YMCA UNIVERSITY OF SCIENCE& TECHNOLOGY, FARIDABAD
M. TECH. 3RD SEMESTER (UNDER CBS)
ADVANCED DATABASE MANAGEMENT SYSTEMS (MTCE-16-203)

Time: 3 Hours

Max. Marks:60

Note: 1. It is compulsory to answer the questions of Part -1. Limit your answers within 20-40 words in this part.
2. Answer any four questions from Part -2 in detail.
3. Different parts of the same question are to be attempted adjacent to each other.
4. Explain using diagrams wherever required.

PART -1

Q1 (a) What is the difference between logical and physical data independence? Which one is (2) harder to achieve?

(b) Why BCNF is considered stricter than 3NF? (2)

(c) Write an efficient algorithm to calculate closure of a set of attributes. (2)

(d) What are general strategies of query processing? (2)

(e) Why immediate update technique of recovery is called UNDO/REDO method? Explain. (2)

(f) Differentiate OLAP systems from traditional OLTP systems. (2)

(g) What is lock thrashing? (2)

(h) What is versioning in OODBMS? (2)

(i) Write advantages of Object Relational database approach for data management? (2)

(j) Differentiate synchronous replication and asynchronous replication? (2)

PART -2

Q2 (a) What are different component modules of a database management system, explain (4) diagrammatically.

(b) A General Hospital consists of a number of specialized wards (such as Maternity, Paediatry etc). Each ward hosts a number of patients, who were admitted on the recommendation by a consultant employed by the Hospital. On admission, the personal details of every patient are recorded. A separate register is to be held to store the information of the tests undertaken and the results of a prescribed treatment. A number of tests may be conducted for each patient. Each patient is assigned to one leading consultant but may be examined by another doctor, if required. Doctors are specialists in some branch of medicine and may be leading consultants for a number of patients, not necessarily from the same ward.
Design and draw an ER diagram for this purpose, clearly indicating the attributes, keys, cardinality ratio and participation constraints. Make necessary assumptions. Also reduce this ER diagram to relational schemas. (6)

Q3 (a) Define normalization and de-normalization. Consider a relation R(ABCD) with following set of FDs, do the following:
F= {AB→C, AB→D, C→A, D→B},
(i) Identify the candidate key(s) of R.
(ii) Identify the best normal form that R satisfies. If R is not in BCNF then obtain a lossless join decomposition of R.
(iii) Apply normalization until you can't decompose the relation further. (6)

(b) Differentiate Hierarchical and Network data Model with suitable example. (4)

Q4 (a) How time stamps can be assigned to transactions. Explain validation based concurrency control mechanism in context of the time stamping with suitable example. (5)

(b) What are deadlocks? Explain deadlock prevention schemes with example. (3)

(c) Explain the concept of checkpoints for recovering from failures. (2)

Q5 (a) What are Distributed Databases? How Semi-Join and Bloom-Join are implemented in these databases?   (5)

(b) What are Parallel database systems? Discuss various design architectures and scale-up in these databases?   (5)

Q6 (a) What is KDD process? Explain various steps involved on this process?   (4)

(b) Consider the following Transaction database which has four transactions.
Let min_support= 2 and min_confidence= 80%

TID	Items_bought
T100	{A,C,D}
T200	{B,C,E}
T300	{A,B,C,E}
T400	{B,E}

(a)   Find all frequent item-sets for this transactional Database.

(b)   List all the strong association rules matching the following meta rule, where X is a variable representing customers and $item_i$ denotes variables representing items (e.g. A, B etc.)

$\forall x \in$ transaction, buys(X,item1) $\wedge$ buys(X, item2) $\Rightarrow$ buys(X,item3)   (6)

Q7 (a) Discuss various type constructors. How they are used to create complex object structures?   (4)

(b) What are Spatial databases, Explain.   (4)

(c) How do multiple inheritance and selective inheritance differ in context of OODBMS?   (2)

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