

(3 Hours)

[Total Marks : 80

- N.B. :** (1) Question No. 1 is **compulsory**.
(2) Solve any **three** questions out of remaining **five**.

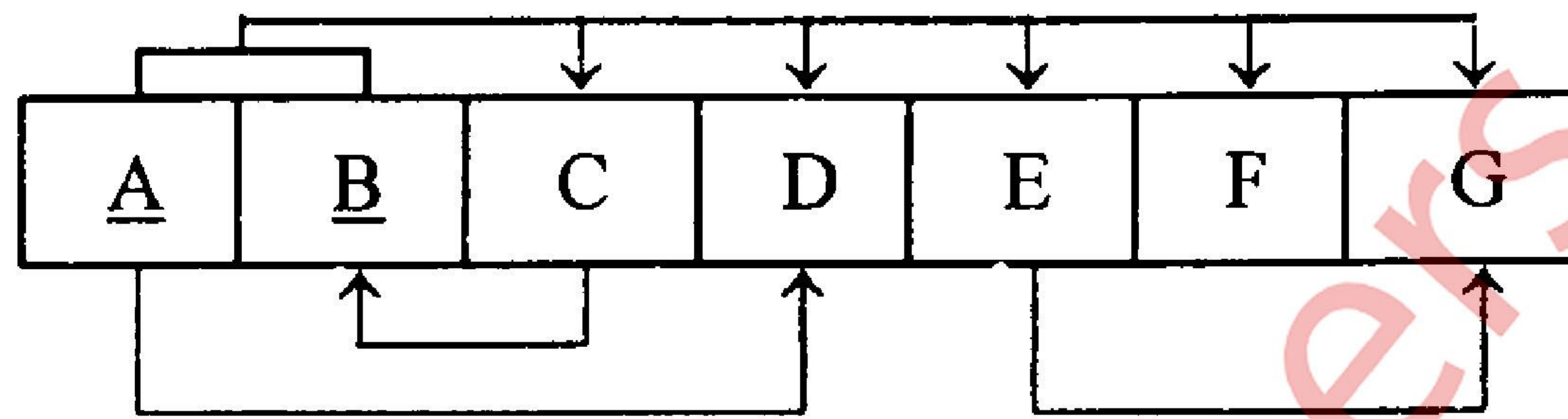
1. (a) Define Data Independence and explain types of data Independence. 5
(b) List all Functional dependencies satisfied by the relation. 5

A	B	C
a ₁	b ₁	c ₁
a ₁	b ₁	c ₂
a ₂	b ₁	c ₁
a ₂	b ₁	c ₃

- (c) Explain Generalization and Specialization. 5
(d) Explain the steps in query processing. 5
2. (a) Explain the steps of an algorithm for ER to relational mapping. 10
(b) Explain different Integrity constraints. 10
3. (a) Draw an E-R diagram for a university database consisting of 4 entities. 10
(i) Student
(ii) Department
(iii) Class
(iv) Faculty and convert it to tables.
 - A student has a unique id, the student can enroll for multiple classes and has at most one major.
 - Faculty must belong to department and faculty can take multiple classes.
 - Every student will get a grade for the class he/she was enrolled.
- (b) Draw and Explain Database system structure. 10
4. (a) Consider the following employee database. 10
Employee (empname, street, city, date_of_joining)
Works (empname, company_name, salary)
Company (company_name, city)
Manages (empname, manager_name).
Write SQL queries for the following statements :-
(i) Modify the database so that 'John' now lives in 'Mumbai'.
(ii) Give all employees of 'ABC Corporation' a 10% raise.
(iii) List all employees who live in the same cities as their managers.
(iv) Find all employees who earn more than average salary of all employees of their company.
- (b) Explain Time-stamp ordering protocol. 10

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5. (a) Consider a dependency diagram of relation R and normalize it up to third normal form. 10



- (b) Explain log-based Recovery. 10
6. (a) Draw a query tree for the following SQL query. 10
- Select P.Pnumber, P.Dnum, E.Lname, E.Address, E.Bdate.
 From Project as P, Department as D, Employee as E.
 Where P.Dnum = D.Dnumber
 AND D.Mgr_ssn = E.ssn.
 AND P.Plocation = 'Chennai'.
- (b) Explain following relational algebra operations with proper examples. 10
- (i) Project
 - (ii) Left outer join.
 - (iii) Division
 - (iv) Rename
 - (v) Natural join.