USN

RV COLLEGE OF ENGINEERING®
(An Autonomous Institution affiliated to VTU)
V Semester B. E. Examinations August-2022
Computer Science and Engineering
DATABASE DESIGN

Time: 03 Hours   *Maximum Marks: 100*
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. In Part B question number 2, 7 and 8 are compulsory. Answer any one full question from 3 and 4 & one full question from 5 and 6

PART-A

1	1.1	Define canned transactions. Which database user is responsible to develop specifications for canned transactions?	02
	1.2	List the different categories of attributes.	02
	1.3	Define recursive relationship with example.	02
	1.4	What is the difference between select and project operation in Relational Algebra?	02
	1.5	What is the use of Normalization?	02
	1.6	Differentiate between serial and nonserial schedules.	02
	1.7	List out the desirable properties of transactions.	02
	1.8	Let $F = \{A \rightarrow B, AB \rightarrow E, BG \rightarrow E, CD \rightarrow I, E \rightarrow C\}$. Find the closures of A+ and (AE)+	02
	1.9	Is elastic search a SQL or No SQL database?	01
	1.10	What is Document Oriented Database?	01
	1.11	List the different Concurrency problems in DBMS transactions.	02

PART-B

2	a	Discuss the main characteristics of the database approach and how it differs from traditional file systems.	08
	b	Explain the roles and responsibilities of different types of database users who are involving in day-to-day use of a large database.	08
3	a	Consider the following set of requirements for a MOVIE database in which data is recorded about the movie industry and draw an ER diagram for this application. i. Each movie is identified by title and year of release. Each movie has a length in minutes. Each has a production company, and each is classified under one or more genres(such as horror, action, drama and so forth). Each movie has one or more directors and one or more actors appear in it. Each movie also has a plot outline. Finally, each movie has zero or more quotable quotes, each of which is spoken by a particular actor appearing in the movie.	

		ii. Actors are identified by name and date of birth and appear in one or more movies. Each actor has a role in the movie. iii. Directors are also identified by name and date of birth and direct one or more movies. It is possible for a director to act in a movie(including one that he or she may also direct). iv. Production companies are identified by name and each has an address. A production company produces one or more movies.	
	b	Develop a relational schema for the ER model of a MOVIE database specified in Question No.3a. Specify the primary and foreign keys. **OR**	10 06

4	a	Generate the relational algebra for the following queries considering the following tables of a database.
		Hotel(hotelNo, hotelName,city)
		Room(roomNo,hotelNo,type,price)
		Booking(hotelNo,guestNo, dateFrom ,dateTo,roomNo)
		Guest(guestNo,guestName,guestAddress)
		   i. List all single rooms with a price below Rs.2000 per night.
		   ii. List the names and address of all guests.
		   iii. List the price and type of all rooms at the Sagar hotel.
		   iv. List all guests currently staying at the Sagar hotel.
			08

	b	Consider the following relations for a database that keeps track of auto sales in a car dealership (OPTION refers to some optional equipment installed on an auto). CAR(Serial_no,Model,Manufacturer,Price) OPTION(Serial_no,option_name,Price) SALES(Salesperson_id,Serial_no,Sale_price) SALESPEROSN(Salesperson_id,Name,Phone) First specify the foreign keys for this schema, stating any assumptions you make. Next, populate the relations with a few example tuples, and then give an example of an insertion in the SALE and SALESPEROSN relations that violates the referential integrity constraints and of another insertion that does not.	08

5	a	Let the following relation schemas be given :
		       Person(Id, name , age, gender, JobId,cityId)
		       Job(JobId,JobName)
		       City(cityId,cityName)
		Write SQL Queries that is equivalent to the following queries.
		   i. $\pi_{name}(\sigma_{age>40 \lor name=John}(Person))$
		   ii. $\sigma_{Id>4 \land age=40}(Person)$
		   iii. $\pi_{name,gender}(\sigma_{city\,Name=bangalore}(Person * City))$
		   iv. $\sigma_{User.OccupationID=Occupation.OccupationID}(Person \times Job))$
		   v. $\pi_{name,}(\sigma_{gender=F \land Job\,Name=Accountant}(Person * Job))$
			10

	b	Explain the different normal forms(1NF,2NF and 3NF)with an example for each. **OR**	06

6	a	Suppose we have a database for an investment firm, consisting of the following attributes:
		 B-Broker,O-Office of a broker, I-Investor,S-Stock
		 Q-Quantity of stock owned by an investor, D-dividend paid by a sock.
		 Hence, the overall schema is R=(B,O,I,S,Q,D).
		 Assume that the following functional dependencies are required to hold on this database.
		 $I \rightarrow B, IS \rightarrow Q, B \rightarrow O, S \rightarrow D$.
		     i. Determine the key for R.
		     ii. Normalize R into BCNF.
		     iii. Normalize R into 3NF preserving functional dependency. Verify whether your answer is in BCNF?
			10

	b	Differentiate between Nested Queries and correlated Nested Queries with examples.	06
7	a	Discuss the features of MongoDB database.	08
	b	Write short note on Elastic Search.	08
8	a	Consider two transactions $T1\ and\ T2$ and Four schedules $S1$, $S2, S3\ and\ S4\ of\ T1\ and\ T2$ as given below: $T1: R1[(x)]W1[(x)]W1[(y)]$ $T2: R2[(x)]R2[(y)]\ W2[(y)]$ $S1: R1[(x)]R2[(x)]R2[(y)]W1[(x)]W1[(y)]\ W2[(y)]$ $S2: R1[(x)]R2[(x)]R2[(y)]W1[(x)]W2[(y)]W1[(y)]$ $S3: R1[(x)]W1[(x)]R2[(x)]W1[(y)]R2[(y)]W2[(y)]$ $S4: R2[(x)]\ R2[(y)]R1[(x)]W1[(x)]W1[(y)]W2[(y)]$ Which of the above schedules are conflict –serializable? Justify your answer.	08
	b	Explain Two phase locking Techniques for Concurrency control.	08