ABV- Indian Institute of Information Technology & Management, Gwalior

Mid-Semester Examination (BCS and BMS III[rd] Semester)

Course Title: Database Systems (CS-204)

Duration: 3 Hour

MM: 40

Note:

1. Please follow all the *Instructions* given on the cover page of the answer book.
2. All parts of a question should be answered consecutively.
3. All the questions are compulsory.

Q.1 Answer the following briefly. **(2M x 5 = 10M)**

a. View and Temporary table in SQL
b. WHERE *vs.* HAVING clause
c. Correlated *vs.* uncorrelated subquery in SQL
d. ATOMICITY and DURABILITY
e. Referential Integrity

Q.2 Given the following schedule of concurrent transactions $T1$ and $T2$.

1. Determine if the schedule exhibits a Phantom Read.
2. Check for the presence of a Blind Write.
3. Identify any Write-Write Conflict.
4. Check for a Non-Repeatable Read.

Explain your reasoning. **(2M x 4 = 8 Marks)**

Schedule:

Step	Transaction	Operation	Data Item
1	$T1$	Read (R)	A
2	$T2$	Write (W)	A
3	$T1$	Read (R)	A
4	$T2$	Write (W)	B
5	$T1$	Read (R)	B
6	$T1$	Write (W)	B
7	$T2$	Insert (I)	C
8	$T1$	Read (R)	C

Q.3 Assume basic timestamp ordering protocol and that time starts from 1, each operation takes unit amount of time and start of transaction Ti is denoted as Si. The table of timestamp is given below. **(4 marks)**

Time	OP
1	S_1
2	$r_1(a)$
3	S_2
4	$r_2(b)$
5	$w_2(b)$
6	$w_1(a)$
7	S_3
8	$w_3(a)$
9	$w_3(b)$

Find rts(a), wts(a), rts(b) and wts(b) of the given schedule. Show the calculation steps.

Q.4 A database table Employee contains the following attributes. **(4 marks)**

Attribute	Data Type
EmpID	Integer
Name	Varchar(50)
Department	Varchar(30)
Salary	Decimal(10, 2)
JoiningDate	Date

1. A query frequently retrieves employees based on their department. Suggest and explain the type of index to create for optimizing this query.
2. Another query retrieves the total salaries grouped by the department. Would the index you suggested in part (1) also help optimize this query? Why or why not?
3. Calculate the potential improvement in search time for a single record by using a B+ Tree index on the EmpID column. Assume:
   a. Without an index, a linear search on 1,000,000 records is required.
   b. The B+ Tree index has a branching factor (number of children) of 100.

Q.5 Explain the following terms with an example: **(2 x 4 = 8 Marks)**

1. GRANT and REVOKE commend
2. SAVEPOINT
3. COMMIT and AUTOCOMMIT
4. Administration privileges (SUPER and SHUTDOWN)

Q.6

1. What is serializability in schedule? Explain it.
2. Check whether the given schedule is conflict serializable and recoverable or not. **(6 Marks)**