MCA 3rd Semester Examination
Data Base Management System (N.S.)
MCA-301

Time : 3 Hours  Max. Marks : 60

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note : Candidate is required to attempt five questions in all selecting one question from each of the section A, B, C, D of the question paper and all the subparts of the questions in E section. Section E is compulsory.

SECTION - A

1. (a) What are the advantages of relational model over other two data models in a DBS? How is relational model implemented? (Answer to the point)  (8)

(b) Define in-way B-tree. Where do we use a B-tree.  (4)

2. (a) Draw an ER diagram for the following scheme:

Supplier (S#, Sname, Scity)

Part (P#, Pname, Pcolor)

Project (PR#, PRname, PRcity)

SPP (S#, P#, PR#, Amount)

Symbols have usual meaning.  (8)

(b) Give an example of index sequential file.  (4)

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SECTION - B

3. (a) What do you mean by free, bound variables and well-formed formula in tuple oriented relational calculus? Give an example of each.

(b) Let \( f_1(x) \) and \( f_2(y) \) be two well-formed formulas with free variables \( x \) and \( y \) respectively.

Whether the following is valid or invalid expression justify

\[
\frac{1}{3}x(f_1(x)) \text{ AND } \frac{1}{3}y(f_2(y))
\]

\[
= \frac{1}{3}x \frac{1}{3}y (f_1(x) \text{ AND } f_2(y))
\]

(6+6=12)

4. Study the following scheme and write the SQL statements for the queries given below:

\[ S (S\#, \text{ Sname, Scity, DoB}) \]

(DoB is date & birth)

\[ \text{CC\#, Cname, Cyear, number 1 number indicates the number of students. SC (S\#, C\#)} \]

(a) Give the number of students studying in second year of ‘Computer Science’ class.

(b) Give the names of the students who have joined the courses from city = ‘xyz’.

(c) Give the total number of students studying in first year.

(4×3=12)

SECTION - C

5. What are the three problems which are handled by concurrency control mechanism? Explain each briefly. (12)

6. Explain locking technique for concurrency control. (12)
SECTION - D

7. What are the main objectives of DDBS? (12)

8. Explain to the point the client/server system. (12)

SECTION - E

9. (a) What are the advantages of DBS? (2)

(b) Define various types of join operations in a DBS. (3)

(c) Define functional dependency. Give the functional dependency (ies) from the following table. (3)

<table>
<thead>
<tr>
<th>X</th>
<th>Y</th>
<th>Z</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>50</td>
<td>90</td>
</tr>
<tr>
<td>20</td>
<td>60</td>
<td>100</td>
</tr>
<tr>
<td>30</td>
<td>70</td>
<td>90</td>
</tr>
<tr>
<td>40</td>
<td>80</td>
<td>110</td>
</tr>
</tbody>
</table>

(d) What are the advantages of Network data model? (2)

(e) In relational algebra give examples of SELECT and PROJECT operations. (2)