Hall Ticket Number:

Code No. : 14268 N/O

VASAVI COLLEGE OF ENGINEERING *(AUTONOMOUS)*, HYDERABAD

Accredited by NAAC with A++ Grade

B.E. IV-Semester Main & Backlog Examinations, July/August-2023

Database Management Systems

(Common to CSE & AIML)

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.	Differentiate between candidate key and super key with a suitable example	2	1	1	1,2
2.	Write two significant differences between file processing systems and a DBMS.	2	2	1	1,2
3.	Differentiate weak and strong entity sets with an example.	2	1	2	1,2
4.	Construct SQL queries that are equivalent to each of the following a. $\Pi_{A,D,C,F}(\sigma_{C>D}(R \times S))$ b. $\Pi_{A,C}(\sigma_{B=17 \wedge C \geq A}(R))$ Where the relation schemas are R = (A, B, C) S = (D, E, F)	2	3	2	1,2
5.	<table><tr><th>A</th><th>B</th><th>C</th><th>D</th></tr><tr><td>a1</td><td>b1</td><td>c1</td><td>d1</td></tr><tr><td>a1</td><td>b1</td><td>c2</td><td>d2</td></tr><tr><td>a2</td><td>b2</td><td>c1</td><td>d2</td></tr><tr><td>a2</td><td>b2</td><td>c2</td><td>d1</td></tr></table> Find any three possible functional dependencies from the given table.	2	2	3	1,2
6.	Write a Pl/SQL procedure to update salary of given employee by 10%	2	3	3	1,2
7.	Define transactions and write its properties	2	1	4	1,2
8.	Construct transaction state diagram and write when the transactions enter failed state	2	2	4	1,2
9.	T1, T2 are two transaction T1 is older than T2. In wait and die scheme what happens if the transaction T1 holds a lock on data item object X and if T2 is required the lock on X	2	3	5	1,2
10.	Briefly mention the modes of locking and construct lock compatibility matrix.	2	2	5	1,2
	Part-B (5 × 8 = 40 Marks)				
11. a)	Draw the structure of Database Management System and explain it in detail.	4	2	1	1,2

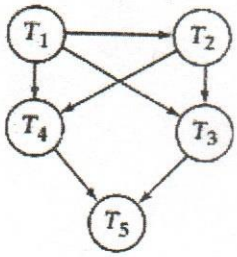
Contd... 2

Code No. : 14268 N/O

b)	Draw an E-R diagram for a university database, containing information about professors (identified by social security number, or SSN) and courses (identified by courseid). Professors teach courses; For each situation, draw an ER diagram that describes. 1. Professors can teach the same course in several semesters, and each offering must be recorded. 2. Professors can teach the same course in several semesters, 3. Every professor must teach some course. 4. Every professor teaches exactly one course (no more, no less). 5. Every professor teaches exactly one course (no more, no less), and every course must be taught by some professor.	4	3	1	1,2
12. a)	Explain basic relational algebra operations with suitable examples	4	1	2	1,2
b)	Consider the following relation schema and write SQL queries: Sailors(**sid**,sname,age,rating) Boats(**bid**,bname,bcolor) Reserves(**sid,bid**,day) (Bold indicates the primary key) i)Retrieve the sailor names who reserved boat number 103. ii)Retrieve each sid and the number of boats reserved by him.	4	3	2	1,2
13. a)	Write rules to find closure set of functional dependencies. Given relation schema r (A, B, C, G, H, I) and the set of functional dependencies: A→B A→C CG→H CG→I B→H Compute at least one super key for the above schema	4	3	3	1,2
b)	Explain the need of Normalization in databases and discuss about first, second and third normal forms by taking an example.	4	2	3	1,2
14. a)	Show the extendable hash structure if we are using extendable hashing on a file that contains records with the following search key values: 10 12 15 8 11 2 5 19 23 29 30 4 And the hash function is h(x)=x mod 8 where buckets can hold two records	4	3	4	1,2,3

Contd... 3

Code No. : 14268 N/O

b)	Explain conflict serializable schedule. Consider the precedence graph of Figure verify the corresponding schedule conflict serializable or not. 	4	2	4	1,2
15. a)	Explain log-based recovery techniques in detail.	4	1	5	1,2
b)	Draw the wait for graph to detect deadlock situation for the given case. i) If Transaction T2 is waiting for Transaction T8 ii) If Transaction T5 is waiting for Transaction T2 iii) If Transaction T7 is waiting for Transaction T2	4	3	5	1,2
16. a)	Explain extended E-R features with suitable example	4	2	1	1,2
b)	Consider the following relational database. *employee* (*person_name*, *street*, *city*) *works* (*person_name*, *company_name*, *salary*) *company* (*company_name*, *city*) Write relational algebra statements for the following a. Find the names of all employees who work for "First Bank Corporation". b. Find the names and cities of residence of all employees who work for "First Bank Corporation". c. Find the names, street addresses, and cities of residence of all employees who work for "First Bank Corporation" and earn more than $10,000.	4	3	2	1,2
17.	Answer any ***two*** of the following:				
a)	Write a procedure in PL/SQL to retrieve the sailor names with their ages for the given rating. In the sailor's data base sailor's schema is: sailor (sid, name, age, rating).	4	3	3	1,2
b)	Construct a B+ tree with fan-out (no of pointers per node) is 3 for the following search key values 80, 50, 10, 70, 30, 100, 90. Assume that the tree is initially empty, and the values are added in the order given. a) Show the tree after insertion of 10, after insertion of 30, and after insertion of 90. Show the tree after deletion of 30, 10	4	3	4	1,2
c)	What is the Two-phase locking protocol? Is the schedule in which each transaction follows the Two-phase locking protocol provide the conflict serializability? If yes, what is the order of transactions?	4	3	5	1,2

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

i)	Blooms Taxonomy Level – 1	20%
ii)	Blooms Taxonomy Level – 2	30%
iii)	Blooms Taxonomy Level – 3 & 4	50%

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