



**WEST BENGAL STATE UNIVERSITY**

B.Sc. Honours 4th Semester Examination, 2021

**CMSACOR10T-COMPUTER SCIENCE (CC10)**

Time Allotted: 2 Hours

Full Marks: 40

*The figures in the margin indicate full marks.  
Candidates should answer in their own words and adhere to the word limit as practicable.  
All symbols are of usual significance.*

**GROUP-A**

1. Answer any **four** questions from the following: 2×4 = 8
- (a) Differentiate between schema and instance.
  - (b) What is “Degree” of a relationship?
  - (c) What is Functional Dependency?
  - (d) Define “Domain” of an attribute with an example.
  - (e) Differentiate between super key and candidate key.
  - (f) When is a relation said to be in 3NF?
  - (g) Define aggregation.

**GROUP-B**

**Answer any four questions from the following**

8×4 = 32

2. (a) Consider the relational database as given below and write down expressions in relational algebra for the following queries. 4
- Sailors (sid, sname, rating, age)  
Reserves (sid, bid, day)  
Boats (bid, bname, color)
- Write the following queries in relational algebra
- (i) Find the name of sailors who have reserved boat 103.
  - (ii) Find the names and ages of sailors with a rating above 7.
  - (iii) Find the names of sailors who have reserved a red boat.
  - (iv) Find the sname, bid and day for each reservation.
- (b) What is a *derived* attribute? Give an example. 4
3. (a) Draw an ER diagram for Hospital management system. 6
- (b) Why integrity constraints are essential for DBMS? 2

4. (a) Differentiate between file based system and database management system. 4  
 (b) Write advantages and disadvantages of DBMS. 4
5. (a) What is Cartesian/Cross product? Explain it. 2  
 (b) Consider the relation schema  $R(ABCDE)$  and the FDs  $\{A \rightarrow B, C \rightarrow D, A \rightarrow E\}$ . Is the decomposition of  $R$  into  $(ABC), (BCD), (CDE)$  lossless? 6
6. (a) Consider the following database schema to write nested queries in SQL Supplier 2+2+2  
 (id, name, city)  
 Parts (pno, pname, prescription)  
 Supply (id, pno, cost)  
 (i) Find the names of the parts supplied by "Rahul"  
 (ii) Find the names of the suppliers who supply "Mango"  
 (iii) Find the cost of "Apple" being supplied by "Nagpur" suppliers.  
 (b) What is Natural Join? 2
7. (a) Given a set of FDs for the relation schema  $R(A, B, C, D)$  with Primary key  $AB$ , and  $D \rightarrow C$  or  $C \rightarrow D$  or  $AC \rightarrow D$  or  $AD \rightarrow C$  or  $BC \rightarrow D$  or  $BD \rightarrow C$ . 4  
 In which normal form is  $R$ ?  
 (b) State BCNF. How does it differ from 3NF? 4
8. (a) What are dense and sparse indexing? Explain with an example. 3+3  
 (b) What is Redundancy? 2

**N.B. :** Students have to complete submission of their Answer Scripts through E-mail / Whatsapp to their own respective colleges on the same day / date of examination within 1 hour after end of exam. University / College authorities will not be held responsible for wrong submission (at in proper address). Students are strongly advised not to submit multiple copies of the same answer script.

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