

21/11/13.

B.E./B.Tech. (Full-Time) Degree Examinations, Nov./Dec. 2013

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Branch : Information Technology

IT8302 Database System Concepts

Regulations : 2012

III Semester

Time : 3 Hours

Max.Marks : 100

Answer all questions

**Part A (10 x 2 = 20 Marks)**

1. List the different data models and state their advantages.
2. Define primary key and foreign key. Give examples.
3. Distinguish between base tables and view tables. How will you create a view using SQL?
4. Compare relational algebra and relational calculus operators.
5. Define multi-valued dependency. Give an example.
6. Suppose that we decompose the schema

$R = (A, B, C, D, E)$  into

$R_1 = (A, B, C)$

$R_2 = (A, D, E)$ .

Show that this decomposition is a loseless decomposition if the following set F of functional dependencies holds :

$A \rightarrow BC$

$CD \rightarrow E$

$B \rightarrow D$

$E \rightarrow A$

7. State the types of locks used for concurrency control in transactions. Draw the compatibility matrix.
8. List the data mining techniques. Write their applications.
9. Write the hierarchy of storage devices.
10. Construct a B-tree for the following key values. Assume that the root node has the key 15.

(7,11,15,17,19,23)

**Part B (5 x 16 = 80 Marks)**

11. (i) Define normalisation, 1NF, 2NF, 3NF and BC/NF. Give examples to each of them and explain them. (10)

- (ii) Consider the following relational schema

hostel (sid, building, fee)

with functional dependencies

$sid \rightarrow building$

$building \rightarrow fee$

$sid \rightarrow fee$

(\*1) Check whether it is in 2NF. If not, convert it into 2NF relations.

(\*2) If it is in 2NF, check whether it is in 3NF. If not, convert it into 3NF.

Justify your answer.

(6)

12. (a) (i) Draw the three level architecture for database systems proposed by ANSI / SPARC. (5)  
(ii) Compare file processing systems and database systems. (5)  
(iii) Draw the overall structure of database systems and explain the components. (6)

(OR)

- (b) (i) List the relational algebra operators and explain them. (5)  
(ii) A university maintains the following tables to store its data :  
student (sid, sname, age, sex, gpa)  
faculty (fid, fname, phone\_no, salary)  
course (course\_no, course\_name, max\_students, fid)  
enrollment (sid, course\_no, credits)  
Draw an E-R diagram to represent this data. (5)  
(iii) Define generalization, specialization and aggregation. Give examples and explain them. (6)

13. (a) (i) Consider the suppliers, parts and shipments database given below

Supplier			
Sno	Sname	Status	City
S1	Sarala	20	Bombay
S2	Uma	10	Chennai
S3	Nehru	30	Chennai
S4	Priya	20	Bombay
S5	Anand	30	Delhi

Parts				
Pno	Pname	Color	Weight	City
P1	Nut	Red	12.0	Bombay
P2	Bolt	Green	17.0	Chennai
P3	Screw	Blue	17.0	Bangalore
P4	Screw	Red	14.0	Bombay
P5	Cam	Blue	12.0	Chennai
P6	Cog	Red	19.0	Bombay

Shipments		
Sno	Pno	Quantity
S1	P1	300
S1	P2	200
S1	P3	400
S1	P4	200
S1	P5	100
S1	P6	100
S2	P1	300
S2	P2	400
S3	P2	400
S4	P2	200
S4	P4	300
S4	P5	400

Using these tables, write SQL queries for the following

- (\*1) Get supplier names for suppliers who supply part P2.  
(\*2) Get supplier names who supply at least one red part.  
(\*3) Get supplier names for suppliers who supply all parts.  
(\*4) Get supplier names for suppliers who supply at least one part supplied by supplier S2.  
(\*5) Delete all suppliers who are located in Chennai.

(10)

- (ii) Explain the INSERT, UPDATE, GRANT and REVOKE commands in SQL. (6)

(OR)

- (b) (i) Explain embedded SQL with an example. Also explain the use of cursors in embedded SQL. (8)  
(ii) Explain database connectivity using either ODBC or JDBC. Also explain dynamic SQL. (8)

14. (a) (i) State and explain the two-phase locking protocol and tree protocol for concurrency control. (8)  
(ii) Explain the log based recovery techniques. (8)  
(OR)
- (b) (i) Compare centralized databases and distributed database. Explain the two phase commit protocol in distributed databases. (8)  
(ii) Explain the Datawarehousing process in detail. (8)
15. (a) (i) Explain the different RAID levels. (8)  
(ii) Explain the hashing techniques. (8)  
(OR)
- (b) (i) Explain the B<sup>+</sup>-tree indexing technique. (8)  
(ii) List the query optimization techniques and explain them. (8)