Heaven's Light is our Guide

Rajshahi University of Engineering & Technology

B.Sc. Engineering 3rd Year ODD Semester Examination, 2016

Department of Computer Science & Engineering

Course No. CSE 3101 Course Title: Database Systems

Full Marks: 72 Time: THREE (03) hours

N.B:

Answer SIX questions taking THREE from each section.
The questions are of equal value.

Use separate answer script for each section.

SECTION A

		Marks
Q.1(a)	What is database management system? List major steps that you would take in setting up a database for a particular enterprise.	03
(b)	List the differences between super key, candidate key and unique key.	03
(c)	Describe the level of data abstraction in database management system.	03
(d)	Suppose an entity set "payment" with attributes payment- no, payment_date and payment_amnt is defined as weak entity list. Justify your answer why payment should not be a strong entity set?	03
Q.2(a)	Describe the scenario with appropriate figure for the placement of relationship attribute for one-to-one, one-to-many, many-to-one and many-to-many relationship.	04
(b)	Construct an E-R diagram for a car-insurance company whose customer own one or more cars each. Each car has associated with it zero to any number of recorded accidents. Describe each step of preparing your E-R diagram.	03
(c)	Consider the following schema for RDBMS student(student-no, student-name) book(book-no, book-name, author) is-rec(is-no, is-date, memo-no, book-no) Consider the tables are already populated with appropriate values and answer the following questions with SQL expression. (i) List the details of student who borrowed book whose author is "Tanenbum". (ii) Give a count of how many books have been borrowed by each student. (iii) List the students who reached the borrowed limit 3. (iv) List the book details which are issued as of today.	05
Q.3(a)	Consider the following student-detail table:	04

Stu_id	S_name	DOB	street	city	state	zip
---	---	---	---	---	---	---
---	---	---	---	---	---	---
---	---	---	---	---	---	---

(Imagine that the table contains some values)
Is this the table in 3NF? If no, normalize the table and explain it.

(b)	Consider the relational database of the following figure where the primary keys are underlined. employee(person-name, street, city) works(person-name, company-name, salary) company(company-name, city) manages(person-name, manager-name) Given an expression in the relational algebra to express each of the following: (i) Find the names of all employees who work for First Bank Corporation. (ii) Find the names and cities of residence of all employees who work for First Bank Corporation.	06

underlined.

employee(person-name, street, city)
works(person-name, company-name, salary)
company(company-name, city)
manages(person-name, manager-name)

Given an expression in the relational algebra to express each of the following:

(i) Find the names of all employees who work for First Bank Corporation.
(ii) Find the names and cities of residence of all employees who work for First Bank Corporation.
(iii) Find the names of all employees who live in the same street as do their managers.
(iv) Find the names of all employees who do not work for First Bank Corporation.

Q.3(c) Distinguish between single valued and multi-valued attributes with suitable example. **02**

Q.4(a) What is deadlock? How do you prevent deadlock? **04**

(b) What is mapping cardinality? How a many to many relationship can be converted into table, explain this with example? **03**

(c) What are the significance of the following: **03**
(i) Relational algebra
(ii) Null values
(iii) Aggregate function.

(d) What is the purpose of the following: **02**
(i) Commit
(ii) Rollback.

SECTION B

Q.5(a) Describe the ACID properties of database system? **03**

(b) What does it mean by view in database management system? Explain with an example where update through view is possible. **04**

(c) Write down the view expansion algorithm. **03**

(d) Define referential integrity constraint? **02**

Q.6(a) What is RAID model? Write the importance of RAID model? What are the factors to be taken into account when choosing a RAID model? **04**

(b) What is the necessity of accountancy control in Oracol? **03**

(c) What is the significance of locking to ensure data integrity on con-current execution? **05**

Q.7(a) Consider the following schedule: **03**

T_1	T_2
raed (A);	
A=A+30;	
	read (A);
	A=A-1000;
	write (A);
	read (B);
write (A);	
read (B);	
B=B-30:	
write (B);	
	B=B+1000;
	write (B);

Determine whether the schedule is conflict serializable or not by constructing a precedence graph.

(b) What is the purpose of database trigger? Suppose you have to create a transparent audit system for a table 'client-master'. The system must keep track of the records that are being deleted or modified and when they have been deleted or modified. Create a trigger and write a PL/SQL block of code to execute that trigger. **06**

(c) What does it mean by assertion in database management system? Why is it important? **03**

Q.8(a) What will be the output of the following PL/SQL block of code? **04**

```
Declare
      i number (1);
      j number (1);
Begin
    << outer_loop>>
For i in 1..3 Loop
      <<inner_loop>>
For j in 1..3 Loop
dbms_output.put_line('i is: '|| i || 'and j is:' || j);
End loop inner_loop;
End loop outer_loop;
End;
```

(b) What are the data types that can be used in PL/SQL? **02**

(c) Why the following terms are used in SQL query? **04**

(i) LIKE
(ii) Distinct
(iii) Order by
(iv) Drop.

(d) What is two phase-locking protocol? Describe the advantages and this disadvantages of using two phase locking protocol. **02**

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RAJSHAHI UNIVERSITY OF ENGINEERING & TECHNOLOGY
DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
3rd Year Odd Semester Examination 2017

COURSE NO: CSE 3101 COURSE TITLE: Database Systems
FULL MARKS: 72 TIME: 3 HRS

N.B. (i) Answer any SIX questions taking any THREE from each section.
(ii) Figures in the right margin indicate full marks.
(iii) Use separate answer script for each section.

SECTION : A

Q.1. (a) Differentiate between data and information with appropriate example. 3

(b) Describe the level of data abstraction in Database Management System with appropriate block diagram. 4

(c) Define the term "entity". Suppose an entity set "payment" with attributes payment_no, payment_date and payment_amount is defined as weak entity set. Justify your answer why "payment" should not be a strong entity set? What treatment can be applied while working with weak entity set? 5

Q.2. (a) What is E-R model? Describe the scenario with appropriate figure for the placement of relationship attribute for one-to-one, one-to-many, many-to-one and many-to-many relationship. 4

(b) Define Mapping Cardinalities. Construct an E-R diagram for a hospital with a set of patients and a set of medical doctors. Assume with each patient a log of the various tests and examinations conducted. 4

(c) Design a generalization-specialization hierarchy for a motor-vehicle sales company. The company sells motor cycles, passenger cars, vans and buses. Justify your placement of attributes at each level of the hierarchy. Explain why they should not be placed at a higher or lower level. 4

Q.3. (a) Define RDBMS. Consider the following insurance database where the primary keys are underlined. 7½

Person (driver_id, name, address)
Car (license, model, year)

placed at a higher or lower level.

Q.3. (a) Define RDBMS. Consider the following insurance database where the primary keys are underlined. 7½

Person (driver_id, name, address)
Car (license, model, year)
Accident (report_no, date, location)
Owner (driver_id, license)
Participated (driver_id, report_no, car, damage_amount)

Write SQL for the following queires-

(i) Find the total number of people who owned cars that were involved in accidents in year 1989.
(ii) Find the number of accidents in which the cars belonging to "John Smith" were involved.
(iii) Add a new accident to the database, assume any values for required attributes.
(iv) Delete the car "Mazda" belonging to "John".
(v) Update the damage amounts $3000 for the car with license number "YJK-100" in the accident with report number "APR2197".

(b) What is view and how to create view from relational databases? What are the difficulties found while updating view? 4½

Q.4. (a) What is relational algebra? Consider the following database schema and generate the relational algebra for queries i) to iii) 6

Hotel (hotel_no, name, city),
Room (room_no, hotel_no, type, price),
Booking (hotel_no, room_no, guest_no, datefrom, dateto),
Guest(gust_no, name, address)

i) List all single room with a price below tk. 800 per night.
ii) List all guest name, address who were stayed in hotel "International" from 01/01/2014 to 31/01/2014.
iii) Generate hotelwise booking summery from 01/01/2017 to 31/01/2017 as hotel_name, room_no, total guest in the period and total income.

(b) Consider the following relation and determine which normal form it belongs to? 4

R(ABCDEF)
AB→CD, CD→EF, BC→DEF, D→B, CE→F

(c) What are the necessary conditions for a union operation to be valid in relational algebra? 2

SECTION : B

Q.5. (a) What is database normalization? Why is it necessary in database design? 3

(b) Define conflict serializable schedule. Describe conflict serializable schedule with an example. 5

(c) Describe the ACID properties of the transaction with appropriate example. 4

Q.6. (a) Define transaction. Consider the following schedule: 4

T1	T2
read(A);	
B=B+10;	
	read(A);
	A=A-100;
	write(A);
	read(B);
write(A);	
read(B);	
B=B-10;	
write(B);	B=B+100;
	write(B);

Determine whether the schedule is conflict-serializable or not by constructing a precedence graph.

(b) List the differences between views and relation with suitable example. 3

(c) "Two phase locking protocol ensures conflict serializability."—explain the statement with suitable example. 5

Q.7. (a) What is deferred database modification? What are the failures that a system may face? Briefly explain. 4

(b) Why stable storage cannot be implemented? Explain how database system deal with this problem. 4

(c) Explain how an inconsistent database state could result if log records for a transaction are not output to stable storage prior to data updated by the transaction being written to disk. Assume that immediate modification is used in a system. 4

... primary key and 3

	write(A); read(B);

write(A);
read(B);
B=B-10;
write(B);	

	B=B+100; write(B);

Determine whether the schedule is conflict-serializable or not by constructing a precedence graph.

(b) List the differences between views and relation with suitable example. 3

(c) "Two phase locking protocol ensures conflict serializability."—explain the statement with suitable example. 5

Q.7. (a) What is deferred database modification? What are the failures that a system may face? Briefly explain. 4

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(c) Explain how an inconsistent database state could result if log records for a transaction are not output to stable storage prior to data updated by the transaction being written to disk. Assume that immediate modification is used in a system. 4

Q.8. (a) Define primary key. What are the basic differences between primary key and unique key. 3

(b) What does it mean by assertion in database management system? Why is it important? 3

(c) Define referential integrity constraint with suitable example. 3

(d) Why does the following keyword use in SQL query? 3

(i) LIKE (ii) Order By (iii) HAVING

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SECTION : A

Q.1. (a) What is database system? "A database is a tool for storing information efficiently" – justify this statement. 04

(b) List and describe four significant importance of database system over file processing system. 04

(c) Explain the distinctions among the primary key, foreign key and unique key. 04

Q.2. (a) What is E-R model? Draw an E-R diagram that includes a car insurance company with the following constraints. 06

i) Customers own one or more cars each.
ii) Each car has associated with it zero to any number of recorded accidents.
iii) Each car must be registered with at most one registration number.

(b) Describe the scenario with appropriate figure for the placement of relationship attribute for one-to-one, one-to-many, many-to-many and many-to-one relationship. 03

(c) Distinguish between strong and weak entity sets with appropriate example. 03

Q.3. (a) Illustrate the significance of using views in relational database. Also state the difficulties faced while updating view. 03

(b) Write queries to represent the following sentences in SQL. Use the database schema state below: 06

instructor(t_id,name, dept_name, salary), teaches(t_id, course_id, semester, year), student(s_id, name, dept_name, total_credit, born_year), takes(s_id, course_id, semester, year, grade), Advistor(s_id, t_id).

i) Create a view with those students name, ids and born_year who are from CSE, EEE or ETE departments.
ii) Find all instructors earning the highest salary in each department.
iii) Display the full name of instructors who are supervising 4 or more students.
iv) Find the number of instructors in each department who teach a course in 3rd year ODD semester.

(c) Write an assertion for the bank database to ensure that the sum of all loan amounts for each branch must be less than the sum of all account balances at the branch. 03

Q.4. (a) What are the anomalies that occurred in database. Illustrate with appropriate example. 03

(b) Suppose a company wants to store the complete address of each employee in "Employee_details" table which looks like below: 07

emp_id	e_name	e_zip	e_state	e_city	e_district

Consider that each attribute contains values. Is the table in 3NF? If not, make the table compatible with 3NF. Also determine the followings of this table.

i) super keys
ii) candidate key
iii) Non-prime attribute

(c) What are the advantages of PL/SQL over SQL in database management system? 02

SECTION : B

Q.5. (a) Consider the following hotel schema: Hotel(hotel_no, name, city), Room(room_no, hotel_no, type, price), Booking(hotel_no, room_no, guest_no, date_from, date_to), Guest(guest_no, name, address). Generate the relational algebra from the following queries: 06

i) List all single room with a price bellow Tk. 1000 per night.
ii) List all guest name, address, who were stayed in hotel "Bangla" from 05/03/2018 to 10/03/2018.
iii) Generate hotelwise booking summary from 01/01/2018 to 30/06/2018 and the summary should contain (hotel no. number of guest, stayed, total income).

(b) Define cross product between two relations. Explain the problem of cross product operation with suitable example. 04

(c) Describe the importance of foreign key in relational database. 02

Q.6. (a) What are the differences between serial schedule and serializable schedule? Write down the major operations which are used in a transaction to access data. 04

(b) Define schedule in transaction management system. Consider the following schedule, 04

T_1	T_2
read(A)	
A=A+10	
	read(A)
	A=A-100
	write(A)
	read(B)
write(A)	
read(B)	
B=B-10	
write(B)	
	B=B+100
	write(B)

Determine whether the schedule is conflict serializable or not.

(c) Describe different states of a transaction by using state diagram. 04

Q.7. (a) Which protocols should be used in concurrent trasactions to preserve isolation property and how? 03

(b) Consider the following two transactions: 05

T_1:

```
r(A);
r(B);
if A=0 then B:=B+1
w(B)
```

T_2:

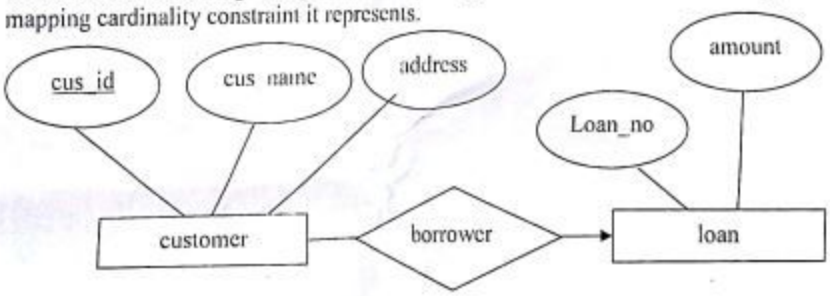
```
r(B);
r(A);
if B=0 then A:=A+1;
w(A);
```

Add lock and unlock instructions to T_1 and T_2 transactions, so that they maintain the two-phase locking protocol. Can the execution of these transactions result in a deadlock?

(c) Write a PL/SQL block to display top 10 employees details of an organization based on their salary. Consider the following database schema to write this block. 04
EMP(e_no, e_name, salary, experience)

Q.8. (a) Why the following keywords are used in SQL and PL/SQL: 04
i) % type ii) Group by
iii) Distinct iv)% not found

(b) Consider the following entity-relationship diagram and determine which type of mapping cardinality constraint it represents. 03



(c) Which type of constraints may be applied on a database schema and why they are necessary? Explain with example. 05