

Time: 03 Hours
Instructions to candidates:

1. Answer all questions from Part A. Part A questions should be answered in first three pages of the answer book only.
2. Answer FIVE full questions from Part B.

Maximum Marks: 100
PART-A

1	1.1	List and briefly write the characteristics of database approach. Recall all DBMS languages briefly.	02
	1.2	Define Entity types and Entity sets.	02
	1.3	What are the types of relationship constraints?	02
	1.4	Summarize the set of operations used in relational algebra.	02
	1.5	Demonstrate attribute preservation condition of a decomposition.	02
	1.6	Define serial and non serial schedules.	02
	1.7	What is transaction timestamp?	02
	1.8	What are the control measures used to provide security of data in databases?	02
	1.9		02
	1.10	What is meant by conflict equivalent and conflict serializable in schedules?	02

PART-B

2	a	What are data models, schemas and instances? Summarize the categories of data model.	08
	b	<p>Notown Records has decided to store information about musicians who perform on its album (as well as other company data) in a database. As a database designer, draw the ER diagram with the following constraints:</p> <ul style="list-style-type: none"> i) Each musician that records at Notown has an SSN, a name, an address and a phone number. Poorly paid musicians often share the same address, and no address has more than one phone. ii) Each instrument used in songs recorded at Notown has a UID, name and a musical key. iii) Each album recorded on the Notown label has a UID, title, a copyright date, a format and an album identifier. iv) Each song recorded at Notown has a title and an author. v) Each musician may play several instruments and a given instrument may be played by several musicians. vi) Each album has a number of songs on it, but no song may appear on more than one album. vii) Each album has exactly one musician who acts as its producer. A musician may produce several albums, of course. 	08

OR

3	a b	<p>Explain the advantages of DBMS approach.</p> <p>Explain the following terms, with examples, briefly:</p> <ul style="list-style-type: none"> i) Overlap constraint; ii) Role indicator; iii) Aggregation; iv) Stored and derived attribute.
4	a b	<p>Suppose that we have a ternary relationship R between entity sets A, B and C such that A has a key constraint and total participation and B has a key constraint; these are the only constraints. A has attributes a_1 and a_2, with a_1 being the key, B and C are similar. R has no descriptive attributes. Write SQL statements that create tables corresponding to this information so as to capture as many of the constraints as possible.</p> <p>Consider the following relations:</p> <p><i>Student(Snum: integer, Sname: string, major: string, Level: string, age: integer)</i> <i>Class(name: string, meets_at: string, room: string, fid: int)</i> <i>Enrolled(Snum: integer, cname: string)</i> <i>Faculty(fid: integer, fname: string, deptid: integer)</i></p> <p>Write the following queries in SQL. No duplicates should be printed in any of the answers.</p> <ul style="list-style-type: none"> i) Find the names of all juniors (level = JR) who are enrolled in a class taught by I.Teach. ii) Find the age of the oldest student who is either a History major or enrolled in a course taught by I.Teach. iii) Find the names of all classes that either meet in room R128 or have five or more students enrolled.
OR		
5	a	<p>Consider the following schema:</p> <p><i>Suppliers(Sid: integer, Sname: string, address: string)</i> <i>Parts(Pid: integer, Pname: string, color: string)</i> <i>Catalog(Sid: integer, Pid: integer, cost: real)</i></p> <p>Write the following queries in SQL:</p> <ul style="list-style-type: none"> i) Find the names of the suppliers who supply some red part. ii) Find the Sids of suppliers who supply some red or green part. iii) Find the Sids of suppliers who supply some red part or are at 221 Parker street.
	b	<p>Consider the following relations containing airline flight information:</p> <p><i>Flights(flno: integer, from: string, to: string, distance: integer, departs: time, arrives: time)</i> <i>Aircraft(aid: integer, aname: string, cruising range: integer)</i> <i>Certified(eid: integer, aid: integer)</i> <i>Employees(eid: integer, ename: string, salary: integer)</i></p> <p>Note that employees relation describes pilots and other kinds of employees as well; every pilot is certified for some aircraft (otherwise, he or she would not qualify as a pilot), and only pilots are certified to fly.</p> <p>Write SQL queries for:</p> <ul style="list-style-type: none"> i) Find the ids of pilots certified for some Boeing aircraft. ii) Find the names of pilots certified for some Boeing aircraft. iii) Find the aids of all aircraft that can be used on non-stop flights from Bonn to Madras.

	Explain the following terms: Embedded SQL, JDBC, SQLJ, stored procedure, Explain all the informal measures of quality for relational schema design.	04
c	What is equivalence of sets and minimal sets of functional dependencies? Discuss.	08
	OR	04
a	What is the difference between JDBC and SQLJ? Why do they both exist? List and prove all inference rules for functional dependencies.	04
b		12
a	Define the terms: Blind Write, Dirty Read, Serializable Schedule, Recoverable Schedule.	08
b	State and justify Thomas Write Rule.	04
c	Explain ACID property of transaction database.	04
	OR	
a	Explain ARIES Recovery algorithm with an example.	08
b	How is dead lock prevention done in scheduling? Explain Briefly.	08
10 a	Record-level logging increases concurrency. What are the potential problems and how does ARIES address them? Explain Briefly.	06
b	What is shadow paging? Explain.	04
c	How is check pointing done in ARIES? Explain.	06
	OR	
11 a	What is LSN of a log record? What are the different types of log records and when are they written? Explain Briefly.	08
b	Explain Grant and Revoke on views and integrity constraints with examples.	08

R. V. COLLEGE OF ENGINEERING
Autonomous Institution affiliated to VTU
V Semester B. E. Examinations Nov/Dec-17(Makeup)
Computer Science and Engineering
DATABASE MANAGEMENT SYSTEMS

Time: 03 Hours
Instructions to candidates:

1. Answer all questions from Part A. Part A questions should be answered in first three pages of the answer book only.
2. Answer FIVE full questions from Part B.

Maximum Marks: 100

PART-A

1	1.1	What are the different ways of interpreting <i>NULL</i> values in the database?	02
	1.2	Differentiate between procedural and no-procedural <i>DML</i> .	02
	1.3	Define Metadata.	02
	1.4	Mention any two general purpose <i>DBMS</i> softwares.	02
	1.5	Given the following set of <i>FDs</i> , find $\{ABC\}^+$, $AD \rightarrow BF, D \rightarrow CE, E \rightarrow G, AB \rightarrow D$	01
	1.6	<i>BCNF</i> is considered to be stronger than <i>3NF</i> . Justify.	02
	1.7	Find the key of the relation $R(A, B, C, D, E, F)$ with the following <i>FDs</i> $AD \rightarrow D, AB \rightarrow C, C \rightarrow F, D \rightarrow EF$	02
	1.8	_____ Transaction property is ensured by concurrency control subsystem.	01
	1.9	Distinguish between Force and no Force approach of writing a page.	02
	1.10	ARIES algorithm uses _____ and _____ approach (steal / no steal and Force / no Force).	02
	1.11	Identify conflict operations in schedule.	02

PART-B

2	a	Discuss the characteristics of the database approach and how it is different from the traditional file system.	08
	b	With an example for each, explain the following: i) Entity types ii) Entity sets iii) Relationship types iv) Relationship sets.	08

OR

3	a	What are data models, schemas and instances? Summarize the categories of data model.	08

b	<p>Assume we have the following application that models soccer teams, the games they play and the players in each team. In the design, we want to capture the following:</p> <p>We have a set of teams, each team has an <i>ID</i> (unique identity), name, main stadium and to which city this team belongs. Each team has many players, and each player belongs to one team, each player has a number (unique identifier), name, DoB, start year and shirt number that he uses, teams play matches, in each match there is a host team and a guest team.</p> <p>For each match we need to keep track of the following:</p> <p>Each match has an <i>ID</i> (unique identifier), e date on which the game is played, final result of the match, players participated in the match. Each match has exactly three referees. For each referee we have an <i>ID</i> (unique identifier), name, DoB, years of experience, one referee is the main referee and other two are assistant referees.</p> <p>Design <i>ER</i> diagram to capture the above requirement. State any assumptions you have, that affects your design.</p>	08
4	<p>a With examples, list all the integrity constraints violated by each update operations (insert, delete and modify).</p> <p>b For the following schema specify the following queries in relational algebra.</p> <p>student (<u>snum: int</u>, sname: string, major: string, level: string, age: int)</p> <p>Course (<u>name: string</u>, meets_at: time, room: string, fid: int)</p> <p>Enrolled (<u>snum: int</u>, cname: string)</p> <p>Faculty (<u>fid: int</u>, fname: string, deptid: int)</p> <ul style="list-style-type: none"> i) Find the names of faculty members for whom the enrollment of the courses that they teach is less than 5. ii) Find the number of students enrolled for each course iii) Find the name of all the students who have not enrolled for any course <p style="text-align: center;">OR</p>	08
5	<p>a With an example for each, explain the following operations:</p> <ul style="list-style-type: none"> i) Project ii) Join iii) Division. <p>b For the following Database schema, write the <i>SQL</i> queries.</p> <p>Employee (<u>emp-name</u>, street, city)</p> <p>Works (<u>emp-name</u>, company-name, salary)</p> <p>Company (<u>company-name</u>, city)</p> <p>Manager (<u>emp-name</u>, manager-name)</p> <ul style="list-style-type: none"> i) Find all employees who earn more than the average salary of all employees of their company ii) Find the company that has the most employees. iii) Find those companies whose employees earn a higher salary, on average, than the average salary of first bank corporation. iv) Assume that the companies may be located in several cities. Find all companies located in every city in which small bank corporation is located. 	08

Explain the issues and techniques of database programming.
Given a relation $R = \{A, B, C, D, E, F, G, H, I, J\}$ and the following FDs
 $B \rightarrow C, DE \rightarrow F, G \rightarrow HI, J \rightarrow A$. Decompose R into 2NF and 3NF relations
if $\{A\}$ and $\{C, D, E\}$ are keys of R .

OR

Discuss the following terms:

- i) Embedded SQL
- ii) JDBC
- iii) SQLJ
- iv) Stored Procedure.

With an example for each, explain all the normal forms which are based on primary keys.

08

08

06

10

Explain the ACID properties of a database transaction.

06

Define the terms:

- i) Serializable schedule
- ii) Recoverable schedule.

With an example for each, explain conflict serializable, view serializable schedules.

04

06

OR

Explain the anomalies when interleaving of transaction occurs.

06

Describe wait die and wound wait deadlock policies for deadlock prevention.

06

Briefly explain the concept of 2PL and strict 2PL.

04

Explain all the process involved in ARIES recovery algorithm with an example.

10

Write a short note on mandatory access control for multilevel security.

06

OR

Discuss write Ahead Log protocol.

06

Explain Grant and Revoke on views and integrity constraints with examples.

10