U.S.N.										

B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

January / February 2025 Semester End Main Examinations

Programme: B.E. **Semester: III**

Branch: Computer Science and Engineering **Duration: 3 hrs.**

Course Code: 23CS3PCDBM / 22CS3PCDBM **Max Marks: 100**

Course: Database Management Systems

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

		UNIT - I	*CO*	*PO*	Marks
1	a)	With neat diagram explain three-schema architecture of database system	*CO1*	*PO1*	**10**
	b)	Consider the following tables in Hotel Database: Hotel (hotelNo, hotelName, city) Room (roomNo, hotelNo, type, price) Booking (hotelNo, guestNo, dateFrom, dateTo, roomNo) Guest (guestNo, guestName, guestAddress) Write SQL Queries for the following i. List full details of all hotels in Mangalore ii. List the names and addresses of all guests in Mangalore, alphabetically ordered by name iii. Display the average price of a room iv. List the price and type of all rooms at the Pavillion Hotel. v. List the number of rooms in each hotel.	*CO2*	*PO2*	**10**
		OR			
2	a)	List and explain main characteristics of database approach.	*CO1*	*PO1*	**10**
	b)	Consider the following tables in Film Database: ARTIST (Art_id, Art_Name, Art_Gender) PRODUCER (Prod_id, Prod_Name, Prod_Phone) FILMS (Film_id, Film_Title, Film_Year, Film_Lang, Prod_id) CASTING (Art_id, Film_id, Part) REVIEW (Film_id, Stars) Write SQL Queries for the following i. Display artist names. ii. Find the name of all the Films whose producer is 'Raju'. iii. Display the names of films with the stars received and sort the result on the basis of stars. iv. Display all artists who acted in a film between 2020 and 2024. v. Update the stars of all films whose producer is 'Satish' to 5.	*CO2*	*PO2*	**10**

			UNIT - II			
	3	a)	Consider a requirement for a new Student Internal Exam Conduction System at a Department of CSE, BMSCE. The system needs to manage information about students, courses, instructors, and the exams that students take. The Students have a unique StudentID, a Name, an Email, a Major, and a Year. Courses are uniquely identified by a CourseID and have a CourseName, an assigned Instructor, and Credits. Exams are identified by an ExamID and have an ExamName, ExamDate, and TotalMarks. Instructors have an InstructorID, a Name, an Email, and belong to a Department. ExamEnrollments are records that tie students to the exams they take and include the MarksScored. Students can enroll in multiple courses, and a course can have multiple students. An instructor can teach multiple courses, but each course is taught by one instructor. A course can have multiple exams, but each exam is associated with only one course. A student can take multiple exams, and an exam can be taken by multiple students. An instructor can create multiple exams, but each exam is created by one instructor. Design an Entity-Relationship (ER) diagram that captures the above requirements.	*CO3*	*PO3*	**10**
		b)	Consider the following relational database schema consisting of the four relation schemas: passenger (pid, pname, pgender, pcity) agency (aid, aname, acity) flight (fid, fdate, time, src, dest) booking (pid, aid, fid, fdate) Write a relational algebra expression for the following i. Get the complete details of all flights to Bombay ii. Get the details about all flights from Chennai to Bombay. iii. Find only the flight numbers for passenger with pid 321 for flights to Chennai before 06/12/2024. iv. Find the passenger names for those who do not have any bookings in any flights. v. Find the agency names for agencies that located in the same city as passenger with passenger id 321.	*CO2*	*PO2*	**10**
			OR			
	4	a)	Design an Entity-Relationship (ER) diagram for the following Requirements. Suppose you are given the following requirements for a database of the National Hockey League (NHL): The NHL has many teams. Each team has a name, a city, a coach, a captain, and a set of players. Each player belongs to only one team. Each player has a name, a position (such as left wing or goalkeeper), a skill level, and a set of injury records. Injury ID and description of the Injury should be maintained. A team captain is also a player. A game is played between two teams (referred to as host_team and guest_team) and has a date and a score.	*CO3*	*PO3*	**10**

		b)	Consider a relational schema with tables representing students, companies, job postings, and applications for Student Placement Cell database. Student (sID, sName, sEmail, sMajor, sCGPA) Company (cID, cName, cLocation, cIndustry) Job (cID, jID, jTitle, jDescription, jLocation, minCGPA) Application (sID, jID, appDate, appStatus) Write a relational algebra expression for the following i. List distinct Company names that are accepting applications. ii. List Company IDs which require a minimum CGPA of 8.0 for any job posting. iii. List IDs of the Companies located in "Hyderabad" that have not received any applications as of "2023". iv. List IDs of the students from the "Computer Science" major who have applied for jobs with the title "AI Developer". v. List the names of students who have applied to more than three jobs.	*CO2*	*PO2*	**10**
			UNIT - III			
	5	a)	List and explain Informal Design Guidelines for relation Schemas.	*CO1*	*PO1*	**10**
		b)	Consider the relation R = {A, B, C, D, E, F, G, H, I, J} and the set of functional dependencies F = {{A, B} → {C}, {B,D} → {E, F}, {A,D} → {G,H}, {A} → {I}, {H} → {J}}. i. Identify the key of R. ii. Decompose R into Second Normal Form. iii. Decompose R into Third Normal Form.	*CO2*	*PO2*	**10**
			OR			
	6	a)	Write general definitions of Boyce-Codd, Fourth and Fifth Normal Form. Explain with an example for each	*CO1*	*PO1*	**10**
		b)	Consider the relation R = {A, B, C, D, E, F, G, H, I, J} and the set of functional dependencies F = {{A, B} → {C}, {A} → {D, E}, {B} → {F}, {F} → {G, H}, {D} → {I, J}}. i. Identify the key of R. ii. Decompose R into Second Normal Form. iii. Decompose R into Third Normal Form.	*CO2*	*PO2*	**10**
			UNIT - IV			
	7	a)	Explain ARIES recovery algorithm.	*CO1*	*PO1*	**5**
		b)	List and explain ACID properties of transaction.	*CO1*	*PO1*	**5**
		c)	Create precedence graph for the following schedules. Determine whether it is (conflict) serializable schedule or not. If a schedule is serializable, write down the equivalent serial schedule(s). i. R1(A) , R2(A) , R1(B) , R2(B) , R3(B) , W1(A) , W2(B)	*CO3*	*PO3*	**10**

			ii. R1(x), R2(z), R1(z), R3(x), R3(y), W1(x), W3(y), R2(y), W2(z), W2(y)			
			OR			
	8	a)	Describe two phase locking protocol with an example.	*CO1*	*PO1*	**5**
		b)	With neat diagram explain state transition diagram illustrating the states for transaction execution.	*CO1*	*PO1*	**5**
		c)	Consider following schedule. Determine whether each schedule is Strict, Cascadeless or Recoverable. Provide justification to your answer. i. R1(X), W1(X), R1(Y), W1(Y), C1, R2(X), W2(X), C2 ii. R1(X), W1(X), R1(Y), W1(Y), R2(X), W2(X), C2, C1 iii. R1(X), R2(X), W1(X), R1(Y), W1(Y), C1, W2(X), C2 iv. R1(X), R2(X), W2(X), W1(X), C2, R1(Y), W1(Y), C1 v. R2(X), R1(X), W1(X), R1(Y), W1(Y), C1, W2(X), C2	*CO3*	*PO3*	**10**
			UNIT - V			
	9	a)	List and explain different storage types of NoSQL database system.	*CO1*	*PO1*	**10**
		b)	Design NoSQL queries considering MongoDB for the following. Consider a MyDB database has collection named “blog” with the fields: (title, body, category, likes, tags, date) i. Display details of the documents for which the category is “Sports” ii. Update likes to 38 for which the title is “JSS” iii. Display documents which achieved a score more than 75 for likes. iv. Display the documents in the descending order of date v. Determine Minimum and Maximum likes for each category	*CO2*	*PO2*	**10**
			OR			
	10	a)	Explain the pipeline of Vector Database working with a neat diagram.	*CO1*	*PO1*	**10**
		b)	Design NoSQL queries considering MongoDB for the following. Consider a db database has collection named “movies” with the fields: (title, language, directors, viewerRating, releasedYear, runtime, country) i. Find all movies with full information which were released during the year 2021. ii. Display movie titles that were directed by "Dinesh" iii. Display details of movies that have an viewerRating higher than 50 iv. Display details of movies that contain 'ECE' as first three letters for its title v. Display details of movies with the average runtime of movies released in each country.	*CO2*	*PO2*	**10**

****