

Question 1 (Compulsory)

- (a) Explain the difference between the following pairs:
 - (i) Homogeneous and heterogeneous databases. [2]
 - (ii) Centralized and distributed databases. [2]

- (b)
 - (i) Briefly describe the three schema of database. [3]
 - (ii) Explain the difference between logical and physical data independence. [2]

- (c) Briefly explain the term Generalization and Categorization in the context of database. Provide examples to support your answer. [4]

- (d)
 - (i) Explain the term 'view' in SQL. [2]
 - (ii) What are **TWO** benefits of creating views? [2]

- (e) Describe each of the file organisations listed below:
 - (i) Indexed File Organisation [2]
 - (ii) Hashed File Organisation [2]

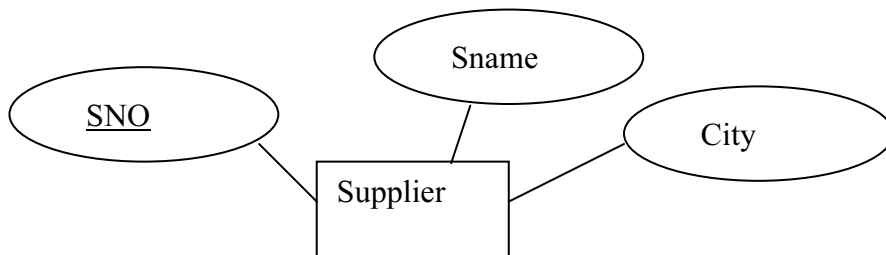
*Question 1 continues on the following page.
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- (f) Consider the following scenario for three users of a database system:

Time	User A	User B	User C
T1	Lock Record K		Lock Record M
T2		Lock Record N	
T3	Request Record M		
T4		Request Record K	
T5			Request Record N

[Each user, when locking a record does not allow others to access it.]

- (i) Will the users be able to process their transactions? Explain what will happen. [2]
- (ii) Describe two ways of managing the above situation. [4]
- (g) Represent the supplier entity below which representing in entity relationship diagram in
- (i) Relational model [1]
- (ii) Hierarchical model [1]
- (iii) Object Oriented Model [1]



Please turn over

Question 2

- (a) In the context of integrity constraints, what is a *referential integrity constraint*? [1]

- (b) With respect to referential integrity rules,
 - (i) What is an insertion rule? [2]
 - (ii) What is a deletion rule? [2]
 - (iii) Name three types of deletion rule, briefly describing their meaning. [6]

- (c) Name and briefly describe two more integrity constraints except the referential integrity rule. [4]

Please turn over

Question 3

- (a) For each of the following relations, indicate the normal form for that relation. Justify your answer. [6]
- (i) MEMBER (MEMBER ID, NAME, ADDRESS)
 - (ii) MEMBER(MEMBERID, NAME, ADDRESS, BOOKID, BOOKTITLE, LOANDATE, RETURNDATE, DUEDATE)
 - (iii) LIBRARY(BOOKID, MEMBERID, BOOKTITLE, LOANDATE, RETURNDATE, DUEDATE)

Consider the following student examination result slip:

STUDENT EXAM RESULT		
Student No	: 00010202020	Name : King Adam
Address	: 222, Kent Street	
Exam Period	: August 2003	
Unit Code	Description	Grade
CS121	Computer Architecture	A
CS222	Database System	B
CS232	Information System	D

- (b) Using the normalization rules, normalize the above student exam result slip to 3NF. Begin by indicating the primary key and repeating groups. Show all steps in the normalization process. [9]

Please turn over

Question 4

- (a) In the context of the object-oriented modelling of databases, what does the term *encapsulation* mean? [2]
- (b) Give **two** reasons why an object-oriented model might be used in the development of a database. [2]
- (c) Describe **four** limitations of OODBMS technology. [4]
- (d) Draw an Object-Oriented diagram to represent the following scenario: [7]

In a library application, there are two types of books: Reference books and Non-Reference books. Attributes and methods for the three types of item are as below:

Non-Reference Book

Attribute: itemno, borrow_date, return_date, duedate

Method: loan, return

Reference Book:

Attribute: itemno, hour_due

Method: loan, return

Please turn over

Question 5

Consider the following table structure:

MEMBER

Column name	Data Type	Length
MEMID	NUMBER	5
NAME	CHARACTER	15
TYPE	CHARACTER	10

BOOK

Column name	Data Type	Length
BOOKID	CHARACTER	5
TITLE	CHARACTER	15
TYPE	CHARACTER	1

LOAN

Column name	Data Type	Length
BOOKID	CHARACTER	5
MEMID	NUMBER	5
DATELOAN	DATE	
DATERETURN	DATE	

- (a) Write an SQL statement to create the **MEMBER** table based on table structure given above [3]
- (b) Write an SQL statement to modify the **LOAN** table by adding a new column named DATEDUE with DATE data type. [3]
- (c) Write an SQL statement to display the total number of members. [3]
- (d) Write an SQL statement to add a new record to the **LOAN** table based on the information given below: [3]

LOAN

Column name	Data
BOOKID	DB212
MEMID	10300
DATELOAN	SYSDATE
DATEDUE	3 weeks after dateloan

- (e) Write an SQL statement to add the return date (20-JUN-03) to the **LOAN** table for BOOKID: DB212, MEMID: 10300 and DATELOAN: 12-JUN-03. [3]

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