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53 (IT 402) DBMS

2018

**DATABASE MANAGEMENT SYSTEM**

Paper : IT 402

Full Marks : 100

Time : Three hours

**The figures in the margin indicate full marks for the questions.**

Answer **any five** questions.

1. (a) Discuss the component modules of a Database Management System and their interactions with neat diagram. 15
- (b) What are the physical and logical data independency ? 5
2. (a) Discuss various types of keys with proper examples. 5

Contd.

- (b) Explain the mapping of Specialization and Generalization from ER to Relational schema. Give examples. 5
- (c) Explain the mapping of N-ary relationship type from ER to Relational schema with proper example. 5
- (d) What is Cardinality ratio ? Discuss its types with examples. 5
3. (a) What is Functional dependency ? Write and prove all six inference rules from functional dependency. 15
- (b) Consider the set of Functional dependency,  $F = \{ Ssn \rightarrow Ename, Pnumber \rightarrow (Pname, Plocation), (Ssn, Pnumber) \rightarrow Hours \}$ , determine the  $F^+$ . 5
4. (a) Consider the following relational schema :
- Actor (actorId, name, nationality, age)
- Director (directorId, name, nationality)
- Film (filmId, title, year, directorId)
- Performance (actorId, filmId, character)

Represent the given statements in Relational Algebra form.

- (i) Retrieve all titles of films that were released before 2000.
- (ii) Retrieve all titles of films directed by a British director.
- (iii) Retrieve all informations about all combination of films released in 2012 and non-American directors.
- (iv) Retrieve details of all films released before 2000 or after 2010.
- (v) Retrieve details of all films released between 2000 and 2010.

10

(b) Consider the following relational schema :

Works (Pname, Cname, Salary)

Lives (Pname, street, city)

Located\_In (Cname, city)

Manager (Pname, Mgrname)

Where Pname — Person name, Cname — Company name and Mgrname — Manager name.

Write SQL query for the following :

- (i) List the names of the people who work for the company 'Wipro' along with the cities they live in.

- (ii) Find the people who work for the company 'Infosys' with a salary more than 50000/-. List the names of those along with street and city addresses.
- (iii) List the names of the persons who live and work in the same city.
- (iv) List the names of the persons whose salary is more than that of all of the 'Oracle' employees.
- (v) List the names of the companies that are located in every city where company Infosys is located.

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5. (a) Consider the relation R (A,B,C,D,E) with FDs as  $A \rightarrow B$ ,  $BC \rightarrow E$  and  $ED \rightarrow A$ , find out the highest Normal Form attained by that relation R ? Justify your answer.

5

(b) Explain two phase locking protocol. Mention its advantage and disadvantage.

5

(c) Explain briefly about query optimization.

5

(d) Define Transaction. Explain transaction properties and transaction states. 5

6. Write short notes on : **(any four)**  $5 \times 4 = 20$

- (i) Referential integrity
  - (ii) Boyce-Codd normal form
  - (iii) Join operations
  - (iv) Database administrator
  - (v) ANSI/SPARC architecture.
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(a) Explain the following terms:  
1. ...  
2. ...

(b) Write short notes on the following:  
1. ...  
2. ...

(c) ...

(d) ...

(e) ...

(f) ...