



Instructions to candidates

- Answer any **FIVE FULL** questions.
- Missing data, if any, may be suitably assumed.

1A. Consider the following Sales database

Customer(Cust#,Name,City)

Orders(Order#,ODate,Cust#,OAmt)

Order_Item(Order#, Item#, qty)

Item(Item#, UnitPrice)

Shipment(ONumber, WNo, ShipDate)

Warehouse(WareHouseNo, ShipDate)

Answer the following in SQL

- Display the names of customers who have purchased items on 09/11/2015.
 - Count the total number of items in each order.
 - Write the DDL to handle the data in order_item relation on deletion of any item from item relation.
 - Display all those orders which have not been shipped yet.
- 1B. Define (i) Cardinality (ii) Total participation (iii) Partial participation
- 1C. What is a view? Create a view to hold total number of items purchased by each customer.

(5+3+2)

2A. Given $R(A,B,C,D,E,F,G)$ with the set of FDs, $F=\{AB \rightarrow CDEFG, B \rightarrow EG, D \rightarrow F, G \rightarrow AB\}$

- Find candidate keys of R
- What is the normal form of R? Justify.

2B. Given a relation $R(A,B,C,D)$ and set $F=\{A \rightarrow BC, B \rightarrow C, A \rightarrow B, AB \rightarrow C, AC \rightarrow D\}$, convert F to an irreducible form.

2C. Illustrate different states of transaction with a help of a diagram.

(5+3+2)

3A. What is the difference between a *where* and *having* clause? Illustrate with an example when does *having* clause behave as *where* clause?

3B. Check whether the following schedules are serializable

Sa: $r_2(z); r_2(y); w_2(y); r_3(y); r_3(z); r_1(x); w_1(x); w_3(y); w_3(z); r_2(x); r_1(y); w_1(y); w_2(x)$

Sb: $r_3(y); r_3(z); r_1(x); w_1(x); w_3(y); w_3(z); r_2(z); r_1(y); w_1(y); r_2(y); w_2(y); r_2(x); w_2(x)$

3C. Write an algorithm for share/exclusive locks.

(5+3+2)

4A. Consider the Sales database in Q. 1A, answer the following in SQL:

- Using scalar sub queries, find the customer name and number of orders by each customer.
- Using *With* clause, find the customer name and location who have made more than 10 orders.
- Find the items which have not been bought by any customer.

4B. Consider Employee Book database:

member(member-no, name, dob)

books(isbn, title, authors, publisher)

borrowed(member-no, isbn, date)

Answer the following in relational algebra:

- Find books published by 'pearson'

- b) Find members who have bought books published by 'pearson'
 c) Find number of books published by 'pearson'.
- 4C. What are the variations under two phase locking? Differentiate among the variations. (5+3+2)
- 5A. Discuss with an example the following steps in reduction of schema:
 a) Reducing weak entity set.
 b) Reducing relationship set involved in 1:1, 1:M, M:M cardinality
 c) Relation with complex attributes.
 d) Combination of schemas.
- 5B. Let $FD1 = \{A \rightarrow B, AB \rightarrow C, D \rightarrow AC, D \rightarrow E\}$ and $FD2 = \{A \rightarrow BC, D \rightarrow AE\}$. Are they equivalent?
- 5C. Given a relation $R(A,B,C,D,E,F,G,H,I,J)$, $F = \{AB \rightarrow C, A \rightarrow DE, B \rightarrow F, F \rightarrow GH, D \rightarrow IJ\}$ and decomposition $D = \{R1(A,B,C), R2(A,D,E), R3(B,F), R4(F,G,H), R5(D,I,J)\}$. Check whether the decomposition is lossless. (5+3+2)
- 6A. List and explain different components of a trigger? Fire a trigger to identify the last access date of a customer's account.
- 6B. What is an active data set? Explain with an example the three modes of parameter passing in PL/SQL procedure.
- 6C. Write an ER diagram for the following requirement:
 A hospital has to maintain information about its patients, doctors and nurses. Doctor, patient and nurse have all their basic information recorded in the database. A doctor can attend any number of patients. Two nurses are dedicated for every patient. A ward has 7 to 10 rooms. Each ward has 3 nurses. A doctor logs all tests conducted on a patients and also, logs the result, date of test. A nurse can view the tests conducted on a patient. Properties of entities can be suitably assumed. (5+3+2)