VIT
Vellore Institute of Technology

Reg. No. :

Final Assessment Test (FAT) - July/August 2023

Programme	**B.Tech.**	Semester	**Fall Inter Semester 22-23**
Course Title	**DATABASE SYSTEMS**	Course Code	**BCSE302L**
Faculty Name	**Prof. K P Vijayakumar**	Slot	**F2+TF2**
		Class Nbr	**CH2022232501054**
Time	**3 Hours**	Max. Marks	**100**

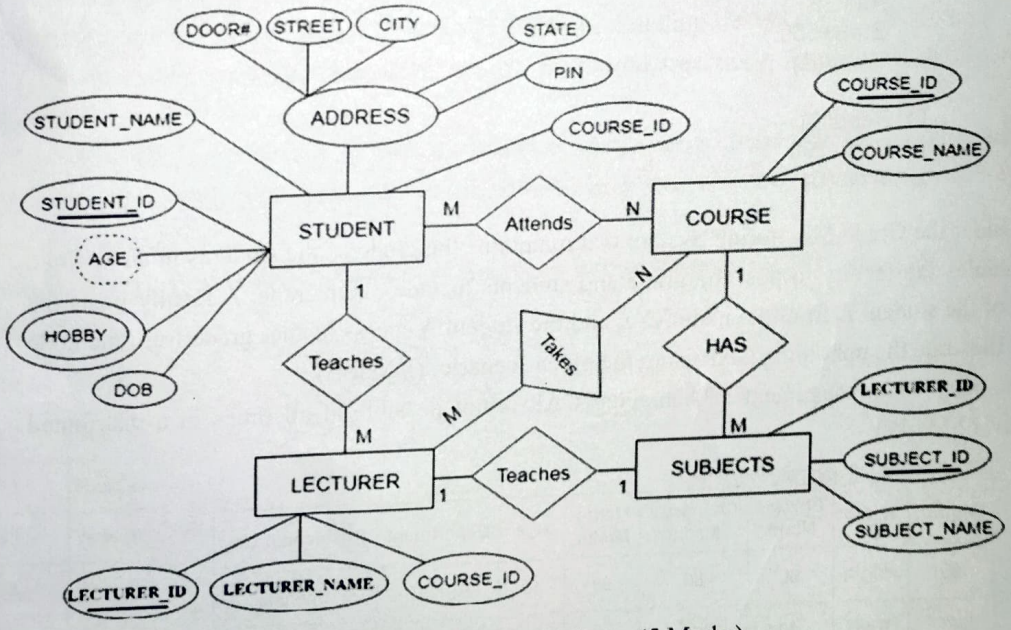
Section A (7 X 10 Marks)
Answer All questions

01. Assume that an online retail store called "HappyShoppy" has experienced rapid growth in its customer base and product inventory. **[10]**

a. Identify and elaborate the kind of DBMS architecture needed to manage their operations efficiently with a neat diagram. (8 Marks)

b. Mention the benefits of chosen architecture (2 Marks)

02. **[10]**



a. Map the above E-R model to appropriate relation schema.(5 Marks)

b. Determine the primary key, foreign key, and any other appropriate constraints in the mapped schema and also describe the purpose of each constraints.(5 Marks)

03. Assume that you are the database designer at TeachEasy and you need to maintain the database for easier access and retrieval of records at any time. The database contains the following: **[10]**

Book ID	Published Date	Tutor ID	Title	Room	PHONE NUMBER	Block Numbers
B1	23.02.23	Tut1	PYTHON	AB3310	9940497934, 9940497938	AB3
B2	18.11.23	Tut3	SQL	AB1331	9876123456	AB1
B3	23.02.23	Tut1	MATLAB	AB2310	9940497934, 9940497938	AB2
B5	05.02.23	Tut3	JAVA	AB2332	9876123459	AB2
B4	04.07.23	Tut5	AZURE	DB321	9876543210	DB

Normalize the given table up to the third level normal form with proper justifications for violations in each form.

04. a. Banking System online application is used to store, manipulate and retrieve the customer's account details. Identity and describe the recovery techniques that can be applied for critical data restoration in case of some transaction failure or data corruptions. (4 Marks) **[10]**

b. Write the log records created during Deferred database modification and Immediate database modification for the following schedule. Assume that the initial values of A=1100, B=1200 and C=1000. (6 Marks)

T0: Read(A)
A:=A-550
Write(A)
Read(B)
B:=B+550
Write (B)

T1: Read(C)
C:=C-300
Write(C)

05. a. Consider the Grade Monitoring System that maintains the grade of the students in an institute that enables the faculty to post the grade and students to view their grade. A faculty posts the grade of the student A from the node XYZ and the student A access his/her grade from the node PQR. Illustrate the upholding CAP using the given scenario. (8 Marks) **[10]**

b. Comment on the statement : "Achieving CAP is not possible at all times in a distributed system" (2 Marks)

06. **[10]**

Consider the following student table:

Reg.No.	Name	Physics Marks	Chemistry Marks	Maths Marks	Age	Department	Residential City
1001	Harish	90	80	98	19	SENSE	Chennai
1002	Ram	50	95	90	20	SENSE	Bangalore
1003	Suresh	80	85	75	19	SENSE	Mumbai
1004	Dhamu	95	95	55	20	SCOPE	Kolkata
1005	Prathik	85	70	85	19	SENSE	Delhi
1006	Gokul	65	52	40	18	SCOPE	Chennai

Write SQL query for the following,

a. Add a new column "Average" in the above table and find the average of all the students (2 Marks)

b. Display the name of all students whose residential city is either Chennai or Bangalore (2 Marks)

c. List the name of all students in Upper Case those who are in the age 19 and studying in SENSE department (2 Marks)

d. Display the minimum and maximum age of the students (2 Marks)

e. Find the student name and department whose average mark above 80 department wise (2 Marks)

07. a. The management team wanted to check whether a particular faculty in the university is employed or not. Write a PL/SQL function to assist the management team so that a message is displayed as "Employed" Otherwise "Not Employed". (5 Marks) [10]

b. Create an explicit cursor named university_cur and fetch the details of all students in the student table whose department is SENSE. Also, Illustrate the ROWCOUNT using implicit cursor. (5 Marks)

Note: Assume the required tables with data are already existing in the database.

Section B (2 X 15 Marks)

Answer All questions

08. Consider the following relations of a university database. [15]

Faculty (EmpId, Name, Phno, School, DateOfJoining)
Student (RegNo, Name, Phno, School)
Course (CourseCode, CourseName, Credits)
CourseAllocation (ClassNumber, AEmpId, ACourseCode,Venue, MaxStrength, Slot)
StudReg (RegNo, ClassNumber)

a. Write a relational algebra query and depict a query tree to find Name and Phone numbers of Faculty members who have joined after 01-01-2023 and handling DBMS course. (5 Marks)

b. Convert the constructed canonical tree into optimized tree using Heuristic technique. (5 Marks)

c. The Keys 12,18,13,2,3,23,5 and 15 are inserted into an empty hash table of length 8 using open addressing with hash function h(k)=k mod 8. Show the resultant hash table of each key entries (5 Marks)

09. Consider the Concurrent Transaction and initial values of A, B and C are 200, 200, and 380 respectively [15]

Time	Transaction Tx	Transaction Ty
T1	Read (A)	Read(A)
T2	Read (B)	Read (B)
T3	Write (B=A+100)	
T4	Write (C=C+B*2)	Write (B=A+100)
T5	Read (C)	Write (C=C+B*2)
T6	Read(A)	Read (A)
T7	Read(B)	Read(B)
T8		Read (C)

a. Identify and elaborate the issues on the concurrent transaction as given in the above table (4 Marks)

b. Illustrate the solution to overcome the problems using lock based protocol (basic, Strict and Rigorous) with proper justification (11 Marks)