UNIVERSITY OF COLOMBO, SRI LANKA

UNIVERSITY OF COLOMBO SCHOOL OF COMPUTING

BACHELOR OF SCIENCE IN COMPUTER SCIENCE

Academic Year 2015/2016 – First Year Examination – Semester I – 2016

SCS1103 – Database I

TWO (2) HOURS

To be completed by the candidate

Examination Index No: _____

Important Instructions to candidates:

1. The medium of instruction and questions is **English**.

2. If a page or a part of this question paper is not printed, please inform the supervisor immediately.

3. Note that questions appear on both sides of the paper. If a page is not printed, please inform the supervisor immediately.

4. Write your index number on each and every page of the question paper.

5. This paper has **03** questions and 14 pages.

6. Answer **ALL** questions.

7. Any electronic device capable of storing and retrieving text including electronic dictionaries and mobile phones are **not allowed**.

8. Calculators are **not allowed**.

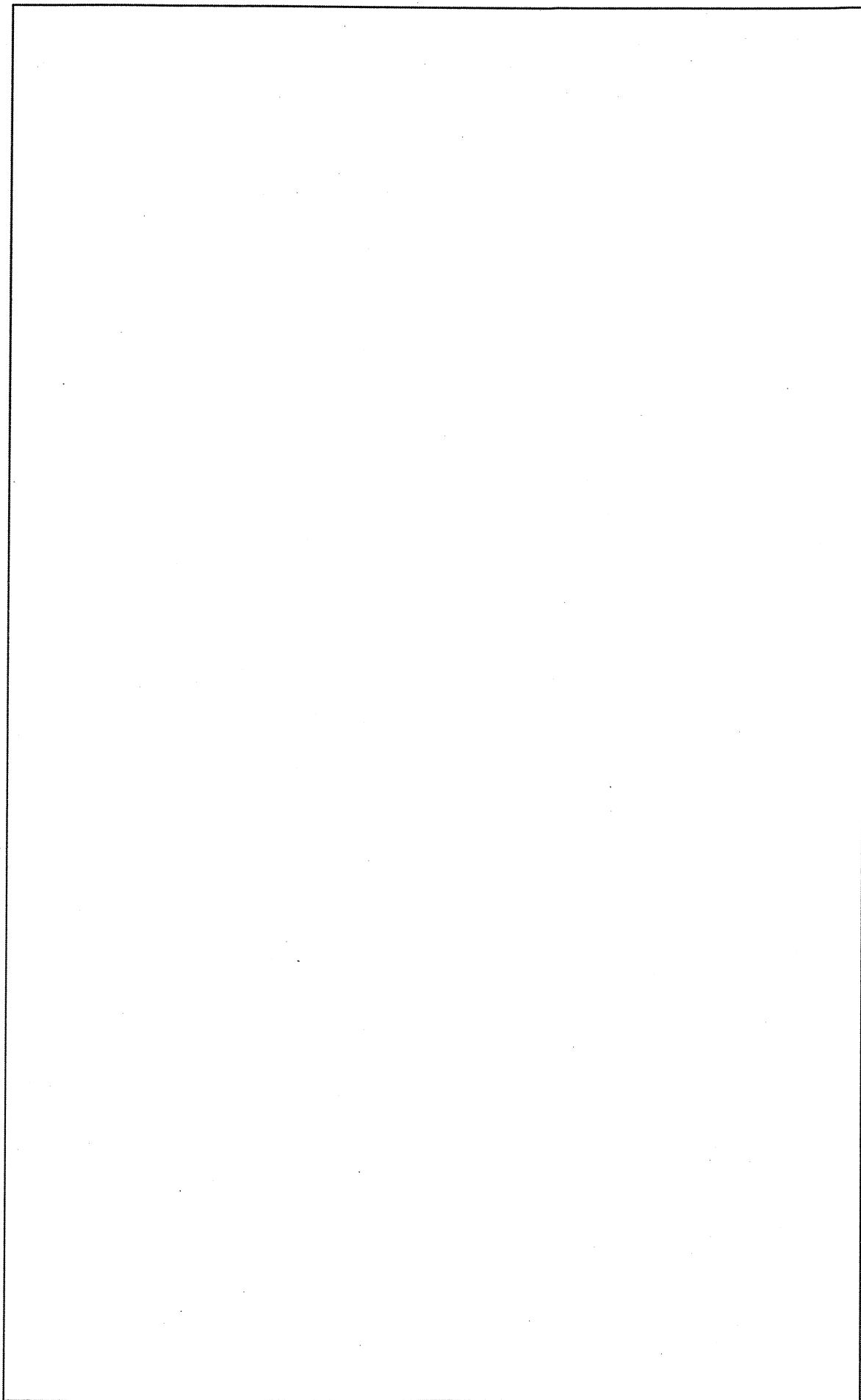| For Examiner's use only	
Question No	Marks
1	
2	
3	
Total	

1. The following vague description has been recorded by a student during a facts gathering session conducted at a Registrar's office of a university. Carefully analyze it and answer part a) and part b) based on the findings of your analysis.

The Registrar's office maintains the following information about academic activities;

- *The university offers number of different degree programmes.*
- *Information like titles and code number of courses, number of credits allocated to each course, syllabus of each course, pre-requisites of each course, minimum class size, etc*
- *Selected number of above mentioned courses are offered in each degree programme, details like; course code, year, semester, time slots, lecture hall, degree programme, mandatory or not, etc. are recorded regarding them*
- *Details about students including student's ID numbers, names of the students, registered degree programme of students, contact details etc.;*
- *Details about lecturers and instructors including Staff ID number, email addresses Staff room number, department, title, telephone numbers etc.*
- *Staff members are assigned to offered courses.*
- *Some of the courses may not be offered due to minimum class size. The current minimum class size is five. i.e. if the number of students for a particular course is less than five, that course will not be offered.*
- *The enrollment details of students in courses are recorded in enrollment cards with degree programme, year, student id no, course codes of enrolled courses etc. One student may enroll in more than the required number of courses.*
- *Grades awarded to students in each course they are enrolled for are also appropriately recorded in mark sheets.*
- *No student is allowed to register with more than one degree programme.*
- *Each degree programme has its own constraints like number of vacancies, total number of credits offered in each year, duration in years, etc.*
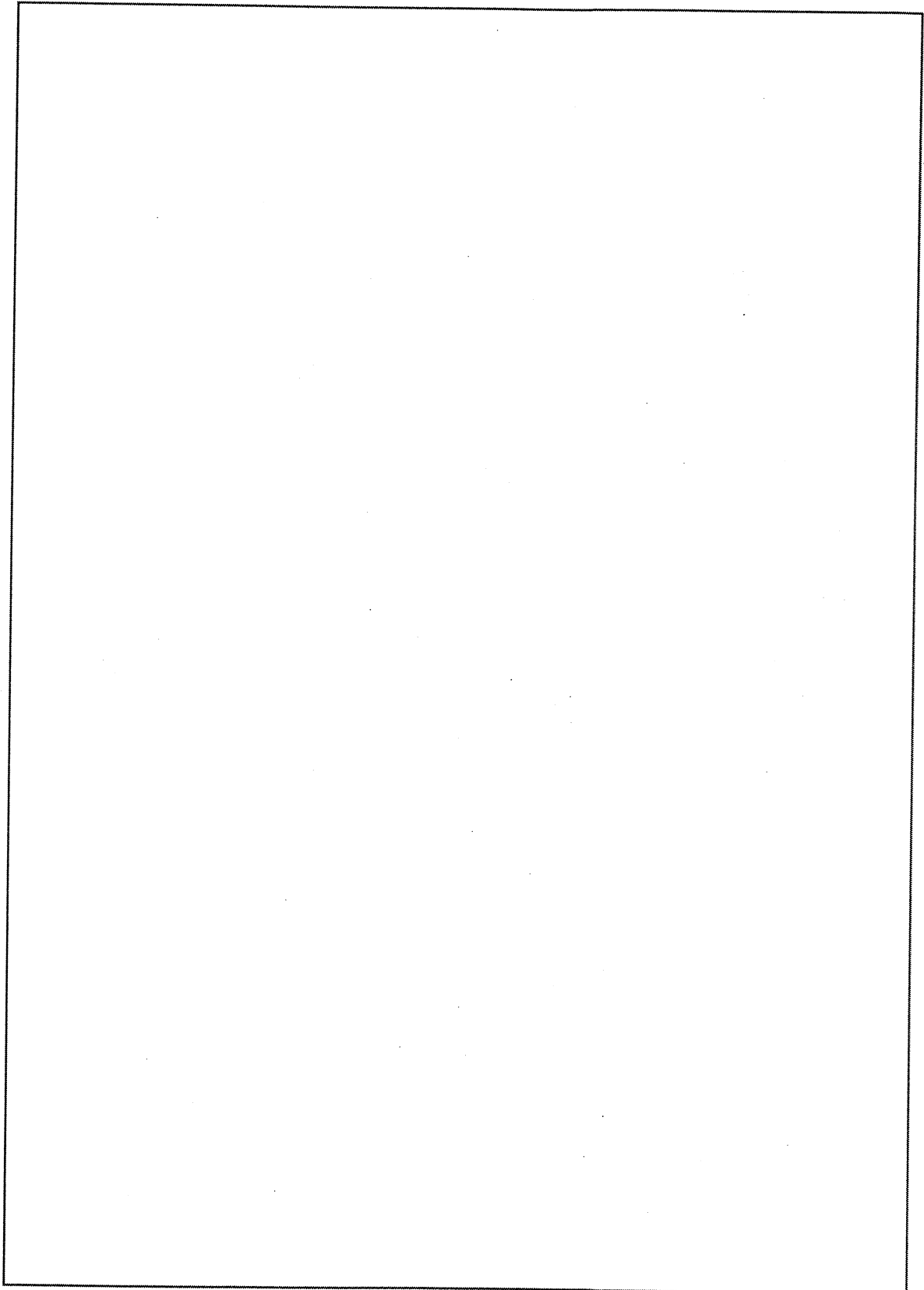
a) Draw an ER/EER diagram for the scenario described above. Make sure to indicate all cardinality constraints specified above. State all your assumptions (if any).

[10 marks]

b) Convert above constructed ER/EER diagram into relations, Remember to include any constraints that follow from the description of the scenario or your ER/EER diagram, including primary key and foreign key constraints.

[10 marks]

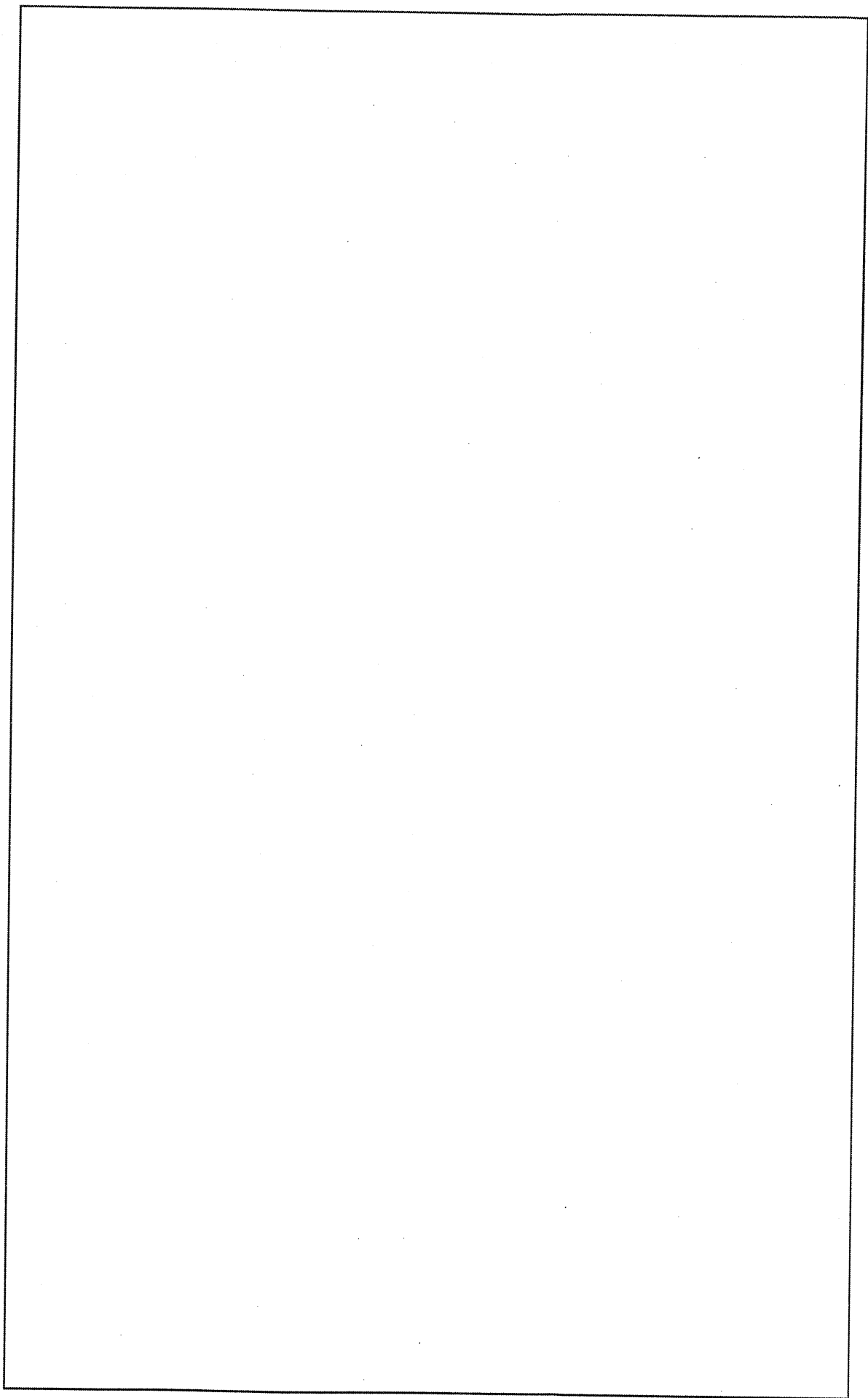2. Consider the following instance of the relation **Patients_dental_appointments**

StaffNo	DentistName	PatientNo	PatientName	ApptDate	ApptTime	SurgeryNo
S1011	Rohan Silva	P100	Geetha Kumari	12-Aug-15	10:00	S10
S1011	Rohan Silva	P105	Athula Zoysa	13-Aug-15	12:00	S15
S1024	Ama Dias	P108	Sooththara puncha	12-Sep-15	10:00	S10
S1024	Ama Dias	P108	Sooththara Puncha	14-Sep-15	10:00	S10
S1032	Amal Perera	P105	Athula Zoysa	14-Oct-15	16:30	S15
S1032	Amal Perera	P110	Nai Pinwatha	15-Oct-15	18:00	S13

a) State the normal form of the above relation with a justification

[05 marks]

b) If the relation is not in 3NF then decompose it into 3NF. Clearly indicate all your intermediate steps/ stages. State all your assumptions (if any).

[10 marks]

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c) Consider the following Relations when answering **i– x**
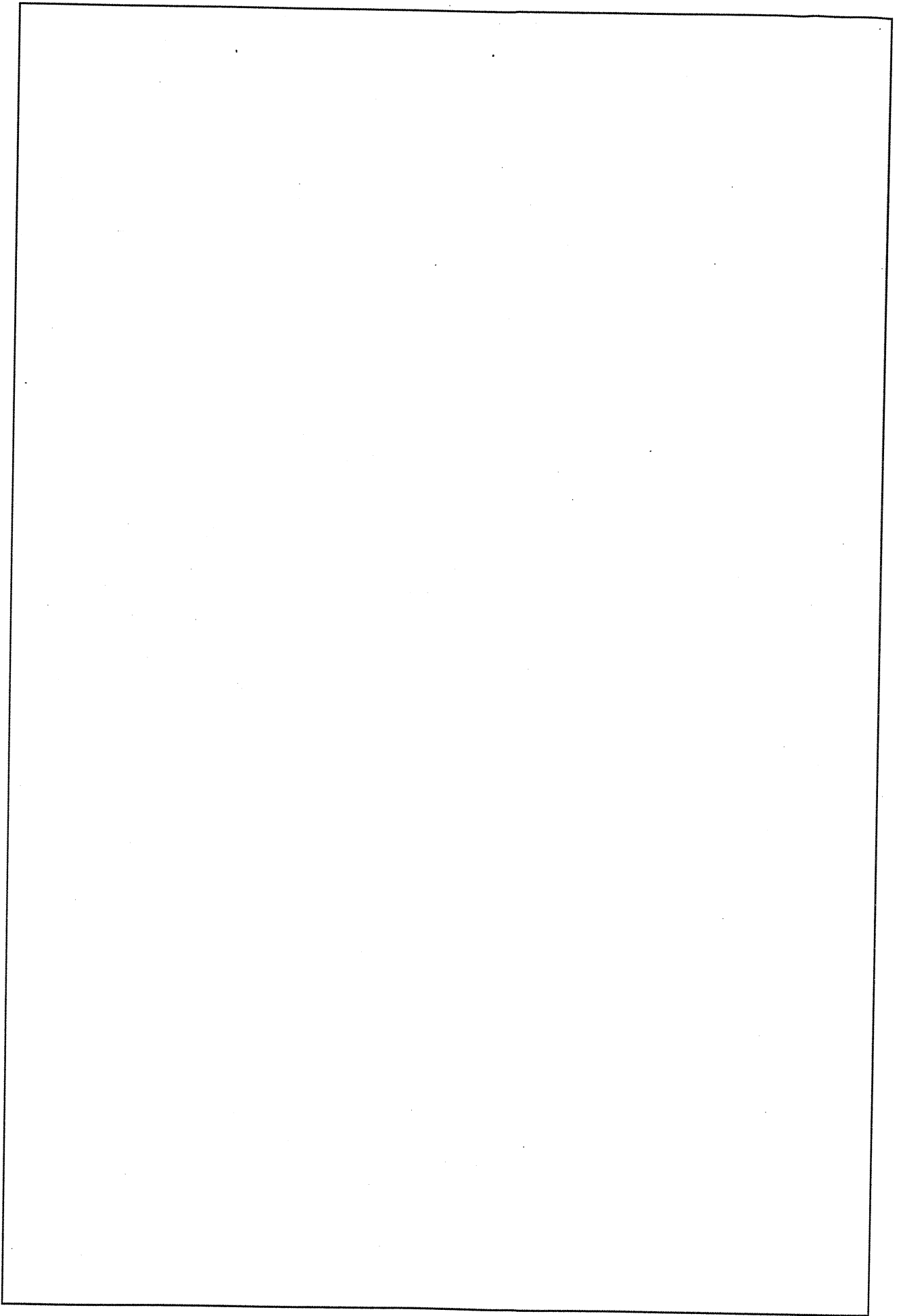
Hotel (Hotel No, Name, Address)
Room (Room No, Hotel No, Type, Price)
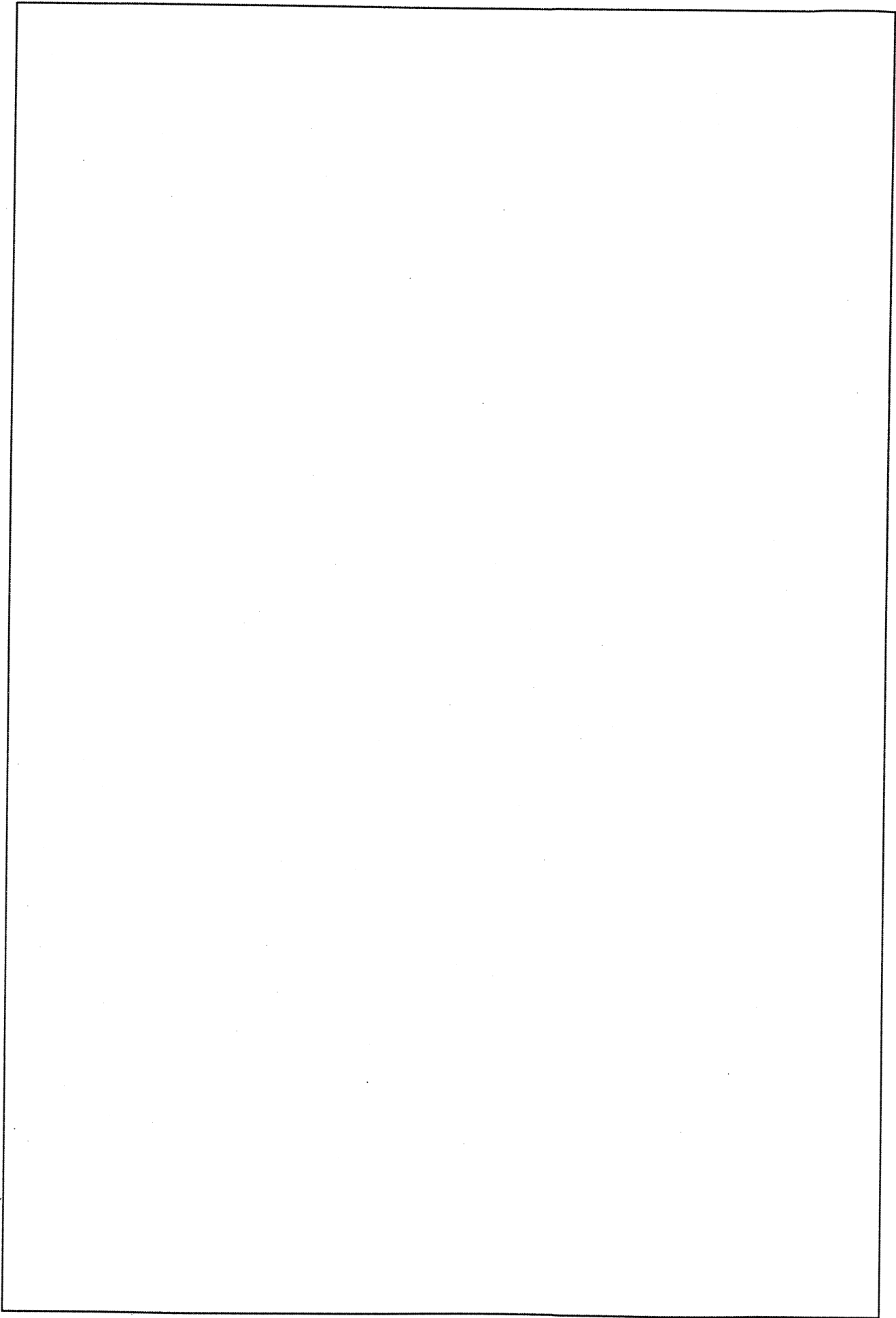**Booking** (Hotel No, Guest No, Date From, Date_To, Room_No)
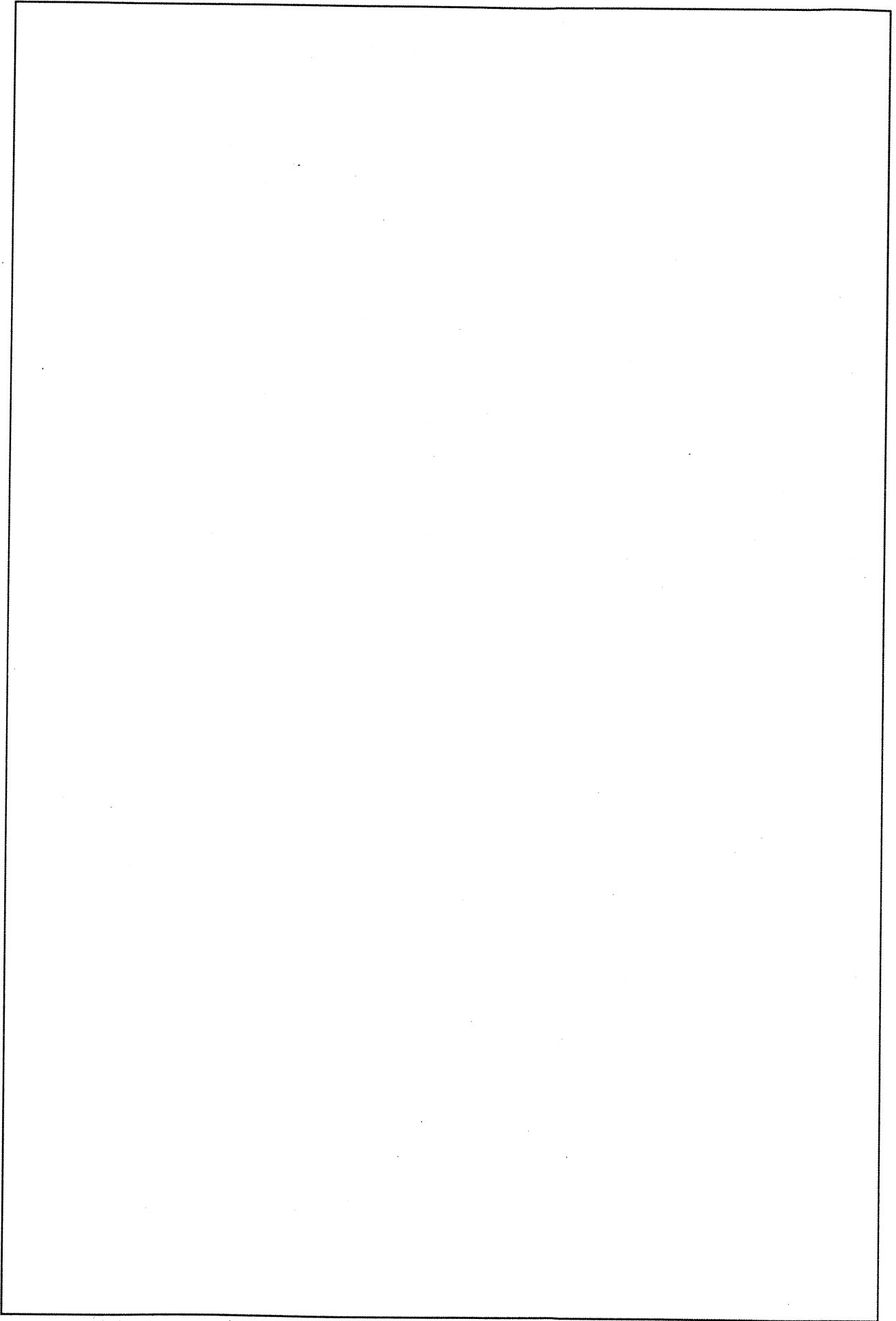**Guest** (Guest No, Name, phone number, Address)

Write SQL queries to find the answers to the following user queries;
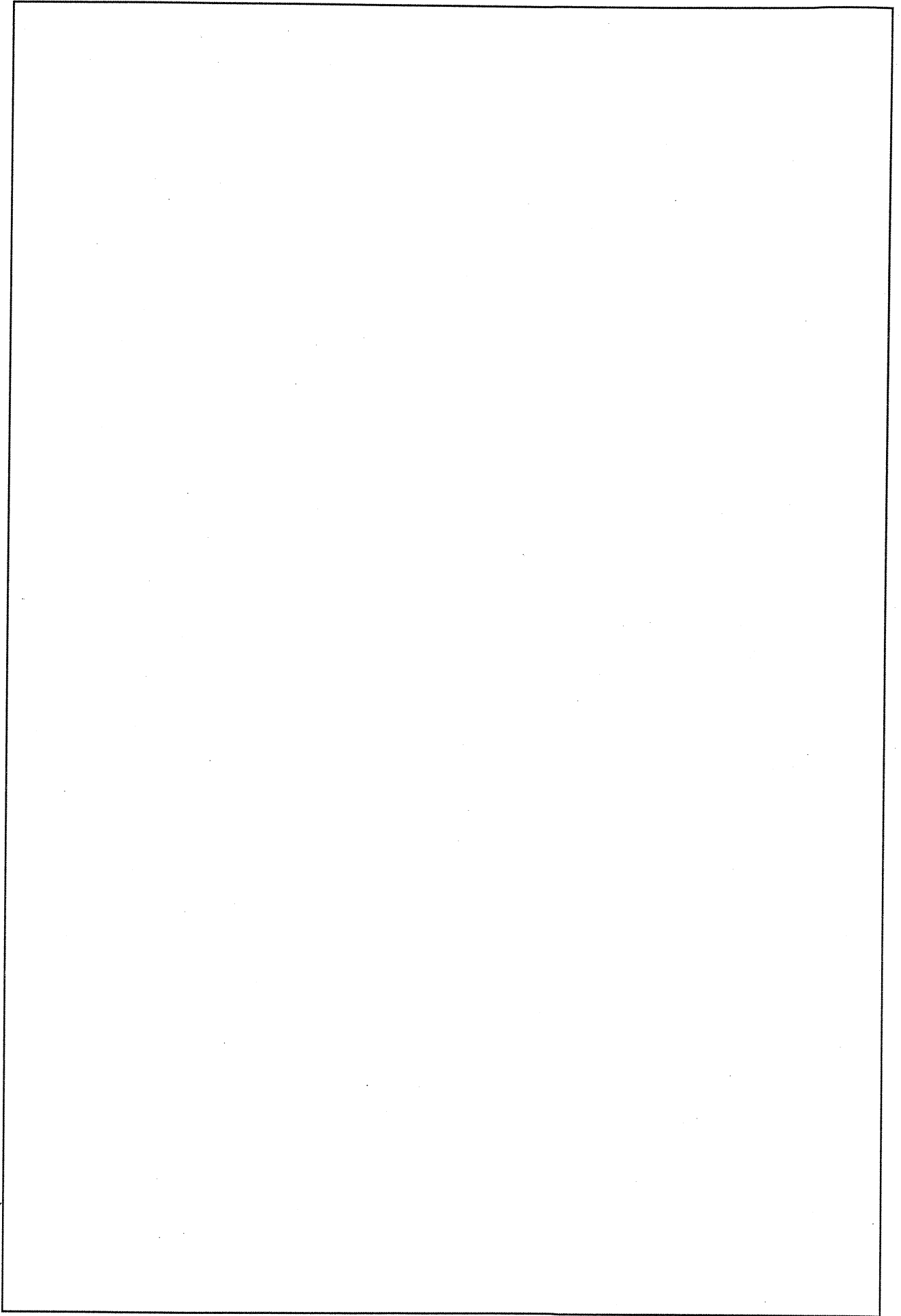
i.   List all double or family rooms with a price below LKR 7500.00
     per night, with the hotel name and type of the room, in
     ascending order of price.
                                                         [04 marks]
ii. What is the total revenue per night from all double rooms at
     Anilana Nilaveli Hotel?
                                                         [03 marks]
iii. List the details of all rooms at Anilana Nilaveli Hotel,
     including the names of the guests staying in the room, if the
     room is currently occupied.
                                                         [04 marks]
iv. What is the total income from bookings for the Anilana
     Nilaveli Hotel today?
                                                         [03 marks]
v.   What is the lost income from currently unoccupied rooms at the
     Amaya Lake Hotel?
                                                         [04 marks]
vi. List the number of rooms in each hotel in Dambulla.
                                                         [02 marks]
vii. Create a view to list guest name, hotel name, room, date_from,
     date_to and phone number of the guest.
                                                         [04 marks]
viii. What is the most commonly booked room type for each hotel in
     Colombo?
                                                         [03 marks]
ix. Create a view to list hotels with double rooms and family
     rooms in Dambulla.
                                                         [04 marks]
x.   Create a view to list the name, number of rooms with prices in
     each hotel in Dambulla.
                                                         [04 marks]

3. Given below are 15 multiple choice questions (MCQ) having five choices with one or more correct answers. There will be a penalty for incorrect responses to discourage guessing. Each MCQ will carry two marks. Clearly circle to indicate the correct choice(s).

[30 Marks]

i. An on-line commercial site such as Amazon.com is an example of a(n) _____ .
   a) single-user database application
   b) multiuser database application
   c) e-commerce database application
   d) data mining database application
   e) integration of databases with WWW

ii. Which of the following are components of a database?
   a) User data
   b) Metadata
   c) Reports
   d) Indexes
   e) Users

iii. SQL stands for _____ .
   a) Structured Query Language
   b) Sequential Query Language
   c) Structured Question Language
   d) Sequential Question Language
   e) Standalone Query Language

iv. The following are functions of a DBMS except _____ .
   a) creating and processing forms
   b) creating databases
   c) processing data
   d) administrating databases
   e) imposing integrity constraints

v. Which of the following data constraints would be used to specify that the value of cells in a column must be one of a specific set of possible values?
   a) A domain constraint
   b) A range constraint
   c) An intra-relation constraint
   d) An interrelation constraint
   e) A physical constraint

vi. Which of the following statement(s) is(are) correct;
   a) A database is called "self-describing" because it contains a description of itself.
   b) A database has a built-in capability to create, process and administer itself.
   c) Prior to 1970, all data was stored in separate files, which were mostly stored on reels of magnetic tape.
   d) A database design may be based on existing data.
   e) CODASYL led to the development of COBOL and other standards.

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vii. Some advantages of the database approach include are;
   a) Minimal data redundancy.
   b) Improved data consistency.
   c) Logical-physical data dependency
   d) Improved data sharing.
   e) Program-data dependency.

viii. Data administrators are responsible for:
   a) Physical database design.
   b) Managing technical issues in the database environment.
   c) Overall management of data resources in an organization.
   d) Writing application programs.
   e) Defining integrity constraints of the data.

ix. Legacy data is;
   a) Data contained in a newly-installed system
   b) Data rejected during the installation of a new system
   c) Data contained in a file system
   d) Data contained by a system used prior to the installation of a new system
   e) Data related to legal issues.

x. A database management system (DBMS) is a:
   a) Hardware system used to create, maintain, and provide controlled access to a database.
   b) Hardware system used to create, maintain, and provide uncontrolled access to a database.
   c) Software system used to create, maintain, and provide controlled access to a database.
   d) Software system used to create, maintain, and provide uncontrolled access to a database.
   e) Software system written in SQL.

xi. User views are included as part of;
   a) Internal schema
   b) Subschema
   c) Conceptual schema
   d) External schema
   e) None of the above.

xii. Which of the following database activities require a specific knowledge of a DBMS?
   a) Enterprise modeling
   b) SQL coding
   c) Conceptual data modeling
   d) Logical database design
   e) Physical database design and definition

xiii.   Which of the following database activities allow for the actual retrieval and use of a database?
a) Enterprise modeling
b) Logical database design
c) Physical database design and definition
d) Database implementation
e) Requirement analysis

xiv.   For some relations, changing the data can have undesirable consequences called:
a) Referential integrity constraints.
b) Modification anomalies.
c) Normal forms.
d) Transitive dependencies.
e) Insertion anomalies.

xv.   Which of the following statement(s) regarding hierarchical data model is(are) correct?
a) The data is organized into a tree-like structure.
b) The data is stored as records which are connected to one another through links.
c) A record is a collection of fields, with each field containing one or more values.
d) The entity type of a record defines which fields the record contains.
e) Each child record can have one or more parent, whereas each parent record can also have one or more child records.

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