Reg.No.				

Bansilal Ramnath Agarwal Charitable Trust's
VISHWAKARMA INSTITUTE OF TECHNOLOGY, PUNE – 411037.
(An Autonomous Institute Affiliated to Savitribai Phule Pune University)

Examination: ESE

Year: 2022-23 **Branch**: SYCommon-CS/ENTC/IC/AI/IT

Subject: Database Management Systems **Subject Code:** CS2227

Max. Marks: 60 **Total Pages of Question Paper:** 02

Day & Date: Friday, 12-May-2023 **Time**: 3:00pm To 5:00pm

Instructions to Candidate

1. All questions are compulsory.
2. Neat diagrams must be drawn wherever necessary.
3. Figures to the right indicate full marks.

<table>
<tr><th>Q. N.</th><th>CO No</th><th>BT* No</th><th></th><th>Max marks</th></tr>
<tr><td>Q. 1.</td><td>1</td><td>1,2</td><td>A] Define DBMS. Explain 2 tier and 3 tier Database system architectures.</td><td>4</td></tr>
<tr><td></td><td>1</td><td>3</td><td>B] Design database for the following application using an ER model considering the constraints given below−
A post office has few postmen who go every day to distribute letters. Every morning a post office receives large number of registered letters. The post office intends to create database to keep a track of these letters.
● Every letter has a sender, origin post office from where it was sent, a destination post office to which it is to be sent, date_of_registration, status.
● Every Sender has name and address
● Every Receiver has name and address
● Every Postman has a designated area where he delivers letters.
● There are set of streets under jurisdiction of the post office.
● Every street contains set of buildings which has name, number etc.
● Status of the letter can be delivered, not delivered, under process etc.</td><td>6</td></tr>
<tr><td>Q. 2.</td><td>2</td><td>2</td><td>A] What is a Strong and weak entity type? Explain with suitable example.</td><td>4</td></tr>
<tr><td></td><td>2</td><td>4</td><td>B] Analyze whether following relation is in 1NF. If no, Normalize it to 1 NF.
<table>
<tr><th>Student_ID</th><th>Student_Name</th><th>Student_Hobbies</th><th>Student_State</th></tr>
<tr><td>IX1</td><td>Reema</td><td>Dancing, Painting</td><td>Maharashtra</td></tr>
<tr><td>IX2</td><td>Rekha</td><td>Cooking,Calligraphy</td><td>Rajasthan</td></tr>
<tr><td>IX3</td><td>Jaya</td><td>Skating</td><td>Kerala</td></tr>
<tr><td>IX4</td><td>Sushma</td><td>Painting, Skating</td><td>Chhattisgarh</td></tr>
<tr><td>IX5</td><td>Tithi</td><td>Poetry, Fencing</td><td>Haryana</td></tr>
</table></td><td>6</td></tr>
<tr><td></td><td></td><td></td><td>OR</td><td></td></tr>
<tr><td></td><td>2</td><td>4</td><td>B] Analyze and Justify whether following relation is in 3NF.
R(ABCD) where Functional Dependency given as {AB□ CD, D□A}</td><td>6</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Q. 3.</td><td>3</td><td>5</td><td>A] Write SQL Queries for following set of tables: (Any 3)

EMPLOYEE (EmpNo, Name, DoB, Address, Gender, Salary, DNumber)
DEPARTMENT (DNumber, Dname, ManagerEmpNo, MnagerStartDate).

i) Display count of 'male' and 'Female' employees.
ii) Display EmpNo, name and DNumber of employee working in the 'Marketing' department.</td><td>6</td></tr>
</table>

			iii) Display the name of employee getting highest salary. iv) Display average salary amount offered to any Employee.	
	3	6	B] By considering suitable examples, describe the usage of SQL CREATE and ALTER statements.	4
Q. 4.	5	1	A] What is Transaction? Draw and explain Transaction State diagram.	6
			OR	
	5	1	A] What is the two-phase locking protocol? How does it guarantee serializability?	6
	5	2	B] State and explain the ACID Properties.	4
Q. 5.	4	2	A] Explain parallel database system along with its architectural models.	6
	4	1	B] Explain different types of Distributed Database system.	4
Q. 6.	6	2	A] Explain No SQL Databases with their types and examples	6
	6	1	B] Explain OLAP operations with example.	4

CO Statements:

CO1: Design data models as per data requirements of an organization

CO2: Synthesize a relational data model up to a suitable normal form

CO3: Develop a database system using relational queries and PL/SQL objects

CO4: Apply indexing techniques and query optimization strategies

CO5: Understand importance of concurrency control and recovery techniques

CO6: Adapt to emerging trends considering societal requirements

***Blooms Taxonomy (BT) Level No:**

1. Remembering; 2. Understanding; 3. Applying; 4. Analyzing; 5. Evaluating; 6. Creating