Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech Degree S4 (R,S) (FT/WP/PT) Exam April 2025 (2019 Scheme)

Course Code: CST 204

Course Name: Database Management Systems

Max. Marks: 100 Duration: 3 Hours

PART A

(Answer all questions; each question carries 3 marks) Marks

1	Compare weak entity and strong entity with examples.	3
2	What are the major differences between structured, unstructured and semi-structured data?	3
3	Compare SELECT and PROJECT operations on relational database with examples.	3
4	Differentiate between EQUI-JOIN, THETA JOIN and NATURAL JOIN	3
5	What is an assertion? How they differ from triggers?	3
6	Define primary key, candidate key and super key.	3
7	Define functional dependency and explain with example.	3
8	What are Armstrong's axioms?	3
9	What is the significance of Log-Based Recovery?	3
10	List and explain the desirable properties of a transaction	3

PART B

(Answer one full question from each module, each question carries 14 marks)

Module -1

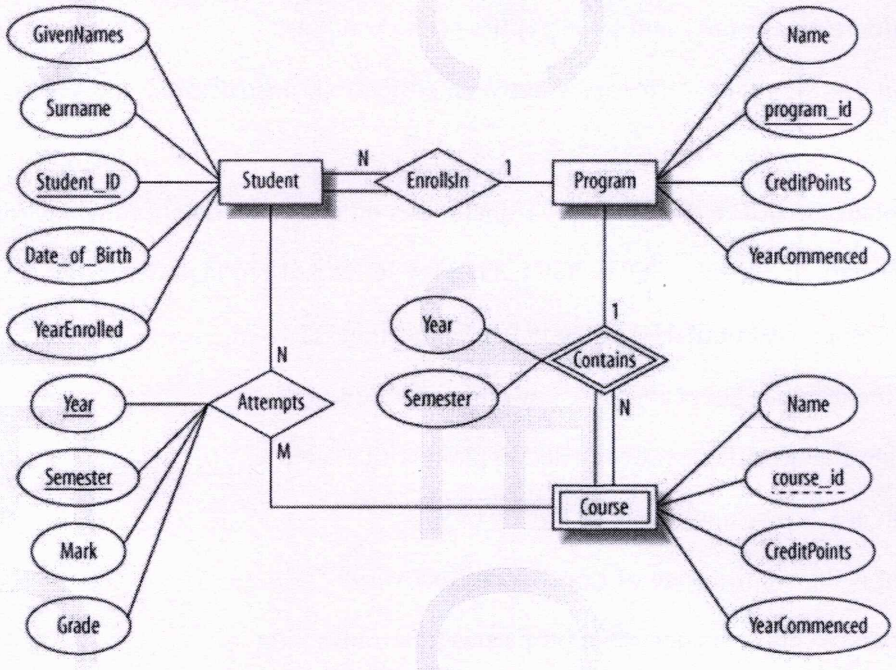
11	a)	With the help of a neat diagram explain the three schema architecture of DBMS	7
	b)	What is an attribute? Explain different types of attributes in the data base management system.	7
12	a)	Draw the ER model of a company by considering the following constraints	10

- In a company, an employee works on many projects which are controlled by one department.
- One employee supervises many employees.
- An employee has one or more dependents.
- One employee manages one department.

b) List different database users and explain each with examples. 4

Module -2

13 a) Write the rules for converting ER diagram to relational model and convert the following ER diagram to relational model. 10



b) Differentiate between the given below SQL statements with examples 4

(i) DROP and DELETE

(ii) ALTER and UPDATE

14 a) An Employee relation has attributes: Employee-Id (numeric type), Name (character type), Salary (numeric type) and Dep-No (numeric type). 8

A Department relation has attributes: Department-Number (numeric type), Department-Name (character type), Dep-Manager-Id (numeric type).

Employee-Id is the primary key of Employee relation. Department-Number is the primary key of the Department relation. Dep-No attribute of Employee relation refers to the Department-Number attribute of Department relation and Dep-Manager-Id attribute of Department relation refers to the Employee-Id attribute of Employee relation.

(i) Write create table statements by specifying necessary integrity constraints for creating these two relations in SQL.

(ii) Write SQL statement to insert the details of an employee John with id 101 with salary 5000 and working in department number 5.

(iii) Insert the details of a Research Department with Department Number 1 and it has not been assigned any manager.

(iv) Assume that a department with employees working in it is to be deleted. Specify the two options to manage this scenario.

b) What is meant by constrains in relational database? Explain each with example. 6

Module -3

15 a) Illustrate structure of B-Tree and B+ Tree. Differentiate between internal nodes and leave nodes of both trees. 6

b) For the relation schema below, By assuming necessary key and referential integrity constraints, give an expression in SQL for each of the queries that follows: 8

employee (ID, person_name, street, city)

works (ID, company_name, salary)

company (company_name, city)

manages (ID, manager_id)

(i) Find the employees whose name starts with 'C'

(ii) Find the name of managers of each company

(iii) Find the ID, name, and city of residence of employees who works for "First Bank Corporation" and earns more than Rs. 50000

(iv) Find the name of companies whose employees earn a higher salary, on average, than the average salary at "First Bank Corporation"

16 a) Define views in SQL. Write simple SQL queries to create a view, update a view and drop a view. 8

b) What is a grid file? What are its advantages and disadvantages? 6

Module -4

17 a) What is normalization? Explain about 1NF, 2NF and 3NF with definition and relevant examples. 7

b) What are different anomalies in designing a database? Explain each with examples. 7

18 a) Consider the relation R = {A, B, C, D, E, F, G, H} and the set of functional dependencies F = {A→DE, B→F, AB→C, C→GH, G→H}. What is the key for R? Decompose R into 2NF and then 3NF relations. 8

b) What is the dependency preservation property for decomposition? Why is it important? 6

Module -5

19 a) Differentiate serial and concurrent schedules. Elaborate conflict serializability with suitable example. 10

b) Explain briefly the ACID properties of a transaction. 4

20 a) What are dirty-read and lost-update problems? Explain with the help of examples. 7

b) What is the two-phase locking (2PL) protocol? How does it guarantee serializability? How strict 2PL differs from basic 2PL? 7

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