remove any repeating groups to convert the data to first normal form.	<p>Repeating group is in <b>Treatment</b>; from Date to Time.</p> <p>With repeating group removed:</p> <p><b>Doctor</b> ( Doctor ID Doctor Name Department )</p> <p><b>Patient</b> ( Patient No. Patient Name )</p> <p><b>Treatment</b> ( Patient No. Date Doctor ID Drug Code Drug Name Dosage Time )</p> <p>2 marks, deduct 1 mark for each error, minimum 0 marks</p>

## Database Systems Specimen Questions Marking Scheme

<p>(ii) Identify the primary and foreign keys in each entity.</p>	<p><b>Doctor</b> Doctor ID (primary key)</p> <p><b>Patient</b> Patient No. (primary key)</p> <p><b>Treatment</b> Patient No., Drug Code, Date, Time (primary key) Patient No., Doctor ID (foreign keys)</p> <p>3 marks, deduct 1 mark for each error, minimum 0 marks</p>
<p>(iii) Construct an entity relationship diagram for the normalised system.</p>	 <pre> graph TD     Doctor[Doctor] --- 1  issues{issues}     issues --- M  Treatment[Treatment]     Treatment --- M  receives{receives}     receives --- 1  Patient[Patient]     </pre> <p>2 marks, deduct 1 mark for each error, minimum 0 marks</p>
<p>(c) To attain second normal form, each non-key field must depend on the entire primary key.</p>	
<p>(i) Explain which field only depends on a part of an entity's primary key in the normalised system.</p>	<p>'Drug Name' does not depend on the entire primary key it can be found if only 'Drug Code' is known</p> <p>1 mark for both points</p>
<p>(ii) Convert the entity to second normal form by removing the partial dependency and creating a new entity.</p>	<p><b>Treatment</b> ( <u>Patient No.</u> <u>Date</u> Doctor ID <u>Drug Code</u> Dosage <u>Time</u> )</p> <p><b>Drug</b> (* <u>Drug Code</u> Drug Name )</p> <p>1 mark for removing field correctly. Keys do not need to be identified.</p>

## Database Systems Specimen Questions Marking Scheme

(d) The hospital will hold a large volume of personal information about its patients.	
(i) Suggest any <b>two</b> advantages of the computerised system over the paper-based system.	<p>Faster searching</p> <p>Records not as easily lost/damaged</p> <p>Any necessary calculations performed quickly/easily</p> <p>Reports easily produced</p> <p>More secure (computer login)</p> <p><b>1 mark for any relevant point, maximum 2 marks</b></p>
(ii) Describe <b>three</b> things the hospital administration must do to comply with the Data Protection Act.	<p>Register with Data Protection Registrar</p> <p>Inform patient that information is being held</p> <p>Allow patients to see the information</p> <p>Correct any mistakes</p> <p>Ensure data is secure</p> <p><b>2 marks for any 3 valid points, 1 mark for any 2 valid points, otherwise 0 marks</b></p>