SVKM'S NMIMS

MUKESH PATEL SCHOOL OF TECHNOLOGY MANAGEMENT& ENGINEERING/

SCHOOL OF TECHNOLOGY MANAGEMENT

Academic Year: 2023-2024

Program/s: B TECH/MBA TECH/B.Tech Integrated — Year: II/IV · Semester: IV/VIII

Stream/s :DS/Comp Engg/Comp Sci/AI/AIML/AIDS/CSBS/CSEDS 7057

Subject: Database Management Systems — Time: 3 hrs (10.00am to 1.00pm)

Date: 29 / 6 / 2024 — No. of Pages:5

Marks: 100

Re-Examination (2022-23)

Instructions: Candidates should read carefully the instructions printed on the question paper and on the cover of the Answer Book, which is provided for their use.

1) Question No. 1 is compulsory.
2) Out of remaining questions, attempt any 4 questions.
3) **In all 5 questions to be attempted.**
4) All questions carry equal marks.
5) **Answer to each new question to be started on a fresh page.**
6) **Figures in brackets on the right hand side indicate full marks.**
7) **Assume Suitable data if necessary.**

Q1		Answer briefly:	
CO4 ; SO-1; BL-1	a.	Explain transaction with an example. Describe the ACID properties in Transaction Management.	[5]
CO3 ; SO-6 ; BL-3	b.	Describe the need of normalization with an example.	[5]
CO2- ; SO-6; BL-4	c.	Consider a database system for a library that stores information about books, authors, and publishers. The database consists of the following tables: **Book (**ISBN, Title, PublicationYear, PublisherID) **Author Table (**AuthorID, Name, Nationality) **Publisher Table (**PublisherID, Name, Address) i. Create relationship table between book and author and justify cardinality between them. ii. Write SQL query to create tables Author, Publisher and book. Add foreign and primary key constraints as required	[5]

CO1- ; SO-1; BL-2	d.	How does the concept of abstraction contribute to the usability of database systems? Describe various levels of abstraction	[5]
Q2 a CO1-; SO-1; BL-3		Describe the five main functions of a database administrator? List five real life applications which you have used and found that Database management system was beneficial over file system.	[10]
Q2 b CO2-; SO-1; BL-5		Consider the relation schema given below Suppliers (SID, sName, address) Parts (PID, pName, color) Catalog (SID, PID, price) **Construct the relational algebra expressions for the first 4 statements** i. Find the name of all red parts. ii. Find all prices for parts that are red or green. (A part may have different prices from different manufacturers.) iii. Find the SIDs of all suppliers who supply a part that is red or green iv. Find the names of all suppliers who supply a part that is red or green. v. Explain the following terms with examples a) Candidate key b) foreign key constraints	[10]
Q3 a CO2-; SO-1; BL-6		**Construct the SQL queries for the following statements based on the following tables** **EmployeeInfo Table**: (EmpID integer, EmpFname varchar(25), EmpLname varchar(25), Dept varchar(15), Project varchar(10), Address varchar(25), DOB date, Gender varchar(10)) **EmployeePosition Table**: (EmpID integer, EmpPosition varchar(10), DateOfJoining date, Salary integer) i. Fetch the number of employees working in the department 'HR'. ii. Find number of employees whose DOB is between 02/05/1970 to 31/12/1975 and are grouped according to gender. iii. Fetch all the records from the EmployeeInfo table ordered by EmpLname in descending order and Department in the ascending order. iv. Fetch details of employees whose EmpLname ends with an alphabet 'A' and contains five alphabets. v. Retrieve duplicate records from a table.	[10]
Q3 b		Evaluate whether the given Product table is in 3 NF. Justify your answer. If yes, then convert it into BCNF.	[10]

CO3-; SO-6; BL-5		**Product** **Brand_id** | **B_name** | **Product_id** | **Quantity** B001 | Parle G | P1001 | 1100 B001 | Parle G | P1003 | 1500 B002 | Hide n Seek | P1002 | 1000 B005 | Krackjack | P1001 | 2500 B004 | Monaco | P1100 | 1150 B004 | Monaco | P1002 | 500	
Q4a CO1-; SO-1; BL-6		Design a database for an automobile company to provide to its dealers to assist them in maintaining customer records and dealer inventory and to assist sales staff in ordering cars. Each vehicle is identified by a vehicle identification number (VIN). Each individual vehicle is a particular model of a particular brand offered by the company (e.g., the XF is a model of the car brand Jaguar of Tata Motors). Each model can be offered with a variety of options, but an individual car may have only some (or none) of the available options. The database needs to store information about models, brands, and options, as well as information about individual dealers, customers, and cars. Your design should include an E-R diagram, a set of relational schemas, and a list of constraints, including primary-key and foreign-key constraints.	[10]
Q4 b CO2-; SO-1; BL-5		i. Describe the concept of views with an example [5] ii. Construct the SQL queries for the given task considering following relations [5] EMP (Emp_no, Dept_no, Emp_name, Job, Salary, MGR, Hiredate) DEPT (Dept_no, Dept_name, Location) a. Find the details of the employee who is taking the second highest salary using subqueries/nested queries. b. Display department wise average salary for those departments where number of employees are more than 20. c. Display employee details from Highest to lowest order of their salaries	[10]
Q5 a CO1-; SO1-; BL-4		i. Describe Specialization and Generalization feature of extended ER with examples. Give an example of weak entity set and justify whether there will always be total participation for the weak entity set. [5] ii. Describe the importance of check constraints and not null constraints in SQL. Formulate a SQL query using these constraints [5]	[10]

Q5 b

CO2-;
SO-6;
BL-4

i. State the importance of primary key in a relation. Explain the following relational algebra operations with examples: a) set intersection, b) projection [5]

ii. Consider two relations: [5]

Course			
course_id	title	dept_name	credit
CS 190	Python	Computer	4
EC 380	Embedded systems	Electronics	3
MX 415	Robotics	Mechatronics	3

Prerequisite	
course_id	preq_id
EC 380	EC 301
MX 415	MX 190

a. Provide the output of following query: select * from Course natural left outer join Prerequisite
b. Convert query in (a) into relational algebra expression

[10]

Q6 a

CO3-;
SO-1;
BL-5

Given set of FDs F over a relation R (U, V, W, X, Y, Z) is as follow:

$$VW \rightarrow XY$$
$$Y \rightarrow V$$
$$WX \rightarrow YZ$$
$$Z \rightarrow U$$

i. Determine two possible candidate keys of R.
ii. Find the highest normal form for the above relation. Justify your answer
iii. Decompose the relation into 3NF

[10]

Q6 b

CO2-;
SO-6;
BL- 5

Consider the set of relations **Formulate the queries for the following statements**:

student (sid, sname, gender, age, year, gpa)
dept(dname, numphds)
prof(pname, dname)
course(cno, cname,dname)
major(dname,sid)
section(dname,cno,sectno, pname)
enroll(sid, grade,dname,cno,sectno)

a) Print the names of professors who work in departments that have fewer than 50 PhD students.

b) Print the name(s) of student(s) with the lowest gpa.

c) Print the names of departments that have one or more majors who are under 18 years old.

[10]

		d) Print the names of students who are taking both a Computer Sciences course and a Mathematics Course. e) Explain any two aggregate functions in SQL	
Q7 a CO4; SO-6; BL-3		Describe the need of NoSQL databases. Compare and Contrast between SQL and MongoDB	[10]
Q7 b CO4-; SO-6; BL-5		i. Evaluate whether the following three schedules' results are equivalent [5] ii. Differentiate between confict serializability and view serializability [5]	[10]

Schedule S1		Schedule S2		Schedule S3	
T1	T2	T1	T2	T1	T2
R (X)		R (X)			R (X)
X = X + 5		X = X + 5			X = X x 3
W (X)		W (X)			W (X)
R (Y)			R (X)	R (X)	
Y = Y + 5			X = X x 3	X = X + 5	
W (Y)			W (X)	W (X)	
	R (X)	R (Y)		R (Y)	
	X = X x 3	Y = Y + 5		Y = Y + 5	
	W (X)	W (Y)		W (Y)	