Hall Ticket Number:

Code No. : 15157 (J) N/O

VASAVI COLLEGE OF ENGINEERING *(AUTONOMOUS)*, HYDERABAD

Accredited by NAAC with A++ Grade

B.E. V-Semester Main & Backlog Examinations, Jan./Feb.-2024

Introduction to Database Management Systems (OE-III)

Time: **3 hours** Max. Marks: **60**

*Note: Answer all questions from **Part-A** and any **FIVE** from **Part-B***

Part-A (10 × 2 = 20 Marks)

Q. No.	Stem of the question	M	L	CO	PO
1.	Consider an E-R diagram in which the same entity set appears several times. Why is allowing this redundancy a bad practice that one should avoid whenever possible?	2	3	1	2
2.	Distinguish between Instance and Schema.	2	2	1	1
3.	Write the differences in meaning between the terms relation and relation schema.	2	1	2	1
4.	Define a Relational Schema.	2	1	2	1
5.	Write an SQL query to find the second highest salary of an employee in an instructor relation.	2	1	3	1
6.	What is a sub query and mention its advantage.	2	1	3	1
7.	Why do we need Normalization?	2	1	4	1
8.	State the Armstrong inference rules.	2	1	4	1
9.	Define a Serial Schedule.	2	1	5	1
10.	List the advantages of concurrent executions in transactions.	2	1	5	1
	Part-B (5 × 8 = 40 Marks)				
11. a)	Illustrate the three levels of Data Abstraction along with an example	3	2	1	1
b)	A university registrar's office maintains data about the following entities: i) Courses, including number, title, credits, syllabus, and prerequisites; ii) Course offerings, including course number, year, semester, section number, instructor(s), timings, and classroom; iii) Students, including student-id, name, and program; and iv) Instructors, including identification number, name, department, and title. Further, the enrollment of students in courses and grades awarded to students in each course they are enrolled for must be appropriately modeled. Construct an E-R diagram for the registrar's office.	5	3	1	2

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12. a)	Consider the relational database. *employee* (*person-name*, *street*, *city*) *works* (*person-name*, *company-name*, *salary*) *company* (*company-name*, *city*) *manages* (*person-name*, *manager-name*) Give a relational-algebra expression for each of the following queries: i) Find the company with the most employees. ii) Find the company with the smallest payroll. iii) Find those companies whose employees earn a higher salary, on average, than the average salary at First Bank Corporation.	4	3	2	1
b)	Differentiate Primary Key, Candidate Key, Super Key and Foreign Key.	4	2	2	1
13. a)	*person (driver-id#, name, address)* *car (license, model, year)* *accident (report-number, date, location)* *owns (driver-id#, license)* *participated (driver-id, car, report-number, damage-amount)* For the above insurance database where the primary keys are underlined. Construct the following SQL queries for this relational database. i) Find the total number of people who owned cars that were involved in accidents in 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 Mazda belonging to "John Smith".	4	3	3	2
b)	Illustrate different types of joins in SQL.	4	2	3	1

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14. a)	Consider the following table of data r(R) of the relation schema R(ABCDE) A B C D E a1 b1 c1 d1 e1 a2 b1 C2 d2 e1 a3 b2 C1 d1 e1 a4 b2 C2 d2 e1 a5 b3 C3 d1 e1 Table R *List all the dependencies you observe among the attributes in Table R* *Also determine the primary key from the above relation.*	4	3	4	2
b)	"Occasionally database designers choose a schema that has redundant information; that is, it is not normalized. They use the redundancy to improve performance" Justify the above statement with a suitable example.	4	2	4	1
15. a)	Discuss the ACID properties of a transaction with relevant examples.	4	2	5	1
b)	Show that there are schedules that are possible under the two-phase locking protocol, but are not possible under the timestamp protocol, and vice versa.	4	3	5	1
16. a)	Differentiate Database Systems and File Systems.	4	2	1	1
b)	Consider the relational database. *employee* (*person-name*, *street*, *city*) *works* (*person-name*, *company-name*, *salary*) *company* (*company-name*, *city*) *manages* (*person-name*, *manager-name*) Give an expression in the relational algebra for each request: i) Modify the database so that Jones now lives in Newtown. ii) Give all employees of First Bank Corporation a 10 percent salary raise. iii) Give all managers in this database a 10 percent salary raise. iv) Give all managers in this database a 10 percent salary raise, unless the salary would be greater than $100,000. In such cases, give only a 3 percent raise.	4	3	2	2

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17.	Answer any ***two*** of the following:				
a)	Compute the closure of the following set of functional dependencies for a relation schema R=(A,B,C,D,E,F,G,H). $F = \{ A \rightarrow B,\ A \rightarrow C,\ CG \rightarrow H,\ CG \rightarrow I,\ B \rightarrow H\}$	4	3	3	2
b)	Consider the following table. STUD_NO | COURSE_NO | COURSE_FEE 1 | C1 | 1000 2 | C2 | 1500 1 | C4 | 2000 4 | C3 | 1000 4 | C1 | 1000 2 | C5 | 2000 Note that, there are many courses having the same course fee. Convert the above relation to 2NF.	4	3	4	2
c)	During its execution, a transaction passes through several states, until it finally commits or aborts. List all possible sequences of states through which a transaction may pass. Explain why each state transition may occur	4	2	5	1

M : Marks; L: Bloom's Taxonomy Level; CO; Course Outcome; PO: Programme Outcome

i)	Blooms Taxonomy Level – 1	20%
ii)	Blooms Taxonomy Level – 2	38%
iii)	Blooms Taxonomy Level – 3 & 4	42%

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OK
10/2/2024