VIT Vellore Institute of Technology

Reg. No. : 21BPS1364

Final Assessment Test (FAT) - APRIL/MAY 2023

Programme	B.Tech	Semester	Winter Semester 2022-23
Course Title	DATABASE SYSTEMS	Course Code	BCSE302L
Faculty Name	Prof. Balasundaram A	Slot	E2+TE2
		Class Nbr	CH2022235000920
Time	3 Hours	Max. Marks	100

SECTION 1 (4 X 10 Marks)
Answer All questions

01. (i) Identify the particular property of DBMS that helps to enhance the security of the system, save time and reduce cost required once the information in database is changed or altered. Is there any further classification of the said property available? If yes, then provide a comparison between those. [5 marks] **[10]**

(ii) Illustrate with pictorial representation how to achieve this property through data abstraction. [5 marks]

02. (i) Explain in short the various types of conflicts that can arise while two different transactions are scheduled for concurrent execution. [2 marks] **[10]**

(ii) Check whether the given schedule is conflict serializable and recoverable or not. [5 marks]

T1	T2	T3
	R(Y)	
		R(Y)
R(X)		
		R(X)
	R(Z)	
		W(Y)
W(X)		
	W(Z)	
R(Z)		
W(Z)		

(iii) Determine all the possible serialized schedules for the above schedule specified in (ii). [3 marks]

03. Consider a schema containing the following relations: **[10]**

EMPLOYEE (**EMPID**, NAME, AGE, SALARY, DEPTID, PID)

DEPARTMENT (**DEPTID**, DNAME, LOCATION)

PROJECT (**PID**, PNAME, DEPTID)

Write SQL queries for the following:

a. Create all the tables using DDL instructions, include appropriate primary and foreign key constraints.[3 Marks]

b. Display the Employee Name, Department name and project name of the employee 'ABC'. [2 Marks]

c. Display the Employee Name, project name and the work location of all employees.[2 Marks]

d. Create a view named xyz_empl that contains Employee Name, Department name and project name of all the employees belonging to 'XYZ' project. [3 Marks]

04. (i) Elucidate some situations where you should prefer using NoSQL databases rather than conventional databases. [6 Marks] [10]

(ii) In the context of distributed system, discuss the significance of the CAP theorem. [4 Marks]

SECTION 2 (4 X 15 Marks)

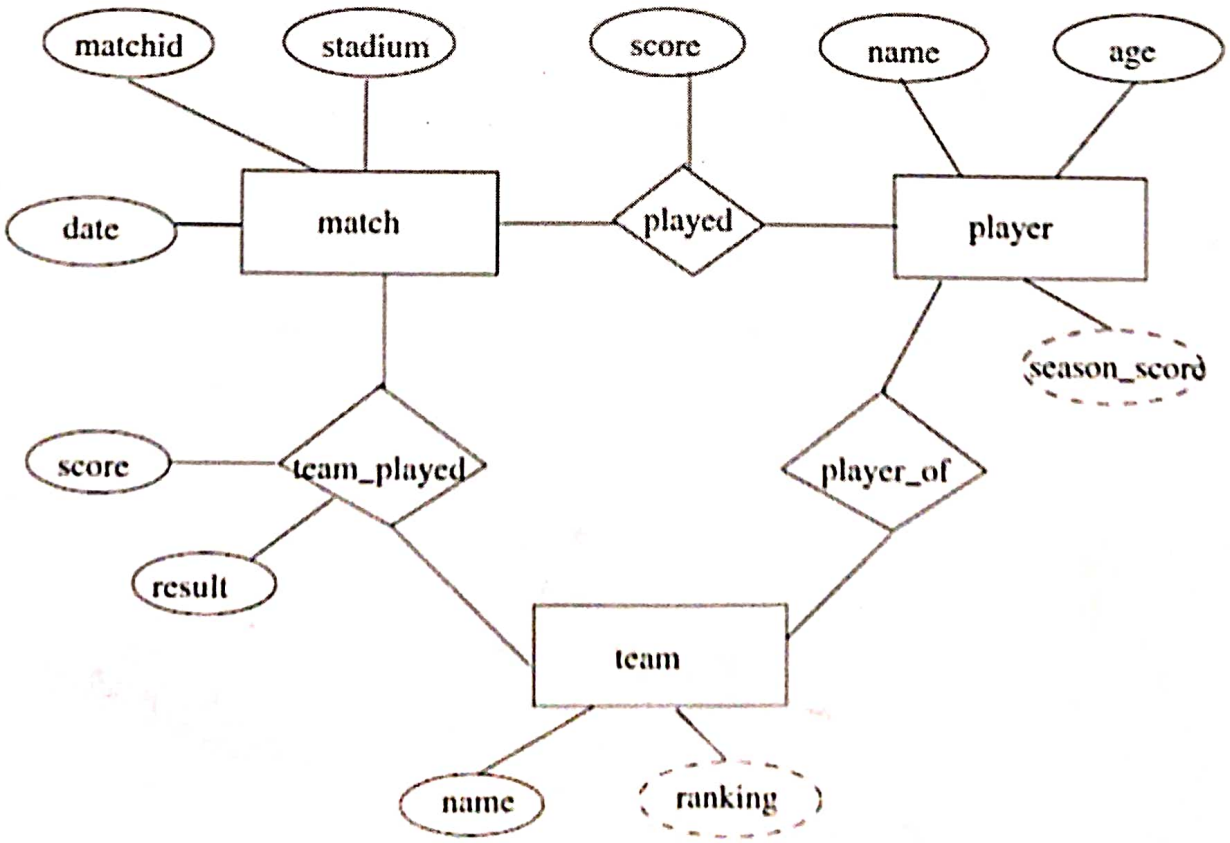
Answer All questions

05. (i) A furniture shop wants to sell different types of furniture in online mode. The customers can view the furniture and place orders online. [15]

- The portal sells different type of furniture such as chairs, tables, sofa etc.
- For each of the furniture, the portal maintains its unique code, furniture name, the furniture description (such as wooden, plastic), the year it was manufactured and price.
- Customers can place an order for the furniture of their interest. Information about customers such as their name, PAN number, address, phone number and email are collected during ordering.
- A customer can place more than one order. Each order may comprise of more than one furniture. The customers who place orders with order amount exceeding Rs. 50000 are given a discount of 5% on the order price.
- In each order, the furniture code, quantity, furniture name, order amount and discount are recorded.

Draw the ER-diagram and make sure to indicate key attributes, cardinality and participation constraints. [8 Marks]

(ii) Consider the following ER diagram representing a Cricket League database. Note that a player will represent only one team during a given season.



Map the above **ER diagram to its equivalent relational model.** [7 Marks]

06. (i) Consider the relation Project Management PM with the following attributes [15]

PM (proj_code, proj_title, proj_mgr_id, proj_mgr_name, emp_no, emp_name, dept_no, dept_name, hourlyrate)

The proj_code, emp_no, dept_no together form a primary key.

The functional dependencies are given below:

proj_code -> proj_title, proj_mgr_id,

proj_mgr_id->proj_mgr_name,

emp_no -> emp_name,

dept_no -> dept_name,

emp_no,dept_no,proj_code -> hourlyrate

Normalize the above relation upto 3NF and clearly show the steps [10 Marks]

(ii) Consider the relation R(A,B,C,D,E,I) with the following functional dependencies.

A -> C,

AB -> C,

C -> DI,

CD -> I,

EC -> AB,

EI -> C.

Find the minimal cover [5marks].

07. (i) Given the table "Item": [15]

ItemId (k)	ItemName	Price
18	Blue-Ninja-Shirt	800
41	Red-T-shirt	1200
22	Black-T-shirt	2700
44	Belle-Gown	2000
59	Red Lehenga	9000
32	Crew-neck-T-shirt	300
31	Blush-Hoodie	2000
73	Crystal-Pendant	3000

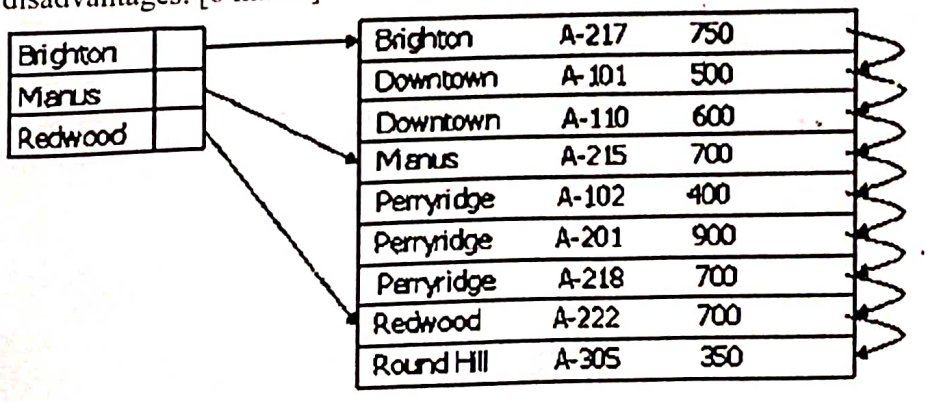
Form a hash table for the hash function h(k) = k mod 13 and use the following collision resolution techniques to address collisions.

a. Separate chaining [3 marks]

b. Linear probing [3 marks]

c. Quadratic probing [3 marks]

(ii) Explain the indexing structure used in the given figure and discuss its advantages and disadvantages. [6 marks]



08. (i) Create the log entries corresponding to the following transaction actions by assuming a transaction with immediate update: [5 Marks] **[15]**

a1:=700
b1:=500
T1: read(a1)
a1:= a1 – 500
Write (a1)
T2: read(b1)
b1:= b1 + 500
Write(b1)

(ii) Consider the following two transactions: [10 Marks]

T1: Read(A)
Read(B)
If A = 0 then B:= B + 10
Write(B)
T2: Read(B)
Read(A)
If B = 0 then A:= A + 10
Write (A)

Add lock and Unlock instructions to Transactions T1, T2, so that they observe the Two – Phase Locking protocol. Can the execution of these transactions result in a deadlock ? Justify your answer.

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