

SECTION A [40 Marks]

Attempt ALL questions in this section

Question 1

Write brief notes on the following, with simple illustrations where possible: **(2 marks @)**

- (a) Superclass
- (b) Subclass
- (c) Attribute inheritance
- (d) Specialization
- (e) Generalization
- (f) Participation constraints
- (g) Disjoint constraints

Question 2

Define each of the following in regard to Entity Relationship Modeling with an illustration: **(2 marks @)**

- (a) Entity type
- (b) Relationship type
- (c) Attribute
- (d) Binary relationship
- (e) Ternary relationship
- (f) Recursive relationship
- (g) Attribute domain
- (h) Multivalued attribute
- (i) Derived attribute
- (j) Primary key

Question 3

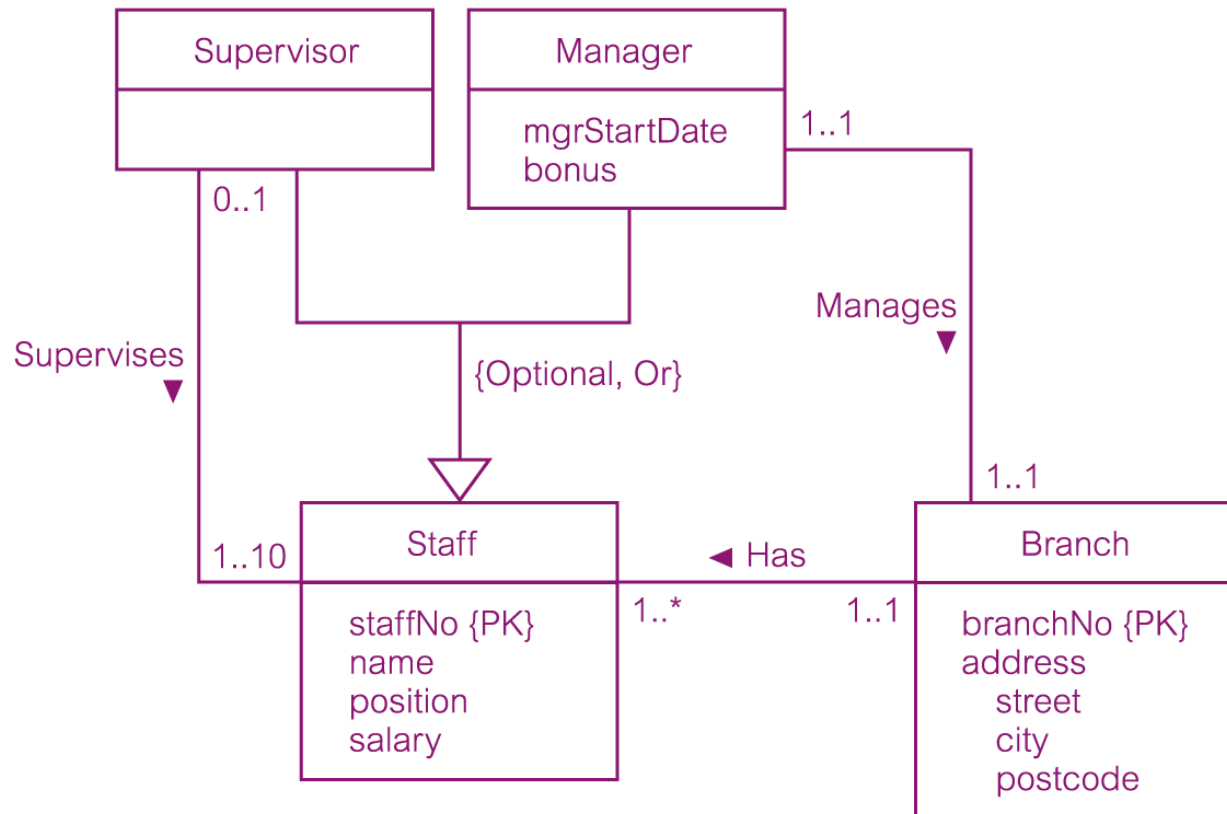
Explain the different states of a database transaction with an illustration. **(6 marks)**

SECTION B [60 Marks]

Attempt ANY THREE questions from this section

Question 1

Explain the business scenario represented by the EER diagram below: **(20 Marks)**



Question 2

Create an ER model to represent the data use by the library. **(20 marks)**

The library provides books to borrowers. Each book is described by title, edition and year of publication and is uniquely identified using the ISBN. Each borrower is described by his or her name and address and is uniquely identified using a borrower number. The library provides one or more copies of each book and each copy is uniquely identified using a copy number, status indicating if the book is available for loan and the allowable loan period for a given copy. A borrower may loan one or many books and the date each

book is loaned out and is returned is recorded. Loan number uniquely identifies each book loan.

Question 3

- a) Define database normalization **(2 marks)**
- b) Explain the purpose for normalization **(4 marks)**
- c) Explain the following in relation to database normalization: **(2 marks @)**
 - i) Functional dependencies
 - ii) Full functional dependencies
 - iii) Transitive dependencies
 - iv) Data redundancy

The table shown below displays the details of the roles played by actors/actresses in films.

nNo	fTitle	dirNo	director	actorNo	aName	role	timeOnScreen
00	Happy Days	D101	Jim Alan	A1020	Sheila Toner	Jean Simson	15.45
		D101	Jim Alan	A1222	Peter Watt	Tom Kinder	25.38
		D101	Jim Alan	A1020	Sheila Toner	Silvia Simpson	22.56
09	Snake Bite	D076	Sue Ramsay	A1567	Steven McDonald	Tim Rosey	19.56
		D076	Sue Ramsay	A1222	Peter Watt	Archie Bold	10.44

- (a) Describe why the table shown below is not in first normal form (1NF). **(2 marks)**
- (b) Transform the above table from un-normalized (UNF) form to first normal form (1NF) **(4 marks)**

Question 4

- a) Explain with an illustration what you understand by a transaction in a database **(5 marks)**
- b) Explain the four ACID properties of transaction **(4 marks)**
- c) Explain a deadlock with an illustration **(8 marks)**
- d) List three factors why we need concurrency control **(3 marks)**

Question 5

- a) Explain what you understand by Database security **(2 marks)**
- b) Database security involves measures to avoid some occurrences. Identify and explain these occurrences. **(10 marks)**
- c) Explain any **five** counter measures you can have in database security **(5 marks)**
- d) Explain what you understand by a computer virus **(3 marks)**

Question 6

Give illustrations on how you can implement / use the following SQL commands:

(4 marks @)

- a) CREATE
- b) INSERT
- c) ORDER BY
- d) GROUP BY
- e) ALTER