3/EH–73 (iii) (Syllabus–2015)

2022

(February)

COMPUTER SCIENCE

(Elective/Honours)

(Database Management System)

(CS–301 T)

Marks : 56

Time : 3 hours

The figures in the margin indicate full marks for the questions

Answer *any* **one** question from each Unit

UNIT—I

1. *(a)* What are the responsibilities of the DBA and the database designers? 3

(b) Employees work in departments; each department is managed by an employee, a child must be identified uniquely by name when the parent (who is an employee; assume that only one parent works for the company) is known. We are not interested in information about a child when the parent leaves the company. Draw an ER diagram that captures this information. 6

(c) Discuss the main characteristics of the database approach and how it differs from traditional file systems. 4+2=6

2. *(a)* Explain three-schema architecture with the help of a diagram. 6

(b) What is a participation role? When is it necessary to use role names in the description of relationship types? 2+3=5

(c) What is the difference between a database schema and a database state? 4

UNIT—II

3. *(a)* What is an index on a file of records? What is a search key for an index? Why do we need indexes? 4

(b) Explain how performance and reliability can be improved through RAID. 4

4. *(a)* With an example, explain clustered indexes. 3

(b) How does multilevel index improve search? Explain. 5

UNIT—III

5. *(a)* Explain in terms of relational model concept with example : 2×3=6

(i) Domains

(ii) Attributes

(iii) Tuples

(b) Discuss equi-join operation with an example. 3

(c) Assuming the tables Employee (SSN, FName, LName, Salary, DeptId, Age, Address, Pincode) and Department (DeptNo, DName, Dlocation), write SQL for the following : 3×2=6

(i) List the tuples of all the employees whose salary is greater 20000

(ii) List out the department-details for all the departments where employee above the age of 45 is working

6. *(a)* What are the SELECT and PROJECT algebra operations from set theory with examples? 3+3=6

(b) What is the purpose of the Having clause when used in conjunction with Group By? 3

(c) With reference to the tables given in Q. **5** *(c)*—

(i) display the tuples of employees having age above 35 for each department using relational algebra;

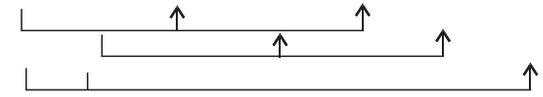
(ii) display the FName and Salary of employees having salary >20000 using relational algebra. 3×2=6

UNIT—IV

7. *(a)* Describe 3NF normalization with examples. 3

(b) What do you understand by closure of a set of functional dependencies F? Consider the following relation with the given set of functional dependencies. Find $F+$.

EMP_PROJ (Eno, Pno, Ename, Pname, DOB, Ploc, Hours)



where Eno—Employee no, Ename—Employee name, Pname—Project name, Ploc—Project location and Hours— No. of hours an employee works on a project. 1+2=3

8. *(a)* Explain multivalued dependency. Explain 4NF with an example. 2+2=4

(b) What do you mean by a minimal set of functional dependency? 2

UNIT—V

9. *(a)* Discuss the possible states a transaction can assume with a suitable diagram. 6

(b) What is a schedule? When are two operations in a schedule said to conflict? What is a complete schedule? 1+3+2=6

10. *(a)* What is a binary lock? How is a shared/exclusive lock different from it? Explain the operations read_lock(X) and write_lock(X) and unlock(X). 1+1+3=5

(b) Explain strict timestamp ordering protocol. 3

(c) Explain briefly threats to a database. 4

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