Name:

Enrolment No:

UPES

End Semester Examination, May 2023

Course: Advanced Database Management Systems **Semester: IV**

Program: B.Tech. (CSE) With all Spec. **Time : 03 hrs.**

Course Code: CSEG2005 **Max. Marks: 100**

Instructions:

SECTION A
(5Qx4M=20Marks)

S. No.		Marks	CO
Q. 1	DCL plays an important role in DBMS, Comment.	**4**	**CO1**
Q. 2	Describe sparse and dense index with suitable example.	**4**	**CO2**
Q. 3	Exemplify the requirement of referential integrity constraint.	**4**	**CO3**
Q. 4	Write relational algebra based on following tables: **EMPLOYEE** (table below) **DEPARTMENT** (table below)	4	**CO3**

EMPLOYEE

Fname	Minit	Lname	Ssn	Bdate	Address	Sex	Salary	Super_ssn	Dno
John	B	Smith	123456789	1965-01-09	731 Fondren, Houston, TX	M	30000	333445555	5
Franklin	T	Wong	333445555	1955-12-08	638 Voss, Houston, TX	M	40000	888665555	5
Alicia	J	Zelaya	999887777	1968-01-19	3321 Castle, Spring, TX	F	25000	987654321	4
Jennifer	S	Wallace	987654321	1941-06-20	291 Berry, Bellaire, TX	F	43000	888665555	4
Ramesh	K	Narayan	666884444	1962-09-15	975 Fire Oak, Humble, TX	M	38000	333445555	5
Joyce	A	English	453453453	1972-07-31	5631 Rice, Houston, TX	F	25000	333445555	5
Ahmad	V	Jabbar	987987987	1969-03-29	980 Dallas, Houston, TX	M	25000	987654321	4
James	E	Borg	888665555	1937-11-10	450 Stone, Houston, TX	M	55000	NULL	1

DEPARTMENT

Dname	Dnumber	Mgr_ssn	Mgr_start_date
Research	5	333445555	1988-05-22
Administration	4	987654321	1995-01-01
Headquarters	1	888665555	1981-06-19

	DEPENDENT Essn | Dependent_name | Sex | Bdate | Relationship 333445555 | Alice | F | 1986-04-05 | Daughter 333445555 | Theodore | M | 1983-10-25 | Son 333445555 | Joy | F | 1958-05-03 | Spouse 987654321 | Abner | M | 1942-02-28 | Spouse 123456789 | Michael | M | 1988-01-04 | Son 123456789 | Alice | F | 1988-12-30 | Daughter 123456789 | Elizabeth | F | 1967-05-05 | Spouse i. Retrieve the name and address of all employees who work for the 'Research' department. ii. Retrieve the names of employees who have no dependents.		
Q. 5	Write SQL query for based on tables in given in question 4: i. Retrieve the name and address of all employees who work for the 'Research' department. ii. Retrieve the names of employees who have no dependents.	4	**CO3**
	SECTION B **(4Qx10M= 40 Marks)**		
Q. 6	Can we draw relation/s from ER diagram? If yes, explain the necessary steps to convert ER-diagram to relation/s with a suitable example and if not then why.	**10**	**CO1**
Q. 7	Compare B-tree and B+ tree with suitable example. Insert in a B+ tree with order=3 in following sequence 8, 5,1, 7, 3, 12, 9, 6. (OR) Explain the use of hashing. Compare open hashing and closed hashing collision resolution techniques with suitable example.	**10**	**CO2**
Q. 8	i. Relation R (A, B, C, D) with FDs = {A→BCD, BC→AD, D→B}. Identify the current normal form of the relation R and if it is not in BCNF, decompose it into BCNF. ii. Is BCNF stronger form than 3NF? If yes, how and if not, then why?	**5** **5**	**CO4**
Q. 9	i. Compare the relative advantages of centralized and distributed databases. ii. A relation can be fragmented in how many ways in DDBMS, explain.	**5+5**	**CO6**
	SECTION-C **(2Qx20M=40 Marks)**		
Q. 10	i. Consider the three transactions T1, T2, and T3, and the schedules S1 and S2 given below. Draw the serializability (precedence) graphs for S1 and S2, and state whether each schedule is serializable or not. If a schedule is serializable, write down the equivalent serial schedule(s).	**10**	**CO5**

	T_1: $r_1(X)$; $r_1(Z)$; $w_1(X)$; T_2: $r_2(Z)$; $r_2(Y)$; $w_2(Z)$; $w_2(Y)$; T_3: $r_3(X)$; $r_3(Y)$; $w_3(Y)$; S_1: $r_1(X)$; $r_2(Z)$; $r_1(Z)$; $r_3(X)$; $r_3(Y)$; $w_1(X)$; $w_3(Y)$; $r_2(Y)$; $w_2(Z)$; $w_2(Y)$; S_2: $r_1(X)$; $r_2(Z)$; $r_3(X)$; $r_1(Z)$; $r_2(Y)$; $r_3(Y)$; $w_1(X)$; $w_2(Z)$; $w_3(Y)$; $w_2(Y)$; ii. Explain the working of the locking technique in concurrency control. What benefits does Rigorous two-phase locking provide? How does it compare with other forms of two-phase locking? (OR) iii. 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. iv. Discuss the timestamp ordering protocol for concurrency control. How does strict timestamp ordering differ from basic timestamp ordering?	**10** **8** **12**	
Q. 11	i. Describe the use of normalization and explain 1NF, 2NF and 3NF normal forms with suitable example. ii. A relation R (A, C, D, E, H) is having two functional dependency sets F and G as shown- Set F- {A → C, AC → D, E → AD, E → H} Set G- {A → CD, E → AH} Are F and G equivalent?	**15** **5**	**CO4**