

THE KAVERY ENGINEERING COLLEGE*(An Autonomous Institution)***UG/PG DEGREE END SEMESTER THEORY EXAMINATIONS, APRIL-MAY 2026***Third Semester***Artificial Intelligence & Data Science****AD3391 - DATABASE DESIGN AND MANAGEMENT***Regulations - 2021***Duration : 3 Hrs****Maximum : 100 Marks****PART – A (ANSWER ALL QUESTIONS) (Marks 10*2=20)**

Q.No	Questions	BTL	CO	Marks
1.	Mention the steps involved in database development life cycle.	K1	1	2
2.	Draw an E-R diagram to represent student and staff entity set.	K2	1	2
3.	What do you mean by Referential Integrity constraint?	K1	2	2
4.	Define SQL.	K1	2	2
5.	How do update anomalies arise in a poorly designed relational database?	K1	3	2
6.	What is a minimal cover in functional dependencies?	K2	3	2
7.	What are the ACID properties of a transaction?	K1	4	2
8.	How can deadlocks be prevented in a two-phase locking protocol?	K1	4	2
9.	Differentiate between an EER model and an ODB schema?	K2	5	2
10.	Explain how do you update a document in MongoDB?	K2	5	2

PART – B (ANSWER ALL QUESTIONS) (Marks 5*16 = 80)

Q.No	Questions	BTL	CO	Marks
11.	a i Clarify the three schema architecture of DBMS. Why do we need mappings between different schema levels?	K2	1	7
	ii Illustrate the in detail about the architecture DBMS with neat diagram	K2	1	9
	Or			
	b i Outline the UML class diagram of an ATM machine.	K2	1	10
	ii Compare and contrast specialization and generalization in Enhanced ER model.	K2	1	6
12.	a Illustrate the process of defining and enforcing integrity constraints at the column level versus the table level using SQL syntax, providing a practical example.	K2	2	16
	Or			
	b Deliberate the following relations for a boat management application for a beach resort: SAILOR (SID, NAME, AGE, GENDER, RATING) RATING can take the vales ('FAIR', 'GOOD', 'EXCELLENT') BOAT (BID, BTYPE, BNAME, COLOR) BTYPE can take two values (D, S) D – Deluxe, S –Super Deluxe SAILS (SID, BID, SHIFT) SHIFT can take two values – FN or AN	K2	2	16
	a. Develop a SQL query to list number of female sailors.			
	b. Develop a SQL query to list the boatname and boattype sailed by a particular sailor "SAM".			
	c. Develop a SQL query to list how many sailors are ranked excellent.			
	d. Develop a SQL query to list the boat name, sailor name who sails the boat.			

13. a i Create the emp project table: K6 3 8
emp project(id, project_id, hours, employee_name, project_name, project_location)
 The functional dependencies that hold for emp project are given in the form of $X \rightarrow Y$, which means Y is functionally dependent on X.
- $id, project_id \rightarrow hours$
 - $id \rightarrow employee_name$
 - $project_id \rightarrow project_name$
 - $project_id \rightarrow project_location$

Justify whether the above functional dependencies satisfy 2NF. If not, convert it into 2NF.

- ii Build the relation $R(A,B,C,D,E)$ with functional dependencies $\{A \rightarrow BC, CD \rightarrow E, B \rightarrow D, E \rightarrow A\}$. Identify super keys. Find F^* . K6 3 8

Or

- b i Construct the following relation $R(A,B,C,D,E)$ and FD's $\{A \rightarrow BC, C \rightarrow A, D \rightarrow E, F \rightarrow A, E \rightarrow D\}$. Is the decomposition of R into $R_1(A, C, D)$, $R_2(B, C, D)$ AND $R_3(E, F, D)$ lossless? K6 3 8
- ii Discuss the following relation schema and transform it into 1NF. K6 3 8

Department				
dname_ssl	dnumber	m_ssl	start_date	dep_locations
Consultancy	15	333	1988-01-09	New York, Delaware, Wilmington
Finance	4	987	1989-01-09	Tempe
Head Office	1	888	1990-01-09	Florida

14. a Classify the various types of schedules in database systems? Explain the concept of a non-serial schedule and its role in concurrency control. K2 4 16
- Or**
- b Enlighten the working of two phase locking technique and explain with neat example. K2 4 16
15. a Explain how an Enhanced Entity-Relationship (EER) model is mapped to an Object Database (ODB) schema. Discuss the key differences in modeling between relational databases and object databases. K2 5 16
- Or**
- b Illustrate the basic CRUD operations in MongoDB? Provide a detailed explanation and examples of how to perform each of these operations in MongoDB. K2 5 16