

**MCA (Revised) / BCA (Revised)**

**Term-End Examination**

**02960      December, 2017**

**MCS-023 : INTRODUCTION TO DATABASE  
MANAGEMENT SYSTEMS**

*Time : 3 hours*

*Maximum Marks : 100*

*(Weightage : 75%)*

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**Note :** *Question no. 1 is compulsory. Attempt any three questions from the rest.*

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1. (a) Draw an ER diagram for the situation given below :

“In a department many employees are working on many projects, which are under control of the manager of the department. The manager of the department also holds the responsibility of the welfare of the employees.”

Make suitable choices of the attributes for the entities, identified by you for your ER diagram. Transform your ER diagram into a Relational Database.

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- (b) Which of the following functional dependencies holds for the Relation (R) given below ? Justify your answer. 6

Relation (R) :

J	K	L
X	1	2
X	1	3
Y	1	4
Y	1	3
Z	2	5
P	4	7

Functional Dependencies :

- (i)  $J \rightarrow K$
- (ii)  $K \rightarrow J$
- (iii)  $J, K \rightarrow L$
- (c) What is the role of views in DBMS ? Can we perform insert, delete or modify operations, if the view contains a group function ? Justify. 4
- (d) Why do we do normalization of databases ? Discuss synthesis and decomposition approaches of normalization. Give one example for each approach. 5
- (e) What is the significance of checkpoints in DBMS ? Discuss the utility of checkpoints, with the help of suitable example. 5

- (f) Consider the following relational database schema :

Employer (ecode, ename, eaddress, esalary)

Project (pcode, pname, pduration)

Works for (ecode, pcode, duration)

Perform the following queries using SQL and relational algebra : 5

(i) Find the name of the employees whose salary is less than 5 lacs per annum.

(ii) Find the details of the employees working on the project "Clusters".

- (g) Describe the utility of data replication in distributed DBMS. Briefly discuss the concept of complete and selective replication. 5

2. (a) Explain ANSI-SPARC 3 level architecture of DBMS. Discuss the languages associated at different levels. What are the different types of data independence involved at different levels? 10

- (b) Discuss the following :

(i) Lossless Decomposition

(ii) Dependency Preserving Decomposition

Give suitable examples in support of your discussion. 10

3. (a) Consider the concurrent schedule of Transactions  $T_1$  and  $T_2$ , given below :

Schedule	$T_1$	$T_2$	Sum
$T_1$ : Read (Sum)	Read (Sum)		500
$T_1$ : Sum = Sum - 100	Sum = Sum - 100		
$T_2$ : Read (Sum)		Read (Sum)	
$T_2$ : Sum = Sum + 200		Sum = Sum + 200	
$T_1$ : Write (Sum)	Write (Sum)		
$T_2$ : Write (Sum)		Write (Sum)	

Referring to the schedule given above, answer the following questions with justification :

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- (i) Which property of transactions is violated ?
  - (ii) What is the final status of 'SUM' ?
  - (iii) Is the schedule serializable ?
  - (iv) Which problem in database is contributed by the schedule given ?
- (b) What is the need of indices in a database system ? Mention the categories of indices available in a DBMS. Which data structure is suitable for creating indices and why ?

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4. Differentiate between the following :  $4 \times 5 = 20$
- (a) DBMS and File base systems
  - (b) 2-Phase locking and 2-Phase commit
  - (c) DDBMS and Centralized DBMS
  - (d) Serial schedule and Serializable schedule
5. Write short notes on any *four* of the following :  $4 \times 5 = 20$
- (a) Write Ahead Log Protocol
  - (b) Clustering Indices
  - (c) Locks and its Types
  - (d) Deadlock Prevention Protocols
  - (e) Advantages and Disadvantages of Distributed DBMS
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