

Reg.No.:

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--



VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN
[AUTONOMOUS INSTITUTION AFFILIATED TO ANNA UNIVERSITY, CHENNAI]
Elayampalayam – 637 205, Tiruchengode, Namakkal Dt., Tamil Nadu.

Question Paper Code: 60002

B.E. / B.Tech. DEGREE END-SEMESTER EXAMINATIONS – NOV. / DEC. 2025

Third Semester

Computer Science and Engineering

U23IT404 – DATABASE MANAGEMENT SYSTEMS

(Regulation 2023)

Time: Three Hours

Maximum: 100 Marks

Answer ALL the questions

Knowledge Levels (KL)	K1 – Remembering	K3 – Applying	K5 - Evaluating
	K2 – Understanding	K4 – Analyzing	K6 - Creating

PART – A

(10 x 2 = 20 Marks)

Q.No.	Questions	Marks	KL	CO
1.	Compare and Contrast file Systems with database system.	2	K2	CO1
2.	State about SELECT operation in Relational algebra.	2	K1	CO1
3.	Assess how 'Boyce-Codd normal form is found to be stricter than third normal form'.	2	K2	CO2
4.	Determine whether the decomposition of R into R1 (A,B), R2 (B,C) and R3 (B,D) is lossless or lossy.	2	K2	CO2
5.	Outline the four ACID properties of transactions.	2	K1	CO3
6.	Define two-phase locking protocol.	2	K1	CO3
7.	Identify the factors to consider when selecting a RAID level.	2	K2	CO4
8.	How dynamic hashing differ from static hashing?	2	K2	CO4
9.	List the different aspects of a security problem.	2	K1	CO5
10.	Define SQL Injection and give a simple example	2	K1	CO5

PART – B

(5 x 13 = 65 Marks)

Q.No.	Questions	Marks	KL	CO
11. a)	Describe the Database system Architecture with neat sketch and explain how the components are interrelated in architecture.	13	K1	CO1
	(OR)			
b)	Consider the following relations for a company database Application. <ul style="list-style-type: none"> • Employee (<u>Eno</u>, Name, Sex, DOB, Doj, Designation, Basic_Pay, Dept_No) • Department (<u>Dept_No</u>, Name) • Project (<u>ProjNo</u>, Name, Dept_No) • Works for (<u>Eno</u>, <u>ProjNo</u>, <u>Date</u>, Hours) The attributes specified for each relation is self-explanatory. However the business rules are stated as follows. A department can control a project. An employee can work on any number of projects on a day. However an employee cannot work more than once on a project he/she worked on that day. The primary keys are underlined.		K1	CO1
	i. Identify the forging keys, Develop DDL to implement the above schema.	3		
	ii. Develop an SQL query to list the department number and the number of Employee in each department.	3		
	iii. Develop a view that will keep track of the department number, the number of employees in the department, and the total basic pay expenditure for each department.	3		
	iv. Develop an SQL query to list the details of employees who have worked in more than three projects on a day.	4		
12. a)	Describe the Enhanced-ER (EER) model and explain the mapping process from EER to relational schema with an example.	13	K3	CO2
	(OR)			
b)	Given the relation R(A, B, C, D, E) and the functional dependencies: <ul style="list-style-type: none"> A → B BC → D E → A D → E i. Identify all candidate keys. ii. Determine the highest normal form of R. iii. Decompose R into relations in BCNF, ensuring lossless join and dependency preservation.	13	K3	CO2

13. a) Consider the following schedules. The actions are listed in the order they are scheduled, and prefixed with the transaction name
 S1: T1:R(X), T2:R(X), T1:W(Y), T2:W(Y), T1:R(Y), T2:R(Y)
 S2: T3:W(X), T1:R(X), T1:W(Y), T2:R(Z), T2:W(Z), T3:R(Z)
 For each of the schedule, answer the following questions:
- What is the precedence graph for the schedule?
 - Is the schedule conflict –serializable? if so, what are all the conflict equivalent serial schedules?
 - Is the schedule view-serializable? if so, what are all the view equivalent serial schedules?
- (OR)
- b) What is ARIES (Algorithm for Recovery and Isolation Exploiting Semantics) in crash recovery? Describe the steps in crash recovery in ARIES.
14. a) Examine about RAID system. How does it improve performance and reliability? Discuss the level 3 and level 4 of RAID.
- (OR)
- b) Describe in detail about how records are represented in a file and how to organize them in a file.
15. a) Illustrate with a neat diagram the architecture of a distributed database system.
- (OR)
- b) Explain the role of encryption and public key infrastructure (PKI) in database security.

PART – C

(1 x 15 = 15 Marks)

Q.No.	Questions	Marks	KL	CO
16. a)	Consider the bank database given below, where the primary keys are underlined. Construct the following SQL queries for this relational database. branch (<u>branch_name</u> , branch_city, assets) customer(<u>customer_name</u> , customer_street, customer_city) loan (<u>loan_number</u> , branch_name, amount) borrower (<u>customer_name</u> , <u>loan_number</u>) account (<u>account_number</u> , branch_name, balance) depositor(<u>customer_name</u> , <u>account_number</u>)		K1	CO1

- | | | | | |
|------|---|----|----|-----|
| i. | Find all customers of the bank who have an account but not a loan. | 3 | | |
| ii. | Find the names of all customers who live on the same street and in the same city as "Smith". | 3 | | |
| iii. | Find the names of all branches with customers who have an account in the bank and who live in "Harrison". | 4 | | |
| iv. | Find the branch with the highest total assets. | 3 | | |
| v. | Find the total balance for each branch. | 2 | | |
| | (OR) | | | |
| b) | Analyze the effectiveness of Time Stamp-Based Concurrency Control compared with Two-Phase Locking (2PL) in maintaining serializability. | 15 | K2 | CO3 |
-