



WEST BENGAL STATE UNIVERSITY
B.Sc. Honours 4th Semester Examination, 2024

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) What is the disadvantage of Cartesian product and how to recover from it?
 - (b) What is Candidate Key?
 - (c) What is the objective of the normalization?
 - (d) What are metadata and data dictionary?
 - (e) What are the roles of a DBA?
 - (f) What is the difference between a Key and a Super Key?

GROUP-B

Answer any *four* questions from the following

- 8×4 = 32
2. (a) What do you mean by degree, cardinality of relationship? 2+3+3
- (b) Discuss the different levels of views.
- (c) State Armstrong's three axioms.
3. (a) Differentiate between file based system and data base management system. 4+(2+2)
- (b) What are dense and sparse indexing? Explain with an example.
4. (a) Discuss the ACID properties of transactions. 4+4
- (b) Explain log based recovery checkpoints.
5. Consider the following employee database, primary keys are underlined. 3+3+2
- Employee (employee_name, street, city)
- Works (employee_name, company_name, salary)
- Company (company_name, city)
- Manages (employee_name, manager_name)

Write SQL's for the queries given below:

- ✓(i) Find all employees in the database who live in the same city as the company for which they work.
- ✓(ii) Find all employees who earn more than the average salary of all employees of their company.
- ✓(iii) Find the company that has smallest payroll.

6. ✓(a) Consider two sets of functional dependencies $F_1 = \{A \rightarrow C, AC \rightarrow D, E \rightarrow AD, E \rightarrow H\}$ and $F_2 = \{A \rightarrow CD, E \rightarrow AH\}$. Are they equivalent? 5+3

✓(b) Consider the universal relation $R(A, B, C, D, E, F, G, H, I, J)$ and set of functional dependencies:

$AB \rightarrow C$

$A \rightarrow DE$

$B \rightarrow F$

$F \rightarrow GH$

$D \rightarrow IJ$

Decompose R into 2NF and 3NF relations.

7. Consider a BANK database having customer, loan, account, employee and branch as entity types. Each branch of bank allows customers to open accounts and borrow loans. A customer can open more than one account, and one account may also belong to one or more customers. Similarly, a customer can take out more than one loan and a loan may be held by more than one customer. The bank has a number of employees working in different branches of the bank. Add appropriate attributes for each entity type. Represent the key attribute, weak entity types (if any) and cardinality ratios. Make appropriate assumptions to complete the specification. Design an E-R diagram for the BANK database. 8

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