

Reg. No. 

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**B.E / B.TECH. DEGREE EXAMINATION, MAY 2023**

Third Semester

**IT18305 – DATABASE SYSTEMS**

(Information Technology)

(Regulation 2018 / Regulation 2018A)

**TIME: 3 HOURS**

**MAX. MARKS: 100**

CO	Outcome	RBT
CO 1	Evaluate the basic concepts and data models used in database design ER modeling concepts and architecture and design queries using SQL	5
CO 2	Apply advanced queries execution using relational constraints, joins, set operations, aggregate functions, trigger, views and embedded SQL.	3
CO 3	Apply concurrency control and recovery mechanisms for practical problems	3
CO 4	Interpret internal storage structure based on the requirement	4
CO 5	Evaluate the types of database and use for real world applications	5

**PART- A (10 x 2 = 20 Marks)**  
(Answer all Questions)

	CO	RBT LEVEL
1. Compare conventional file systems with Database Management Systems.	1	4
2. Identify two real time scenarios where ‘before update’ trigger should be applied.	1	3
3. Draw the schemas of at least 3 tables that may be used to store information in a social-networking system such as Facebook.	2	2
4. List any two undesirable properties that a bad database design may have.	2	2
5. What are the desirable properties of a fund transfer transaction?	3	3
6. Sketch the sequence of states a transaction goes through.	3	3
7. Draw a B+ tree of level 2 with m=3 with keys of your choice.	4	3
8. Differentiate static and dynamic hashing.	4	4
9. Give an example of a ‘snapshot’ with respect to temporal databases.	5	2
10. Identify a suitable database to store the data sent by GPRS fixed in a vehicle.	5	3

**PART- B (5 x 14 = 70 Marks)**

	Marks	CO	RBT LEVEL
11. (a) Consider the following schemas. EMPLOYEE ( <u>eno</u> , DOJ, designation, basic_salary,dno) DEPARTMENT ( <u>dno</u> ,dname)	(14)	2	3

Write SQL queries to perform the following

- Display the employee number, name, department\_number, department\_name for all employees
- Show the average salary of all the employees
- For each department display the number of employees in that department
- List the details of employees who work for the department “Security”

(OR)

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|--------------------------------------------------------------------------------------------------|------|---|---|
| (b) Consider the schemas in Q No. 11 (a). Write Relational Algebra expressions for the following | (14) | 2 | 3 |
| a) List the details of all employees                                                             |      |   |   |
| b) Display the department names of all departments                                               |      |   |   |
| c) Display the minimum and maximum salary of employees                                           |      |   |   |
| d) Display the details of employees who joined after 1.1.2000                                    |      |   |   |

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|-------------------------------------------------------|------|---|---|
| 12. (a) Construct ER Model for a University database. | (14) | 1 | 3 |
| (OR)                                                  |      |   |   |

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|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|---|---|
| (b) What are the challenges you will face when you design a database by injecting all details in single table? Develop the ways to design a modularized database system. | (14) | 1 | 3 |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|---|---|

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|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|---|---|
| 13. (a) Illustrate the steps involved in processing the following query using necessary diagrams.<br>select emp_name from employee as E, department as D where E.dno = D.dno | (14) | 3 | 3 |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|---|---|

(OR)

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|------------------------------------------------------------------------------------------------------------------------------------------------------|------|---|---|
| (b) Outline the various problems that arise due to concurrent transactions and how locking protocols are used for concurrency control with examples. | (14) | 3 | 3 |
|------------------------------------------------------------------------------------------------------------------------------------------------------|------|---|---|

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|---------------------------------------------------------------------------|------|---|---|
| 14. (a) Classify the physical storage media based on the speed of access. | (14) | 4 | 2 |
| (OR)                                                                      |      |   |   |

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|----------------------------------------------------------------------------------------|------|---|---|
| (b) Explain the various levels of disk-organization techniques with suitable diagrams. | (14) | 4 | 2 |
|----------------------------------------------------------------------------------------|------|---|---|

15. (a) Your employer asks you to develop an application similar to WhatsApp that supports audio, text, image, and other file formats' exchange and storage. What database will you choose to use as backend? Support with the concepts involved in your choice.

(14) 5 3

(OR)

(b) You, as a Project Manager derived a client requirement that requires the data to be stored at isolated sites in a distributed manner. How will you discuss the challenges involved in data transactions?

(14) 5 3

**PART- C (1 x 10 = 10 Marks)**  
(Q.No.16 is compulsory)

16. Design an ER diagram for the below scenario.  
The university is organized into departments. Each department is identified by a unique name (dept name), is located in a particular building, and has a budget. Each department has a list of courses it offers. Each course has associated with it a course id, title, dept name, and credits, and may also have associated prerequisites. Instructors are identified by their unique ID. Each instructor has name, associated department (dept name), and salary. Students are identified by their unique ID. Each student has a name, an associated major department (dept name), and tot\_cred (total credit hours the student earned thus far. The university maintains a list of classrooms, specifying the name of the building, room number, and room capacity. The university maintains a list of all classes (sections) taught. Each section is identified by a course id, sec id, year, and semester, and has associated with it a semester, year, building, room number, and time slot id (the time slot when the class meets). The department has a list of teaching assignments specifying, for each instructor, the sections the instructor is teaching.

Marks	CO	RBT LEVEL
(10)	1	5