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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

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Course Code: 20MCA102

Course Name: ADVANCED DATABASE MANAGEMENT SYSTEMS

Max. Marks. 60

Duration: 3 Hours

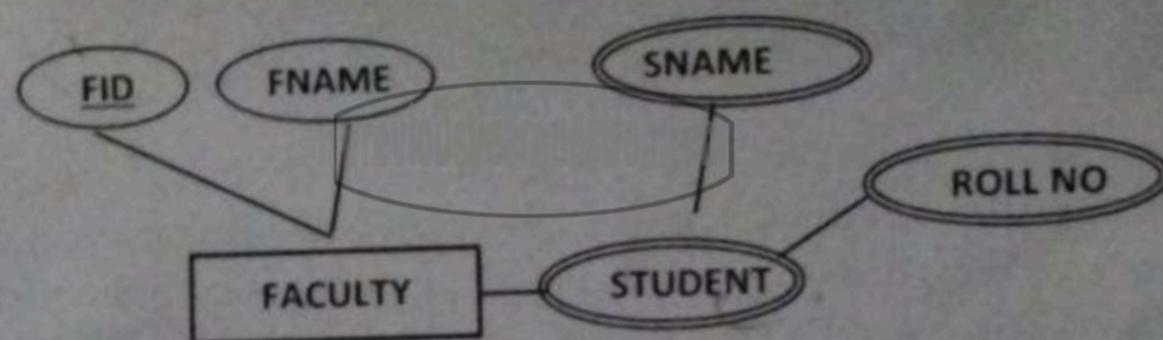
PART A

Answer all questions, each carries 3 marks.

Marks

✓ 1. Differentiate between instance and schema of a database. Give an example in the context of relational DB. (3)

✓ 2. Consider the following entity set FACULTY which gives faculty details along with details of students whose projects are guided by the faculty. Assuming that STUDENT is a multi-valued, composite attribute and that a student is guided by exactly one faculty member, show how the multi-valued attribute can be replaced by an additional entity and a relationship. (3)



✓ 3. Consider the relation R(A,B,C,D,E) with FDs, A→B, AB→D, D→E, BD→C. (3)

Check, using the attribute closure method, if A is a key of R.

✓ 4. Convert the following table MOVIES to 1NF: (3)

MOVIE_ID	TITLE	DIRECTORS	
		FName	LName
A1	Rambo	X	Y
		P	Q
D2	God Father	T	N
		X	Y
T5	Face Off	K	S

✓ 5. What is the importance of log in database recovery? (3)

- ✓ 6. How is the wait/die scheme for time-stamping different from the wait/wound scheme? (3)
- ✓ 7. Distinguish between RAID 2 and RAID 3 levels. (3)
- ✓ 8. How is dense index different from sparse index? (3)
- ✓ 9. How is shading different from replication in the context of MongoDB? (3)
- ✓ 10. What are the desirable properties of distributed databases with replication? (3)

PART B

Answer any one question from each module. Each question carries 6 marks.

Module I

11. Study the following relational schema. Foreign keys have the *same names* as (6) respective primary keys.

*supplier(sid, sname, saddress)
part(pid, pname, pcolour)
project(jid, jname, jcost)
supplies(sid, pid, jid, quanity)*

Write relational algebra expressions for the following queries:

- I. Names of suppliers who supply parts to a project with name "Renovation".
- II. Names and quantity of parts supplied by the supplier "MyC&Co." to the project "Refurbishing"
- III. Names of suppliers who supply no part with colour "red".

OR

12. A company has the following scenario: There are a set of salespersons. Some of (6) them manage other salespersons. However, a salesperson cannot have more than one manager. A salesperson can be an agent for many customers. A customer is managed by exactly one salesperson. A customer can place any number of orders. An order can be placed by exactly one customer. Each order lists one or more items. An item may be listed in many orders. An item is assembled from different parts and parts can be common for many items. One or more employees assemble an item from parts. A supplier can supply different parts in certain quantities. A part may be supplied by different suppliers.
Identify and list entities, suitable attributes, primary keys, foreign keys and relationships to represent the scenario.

Module II

13. Consider a relation R(A,B,C,D,E,F,G) with A and CD as candidate keys. (6)
Assume that the following dependencies hold on R: D→FG, F→G, C→A. Split R into the highest possible normal form quoting the reason for each step.

OR

- Given a relation M(P,Q,R,S,T,U) with FDs, F={P → R, PQ → R, R → SU, RS → U, TR → PQ}, compute the minimal cover of F. (6)

Module III

- ✓15. Illustrate the following problems with suitable examples (i) Lost-update problem (6)
(ii) Inconsistent Retrieval Problem (iii) Uncommitted Data Problem

OR

16. Illustrate, with the help of an example with at least 3 transactions, how the 2-Phase Locking Protocol ensures concurrency control. (6)

Module IV

- ✓17. Which are the situations in which variable length-records are required in a file? (6)
Discuss the slotted-page scheme for accommodating variable length records.

OR

18. Assume that there is a table with the following structure. (6)

Admission No.	Adhaar No.	Name	Age
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Admission No. is the primary key and Adhaar No. is an alternate key. Show a sample file and the corresponding index structure for the table with at least 6 data records for (i) primary index (ii) secondary index on Adhaar No. (Assume that there are two data records per disk block.)

Module V

- ✓19. Illustrate, with the help of suitable examples, how multi-set and array types are created in object-based databases. (6)

OR

20. Illustrate, with the help of a suitable example, the structure of a DTD. Write any two sample XML documents that satisfy your example DTD. (6)
