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Table of Contents

Note : Remove "Table of Content" before including in CP Book
      Each Course Plan shall be printed and made into a book with cover page
      Blooms Level in all sections match with A.2, only if you plan to teach / learn at higher levels

15CS53 : Database Management System

A. COURSE INFORMATION

1. Course Overview

Degree:	B.E	Program:	CS
Year / Semester :	V	Academic Year:	2018-19
Course Title:	Database Management System	Course Code:	15CS53
Credit / L-T-P:	4-0-0	SEE Duration:	180 Minutes
Total Contact Hours:	50	SEE Marks:	80 Marks
CIA Marks:	20	Assignment	1 / Module
Course Plan Author:	Chandana L S	Sign	Dt:
Checked By:		Sign	Dt:

2. Course Content

Module	Module Content	Teaching Hours	Module Concepts	Blooms Level
1	Introduction to Databases: Introduction, Characteristics of database approach, Advantages of using the DBMS approach, History of database applications. Overview of Database Languages and Architectures: Data Models, Schemas and Instances. Three schema architecture and data independence, database languages, and interfaces, The Database System environment. Conceptual Data Modelling using Entities and Relationships: Entity types, Entity sets, attributes, roles, and structural constraints, Weak entity types, ER diagrams, examples, Specialization and Generalization.	10	Storage of data and Entity relationship	L3, L3
2	Relational Model: Relational Model Concepts, Relational Model Constraints and relational database schemas, Update operations, transactions, and dealing with constraint violations. Relational Algebra: Unary and Binary relational operations, additional relational operations (aggregate, grouping, etc.) Examples of Queries in relational algebra. Mapping Conceptual Design into a Logical Design: Relational Database Design using ER-to-Relational mapping. SQL:SQL data definition and data types, specifying constraints in SQL, retrieval queries in SQL, INSERT, DELETE, and UPDATE statements in SQL, Additional features of SQL.	10	Relational algebra and query language	L3, L3
3	SQL:Advances Queries: More complex SQL retrieval queries, Specifying constraints as assertions and action triggers, Views in SQL, Schema change statements in SQL. Database Application Development: Accessing databases from applications, An introduction to JDBC, JDBC classes and interfaces, SQLJ, Stored procedures, Case study: The internet Bookshop. Internet Applications:The three-Tier application architecture, The presentation layer, The Middle Tier	10	SQL and database connectivity	L3, L4
4	Normalization: Database Design Theory – Introduction to Normalization using Functional and Multivalued Dependencies: Informal design guidelines for relation schema, Functional Dependencies, Normal Forms based on Primary Keys, Second and Third Normal Forms,Boyce-Codd Normal Form, Multivalued Dependency and Fourth Normal Form,Join Dependencies and Fifth NormalForm.Normalization Algorithms: Inference Rules, Equivalence, and Minimal Cover, Properties of Relational Decompositions, Algorithms for Relational Database Schema Design, Nulls, Dangling tuples, and alternate Relational Designs, Further discussion of Multivalued dependencies and 4NF, Other dependencies and Normal Forms	10	Database design and Normalization	L3, L4

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| 5 | Transaction Processing: Introduction to Transaction Processing, Transaction and System concepts, Desirable properties of Transactions, Characterizing schedules based on recoverability, Characterizing schedules based on Serializability, Transaction support in SQL. Concurrency Control in Databases: Two-phase locking techniques for Concurrency control, Concurrency control based on Timestamp ordering, Multiversion Concurrency control techniques, Validation Concurrency control techniques, Granularity of Data items and Multiple Granularity Locking. Introduction to Database Recovery Protocols: Recovery Concepts, NO-UNDO/REDO recovery based on Deferred update, Recovery techniques based on immediate update, Shadow paging, Database backup and recovery from catastrophic failure. | 10 | Transaction processing and data transaction and recovery methods | L5, L5 |

3. Course Material

Module	Details	Available
1	Text books	
	Database systems Models, Languages, Design and Application Programming, RamezElmasri and Shamkant B. Navathe, 7th Edition, 2017, Pearson.	In Lib
	Database management systems, Ramakrishnan, and Gehrke, 3 rd Edition, 2014, McGraw Hill	
2	Reference books	
	Silberschatz Korth and Sudharshan, Database System Concepts, 6 th Edition, Mc-GrawHill, 2013.	In dept
	Coronel, Morris, and Rob, Database Principles Fundamentals of Design, Implementation and Management, Cengage Learning 2012.	
3	Others (Web, Video, Simulation, Notes etc.)	
	http://nptel.ac.in/courses.php?disciplineID=111	Available

4. Course Prerequisites

SNo	Course Code	Course Name	Module / Topic / Description	Sem	Remarks	Blooms Level
1	15CS53	Database Management System	1. Knowledge on Software life cycle basics	4	Knowledge on software and stages of life cycle	L2
			2. Datastructure and algorithms	3	Knowledge on basics of programming	L3
			3. Primary memory and Secondary memory	3	Knowledge on data storage and access	L2

Note: If prerequisites are not taught earlier, GAP in curriculum needs to be addressed. Include in Remarks and implement in B.5.

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B. OBE PARAMETERS

1. Course Outcomes

#	COs	Teach. Hours	Concept	Instr Method	Assessment Method	Blooms' Level
-	**Student should be able to…**	-	-	-	-	-
15CS53.1	Understand the importance of Database management system in real time.	05	Storage of data	Discussion	Slip test	L2 Understand
15CS53.2	Identify methodology of conceptual modeling through Entity relationship model	05	Entity relationship	Lecture	Q & A	L3 Apply
15CS53.3	Apply the relational model concepts and operations for optimizing queries in RDBMS.	05	Relational Algebra	Description	Assignment	L3 Apply
15CS53.4	Apply the SQL commands for creating tables in database schema.	05	Query Language	Develope	Employee Problem set	L3 Apply
15CS53.5	Apply the triggers and views in database schema.	05	SQL	solve	Focused on analyzing /compare	L3 Apply
15CS53.6	Analyze the access methods to store the data through internet application	05	Data connectivity	Examine	Demonstrate	L4 Analyze
15CS53.7	Apply the normalization techniques to normalize the database using mathematical modelling	04	Database design	Demonstration	Quiz	L3 Apply
15CS53.8	Analyze the different types of algorithm using database design theory for different applications	06	Normalization	Tutorial	Analyze	L4 Analyze
15CS53.9	Demonstrate the transaction and query processing	05	Transaction process	Presentation	Seminar	L5 Evaluate
15CS53.10	Analyze and implement the concurrency control and database recovery protocols in database	05	Data transaction and recovery methods	Method/ procedure	Student analyze / focuses	L5 Evaluate
-	**Total**	**50**	-	-	-	-

Note: Identify a max of 2 Concepts per Module. Write 1 CO per concept.

2. Course Applications

SNo	Application Area	CO	Level
1	Usage of database in different areas like banking , e-commerce , organization	CO1	L2
2	Understand and apply the concept of conceptual modelling to design a database	CO2	L3
3	Use relational model for optimizing queries	CO3	L3
4	Usage of Structured query language commands in creating database tables	CO4	L3
5	Creation of schema using triggers and views	CO5	L3
6	Accessing the database for various internet applications	CO6	L4
7	Using mathematical modelling techniques for normalization	CO7	L3
8	Understanding the normalization algorithms for database design	CO8	L4
9	Applying the characterizing schedules for transaction processing	CO9	L5
10	Understand the concurrency control techniques and database recovery protocols	CO10	L5

Note: Write 1 or 2 applications per CO.

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3. Articulation Matrix

(CO – PO MAPPING)

-		Course Outcomes	Program Outcomes												
#		COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Level
15CS53.1		Understand the importance of Database management system in real time.	2.5	2.5	2.5	-	2.5	-	-	-	2.5	2.5	2.5	2.5	L2 Understand
15CS53.2		Identify methodology of conceptual modeling through Entity relationship model	2.5	2.5	2.5	-	2.5	-	-	-	2.5	2.5	2.5	2.5	L3 Apply
15CS53.3		Apply the relational model concepts and operations for optimizing queries in RDBMS.	2.5	2.5	2.5	-	2.5	-	-	-	2.5	2.5	2.5	2.5	L3 Apply
15CS53.4		Apply the SQL commands for creating tables in database schema.	2.5	2.5	2.5	-	2.5	-	-	-	2.5	2.5	2.5	2.5	L3 Apply
15CS53.5		Apply the triggers and views in database schema.	2.5	2.5	2.5	-	2.5	-	-	-	2.5	2.5	2.5	2.5	L3 Apply
15CS53.6		Analyze the access methods to store the data through internet application	2.5	2.5	2.5	-	2.5	-	-	-	2.5	2.5	2.5	2.5	L4 Analyze
15CS53.7		Apply the normalization techniques to normalize the database using mathematical modelling	2.5	2.5	2.5	-	2.5	-	-	-	2.5	2.5	2.5	2.5	L3 Apply
15CS53.8		Analyze the different types of algorithm using database design theory for different applications	2.5	2.5	2.5	-	2.5	-	-	-	2.5	2.5	2.5	2.5	L4 Analyze
15CS53.9		Demonstrate the transaction and query processing	2.5	2.5	2.5	-	2.5	-	-	-	2.5	2.5	2.5	2.5	L5 Evaluate
15CS53.10		Analyze and implement the concurrency control and database recovery protocols in database	2.5	2.5	2.5	-	2.5	-	-	-	2.5	2.5	2.5	2.5	L5 Evaluate

Note: Mention the mapping strength as 1, 2, or 3

4. Mapping Justification

Mapping		Justification	Mapping Level
CO	**PO**	**-**	**-**
CO1	PO1	Knowledge of using database management is required to use it in areas like ebanking , ecommerce etc.	L3, L6
CO1	PO2	Understanding database systems is required to identify and analyze complex problems	L2 , L4, L5, L6
CO1	PO3	Learning of database systems is required to design and develop solution to complex problems	L4 , L6
CO1	PO4	Investigation of complex problems of database management requires basic understanding of database systems	L3 , L4
CO1	PO5	To develop appropriate techniques , tools , understanding of database management system is required	L2
CO1	PO10	Applying the knowledge gained about using database in real time systems is required to communicate complex engineering activities	L2 , L3
CO2	PO1	Knowledge of conceptual modelling through entity relationship model is required to design database simple to complex database	L3

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		problems	
CO2	PO2	Analysing problems of database requires knowledge on conceptual modelling	L3 , L4
CO2	PO3	To design solution to database problems requires learning of entity relationship model	L4 , L6
CO2	PO4	Research based knowledge required to interpret data in design of ER diagram	L4 ,L5, L6
CO2	PO5	Knowledge of ER modelling is required in design of modern tools like SQL	L3
CO2	PO9	To develop ER diagrams specific to different databases individual students should have knowledge of ER modelling	L3
CO2	PO11	To solve complex database problems and develop real time projects knowledge of conceptual modelling is required	L4
C03	PO1	Knowledge of relational model concepts is required for query optimization	L3
C03	PO2	To analyze query optimization knowledge of relational model concept is required	L4
C03	PO3	To design various RDBMS , understanding of relational model concept is required	L6
CO3	PO4	Research based knowledge required to interpret data in process of optimization of queries	L4
CO3	PO5	Knowledge of relational algebra is required in design of modern tools like SQL	L3
CO3	PO9	To design queries specific to different databases retrievals individual students should have knowledge of relational algebra	L3
CO3	PO11	To solve complex database problems and develop real time projects , knowledge of query optimization is required	L5
CO4	PO1	Knowledge of basic SQL is required for creation of DB	L2,L3
CO4	PO2	Understanding the usage of SQL commands is required to analyze when complex tables been created	L2,L3,L4
CO4	PO3	Learning of basic SQL and its uswage is required to design and develop a complex database	L3, L4
CO4	PO5	To create a DB appropriate techniques , tools are required in a database systems	L2, L3,L4,L6
CO4	PO9	To design queries specific to different databases retrievals individual students should have knowledge of query language	L3
CO4	PO11	To solve complex database problems and develop real time projects , knowledge of query language is required	L5
CO5	PO1	Knowledge of views and triggers is required to give solution to complex DB problems	L2,L3
CO5	PO2	Analyzing the DB schema for complex problems requires the knowledge of triggers and views	L3,L4,L6
CO5	PO3	To design the solution for a DB problems, understanding triggers and view is required.	L3,L4,
CO5	PO4	Research based knowledge required to analyze the data using views and triggers	L4
CO5	PO9	To design queries specific to different databases retrievals , individual students should have knowledge of using views and triggers	L5
CO5	PO11	To solve complex database problems and develop real time projects , knowledge of views and triggers is required	L5
CO6	PO1	Knowledge of access methods is required to store data through internet applications	L2, L4
CO6	PO2	Access methods knowledge is required to analyze data storage problems.	L2, L4
CO6	PO3	To design and develop access methods to store the data knowledge of analyzing the access methods for different	L3

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		applications is required	
CO6	PO4	Research based knowledge is required to model the different applications which use access methods to store the data	L4
CO6	PO5	Knowledge of data connectivity is required in design of modern tools like SQL	L2
CO6	PO9	To develop different solutions specific to different databases individual students should have knowledge of data connectivity	L3
CO6	PO11	To develop different database applications ,knowledge of data connectivity is required	L4
CO7	PO1	Knowledge of normalization is required to give accurate solution to complex DB problems	L2
CO7	PO2	Analysis of complex DB solution requires understanding of normalization	L2, L4
CO7	PO3	Design the solution of DB problems requires normalization	L3, L4
CO7	PO5	Knowledge of data normalization is required in design of modern tools like SQL	L3
CO7	PO9	To design different databases individual students should have knowledge of data normalization	L3
CO7	PO11	To develop different database applications ,knowledge of data normalization is required	L3
CO8	PO1	Knowledge of normalization algorithm is required in designing of DB	L2,L3
CO8	PO2	To review research solution to DB problems requires require knowledge of normalization algorithm	L2, L4
CO8	PO3	Design solution to complex DB problems requires understanding of normalization algorithm	L4, L6
CO8	PO4	Research based knowledge is required to analyze different types of algorithms using database design theory	L2
CO8	PO5	Knowledge of algorithm analysis is required to develop modern tools like SQL	L3
CO8	PO9	To design different databases individual students should have knowledge of algorithm analysis	L3
CO8	PO11	To develop different database applications ,knowledge of algorithm analysis is required	L4
CO9	PO1	Basics of transaction processing is required to demonstrate it	L2
CO9	PO2	To analyze transaction properties knowledge of acid properties is required	L3
CO9	PO3	To design and develop a database the knowledge of transaction processing is required	L4
CO9	PO4	Research based knowledge is required to solve complex problems related to transaction processing	L2
CO9	PO5	Knowledge of transaction processing is required to design modern tools like SQL	L4
CO9	PO12	Knowledge of transaction processing is required to use different database applications	L2
CO10	PO1	In case of transaction failures knowledge of recovery techniques is required	L2
CO10	PO2	To analyze the issue of transaction failure the knowledge of concurrency control is in need	L3
CO10	PO3	To develop a solution for the transaction failures the knowledge of recovery techniques is required	L6
CO10	PO4	To overcome the transaction failures the investigation with some recovery techniques is in need	L4
CO10	PO9	To recover from databases failures , individual students should have knowledge of implementing recovery protocols	L3
CO10	PO11	To design solution to complex database problems knowledge of analyzing and implementing concurrency control is in need	L4

Note: Write justification for each CO-PO mapping.

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5. Curricular Gap and Content

SNo	Gap Topic	Actions Planned	Schedule Planned	Resources Person	PO Mapping
1					
2					
3					
4					
5					

Note: Write Gap topics from A.4 and add others also.

6. Content Beyond Syllabus

SNo	Gap Topic	Actions Planned	Schedule Planned	Resources Person	PO Mapping
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					

Note: Anything not covered above is included here.

C. COURSE ASSESSMENT

1. Course Coverage

Module #	Title	Teaching Hours	CIA-1	CIA-2	CIA-3	Asg	Extra Asg	SEE	CO	Levels
1	Introduction to database	10	2	-	-	1	1	2	CO1, CO2	L2, L3
2	Relational model	10	2	-	-	1	1	2	CO3, CO4	L3, L3
3	SQL	10	-	2	-	1	1	2	CO5, CO6	L3, L4
4	Normalization	10	-	2	-	1	1	2	CO7, C08	L3, L4
5	Transaction processing	10	-	-	4	1	1	2	CO9, CO10	L5, L5
-	**Total**	**50**	**4**	**4**	**4**	**5**	**5**	**10**	**-**	**-**

Note: Distinct assignment for each student. 1 Assignment per chapter per student. 1 seminar per test per student.

2. Continuous Internal Assessment (CIA)

Evaluation	Weightage in Marks	CO	Levels
CIA Exam – 1	15	CO1, CO2, CO3, CO4	L2, l3, l3, l3
CIA Exam – 2	15	CO5, CO6, CO7, C08	L3, L4, L3, L4
CIA Exam – 3	15	CO9, CO10	L5, L5

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Assignment – 1	05	CO1, CO2, CO3, CO4	L2, l3, l3, l3
Assignment – 2	05	CO5, CO6, CO7, CO8	L3, L4, L3, L4
Assignment – 3	00	-	-
Seminar – 1	00	-	-
Seminar – 2	00	-	-
Seminar – 3	05	CO9, CO10	L5, L5
Other Activities – define – Slip test	-	-	-
Final CIA Marks	**20**	**-**	**-**

Note : Blooms Level in last column shall match with A.2 above.

D1. TEACHING PLAN - 1

Module - 1

Title:	Introduction to database	Appr Time:	16 Hrs
a	***Course Outcomes***	-	**Blooms**
-	The student should be able to:	-	**Level**
1	Understand the importance of Database management system in real time.	CO1	L2
2	Identify methodology of conceptual modeling through Entity relationship model	CO2	L3
b	***Course Schedule***	-	-
Class No	**Module Content Covered**	**CO**	**Level**
1	Introduction to Databases: Introduction,	C01	L2
2	Characteristics of database approach	C01	L2
3	Advantages of using the DBMS approach	C01	L2
4	History of database applications	C01	L2
5	Overview of Database Languages and Architectures: Data Models, Schemas, and Instances.	C01	L2
6	Three schema architecture and data independence, database languages, and interfaces	C01	L2
7	The Database System environment. Conceptual Data Modelling using Entities and Relationships: Entity types, Entity sets, attributes, roles, and structural constraints, Weak entity types, E R diagram	CO2	L3
8	examples, Specialization and Generalization.	CO2	L3
c	**Application Areas**	**CO**	**Level**
1	Usage of database in different areas like banking, e-commerce, organization	CO1	L2
2	Understand and apply the concept of conceptual modelling to design a database	CO2	L3
d	**Review Questions**	-	-
1	What is the difference between a database schema and a database state?	CO1	L2
2	What is the difference between logical data independence and physical data independence? Which one is harder to achieve and why?	CO1	L2
3	What is the role of pre compiler in a DBMS environment?	CO1	L2
4	What is the difference between two tier and three tier client/server architectures?	CO1	L2
5	What do you understand by "degree of a relationship type"? Explain with	CO2	L3

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	example.		
6	Uunder what conditions can an attribute of a binary relationship type be migrated to become an attribute of the participating entity types?	CO2	L3
7	Discuss the naming conventions used for ER schema diagrams.	CO2	L3
e	**Experiences**	-	-
1		CO1	L2
2			
3			
4		CO3	L3
5			

Module – 2

Title:	Relational model	Appr Time:	10 Hrs
a	*Course Outcomes*	-	**Blooms**
-	The student should be able to:	-	**Level**
1	Apply the relational model concepts and operations for optimizing queries in RDBMS.	CO3	L3
2	Apply the SQL commands for creating tables in database schema.	CO4	L3
b	*Course Schedule*	-	-
Class No	**Module Content Covered**	**CO**	**Level**
1	Relational Model Concepts, Relational Model Constraints and relational database schemas, Update operations, transactions, and dealing with constraint violations.	CO3	L3
2	Relational Algebra: Unary and Binary relational operations,	CO3	L3
3	additional relational operations (aggregate, grouping, etc.)	CO3	L3
4	Examples of Queries in relational algebra. Mapping Conceptual Design into a Logical Design: Relational Database Design using ER-to-Relational mapping.	CO3	L3
5	SQL: SQL data definition and data types	CO4	L3
6	specifying constraints in SQL, retrieval queries in SQL INSERT, DELETE, and UPDATE statements in SQL, Additional features of SQL.	CO4	L3
7	retrieval queries in SQL	CO4	L3
8	INSERT, DELETE, and UPDATE statements in SQL, Additional features of SQL.	CO4	L3
c	**Application Areas**	**CO**	**Level**
1	Use relational model for optimizing queries	CO3	L3
2	Usage of Structured query language commands in creating database tables	CO4	L3
d	**Review Questions**	-	-
12	Why are duplicate tuples not allowed in a relation?	CO3	L3
13	What is the difference between candidate key, primary key and unique key?	CO3	L3
14	Discuss the various reasons that lead to the occurrence of NULL values in relations?	CO3	L3
15	What are the rules that must be satisfied by the foreign key?	CO4	L3
16	Consider the following relations for a database that keeps track of student enrollment in courses and the books adopted for each course: STUDENT (Ssn,Name,Major,Bdate) COURSES(Course#,Cname,Dept) ENROLL(Ssn,Course#, Quarter, Grade)	CO4	L3

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		BOOK_ADOPTION(Course#,Querter,Book_isbn) TEXT(Book_isbn,Book_title,Publisher,Author)		
e		Experiences	-	-
	1		CO1	L2
	2			
	3			
	4		CO3	L3
	5			

E1. CIA EXAM – 1

a. Model Question Paper - 1

Crs Code: 15CS53			Sem:	5		Marks:	20		Time:		80 minutes		
Course:		Database Management System											
-	-	Note: Answer any 2 questions, each carry equal marks.									Marks	CO	Level
1	a	What is the difference between logical data independence and physical data independence? Which one is harder to achieve and why?									20	CO1	L2
	b	Discuss the main characteristics of database approach and how it differs from traditional file systems											L2
	c	Describe the three schema architecture . Why do we need mappings among schema levels?											L2
	d	Define the following terms: *data model, database schema, database state,* internal schema, conceptual schema, external schema, data independence,DDL, DML, SDL, VDL, query language, host language, data sublanguage, *database utility, catalog*											L2
2	a	What is a weak entity type? Explain the role of partial key in design of weak entity type.									20	CO2	L3
	b	What do you understand by "degree of a relationship type"? Explain with example.											L3
	c	Define an entity or attribute . Explain the different types of attributes that occur in a ER diagram model with example											L3
	d	Draw an ER diagram for a BANK database schema with at least five entity types. Also specify primary key and structural constraints.											L3
3	a	Consider the following relations for a database that keeps track of student enrollment in courses and the books adopted for each course: STUDENT (Ssn,Name,Major,Bdate) COURSES(Course#,Cname,Dept) ENROLL(Ssn,Course#, Quarter, Grade) BOOK_ADOPTION(Course#,Querter,Book_isbn) TEXT(Book_isbn,Book_title,Publisher,Author)									20	CO3	L3
	b	What is the difference between candidate key, primary key and unique key?											L3
	c	Explain the relational algebra operations from set theory with examples											L3
	d	How are the OUTER JOIN operations different from the INNER JOIN operations? How is the OUTER UNION operation different from UNION ?											L3
4	a	Consider the following relations for a database that keeps track of student enrollment in courses and the books adopted for each course: STUDENT (Ssn,Name,Major,Bdate)									20	CO4	L3

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		COURSES(Course#,Cname,Dept) ENROLL(Ssn,Course#, Quarter, Grade) BOOK_ADOPTION(Course#,Querter,Book_isbn) TEXT(Book_isbn,Book_title,Publisher,Author)			
	b	In SQL which command is used for table creation? Explain how constraints are specified in SQL during table creation with suitable example.			L3
	c	Consider the following RESORT database RESORT (resort no, resort name, resort type, resort addr, resort city, numsuite) SUITE(suit no, resort no, suite price) RESERVATION(reservation no, resort no, visitor no, check in, check out, totoal visitors, suite no) VISITOR(visitor no, firstname, lastname, visiter addr) 1) write the sql to list full details of all the resorts on los angeles 2) write the sql list full details of all the resorts having number of suits more than 30) 3) write the sql to list visitor in ascending order by firstname.			L3
	d	Discuss how NULL s are treated in comparison operators in SQL. How are NULL s treated when aggregate functions are applied in an SQL query? How are NULL s treated if they exist in grouping attributes?			L3

b. Assignment -1

Note: A distinct assignment to be assigned to each student.

Model Assignment Questions							
Crs Code:	15CS53	Sem:	5	Marks:	5 / 10	Time:	90 – 120 minutes
Course:	Database Management System						

Note: Each student to answer 2-3 assignments. Each assignment carries equal mark.

SNo	USN	Assignment Description	Marks	CO	Level
1		Define the following terms: *data model, database schema, database state,* internal schema, conceptual schema, external schema, data independence,DDL, DML, SDL, VDL, query language, host language, data sublanguage, *database utility, catalog, client/server architecture, three-tier architecture,* and n-*tier architecture*.	5	CO1	L2
2		Draw an ER diagram for a BANK database schema with at least five entity types. Also specify primary key and structural constraints.	5	CO2	L3
3		What is a weak entity type? Explain the role of partial key in design of weak entity type.		CO2	L3
4		Explain the typical components module of a DBMS, with a neat diagram.	5	CO1	L2
5		Discuss the main characteristics of database approach and how it differs from traditional file systems	5	CO1	L2
6		Describe the three schema architecture . Why do we need mappings among schema levels?	5	CO1	L2
7		Define an entity or attribute . Explain the different types of attributes that occur in a ER diagram model with example	5	CO2	L3
8		In SQL which command is used for table creation? Explain how constraints are specified in SQL during table creation with suitable example.	5	CO4	L3
9		Explain the relational algebra operations from set theory with examples	5	CO3	L3
10		Consider the following RESORT database	5	C04	L3

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	RESORT (resort no, resort name, resort type, resort addr, resort city, numsuite) SUITE(suit no, resort no, suite price) RESERVATION(reservation no, resort no, visitor no, check in, check out, totoal visitors, suite no) VISITOR(visitor no, firstname, lastname, visiter addr) 1) write the sql to list full details of all the resorts on los angeles 2) write the sql list full details of all the resorts having number of suits more than 30) 3) write the sql to list visitor in ascending order by firstname.

D2. TEACHING PLAN - 2

Module – 3

Title:	SQL	Appr Time:	16 Hrs
a	***Course Outcomes***	-	**Blooms**
-	The student should be able to:	-	**Level**
1	Apply the triggers and views in database schema.	CO5	L3
2	Analyze the access methods to store the data through internet application	CO6	L4
b	***Course Schedule***		
Class No	**Module Content Covered**	**CO**	**Level**
1	More complex SQL retrieval queries,	C6	L3
2	Specifying constraints as assertions and action triggers, Views in SQL		L3
3	Schema change statements in SQL.		L3
	Database Application Development:Accessing databases from applications		L4
4	An introduction to JDBC, JDBC classes and interfaces, SQLJ, Stored procedures		L4
5	Case study: The internet Bookshop.	C5	L4
6	Internet Applications: The three-Tier application architecture, the presentation layer, the middle tier		L4
c	**Application Areas**	**CO**	**Level**
1	Creation of schema using triggers and views	CO5	L3
2	Accessing the database for various internet applications	CO6	L4
d	**Review Questions**	-	-
1	Describe the six clauses in the syntax of an SQL retrieval query. Show what type of constructs can be specified in each of the six clauses.Which of the six clauses are required and which are optional?	CO5	L3
2	Discuss how each of the following constructs is used in SQL, and discuss the various options for each construct. Specify what each construct is useful for. a. Nested queries. b. Joined tables and outer joins. c. Aggregate functions and grouping. d. Triggers. e. Assertions and how they differ from triggers. f. Views and their updatability. g. Schema change commands.	CO5	L3
3	Describe conceptually how an SQL retrival query will be executed by specifying the conceptual order of executing each of the six clauses	CO5	L3
4	What are the basic data types available for the attributes in SQL?	CO5	L3

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5	Explain the three tier application architecture?	CO6	L4
e	**Experiences**	-	-
1			
2			
3			
4			
5			

Module – 4

Title:	Normalization	Appr Time:	16 Hrs
a	***Course Outcomes***	-	**Blooms**
-	The student should be able to:	-	**Level**
1	Apply the normalization techniques to normalize the database using mathematical modelling	CO7	L3
2	Analyze the different types of algorithm using database design theory for different applications	CO8	L4
b	***Course Schedule***		
Class No	**Module Content Covered**	**CO**	**Level**
1	Normalization: Database Design Theory – Introduction to Normalization using Functional and Multivalued Dependencies: Informal design guidelines for relation schema	CO7	L3
2	Functional Dependencies, Normal Forms based on Primary Keys	CO7	L3
3	Second and Third Normal Forms	CO7	L3
4	Boyce-Codd Normal Form, Multivalued	CO7	L3
5	Dependency and Fourth Normal Form, Join Dependencies and Fifth Normal Form.	CO7	L3
6	Normalization Algorithms: Inference Rules, Equivalence, and Minimal Cover, Properties of Relational Decompositions	CO8	L4
7	Algorithms for Relational Database Schema Design, Nulls, Dangling tuples, and alternate Relational Designs,	CO8	L4
8	Further discussion of Multivalued dependencies and 4NF, Other dependencies and Normal Forms	CO8	L4
c	**Application Areas**	**CO**	**Level**
1	Using mathematical modelling techniques for normalization	CO8	L3
2	Understanding the normalization algorithms for database design	CO7	L4
d	**Review Questions**	-	-
1	What is a functional dependency? What are the possible sources of the information that defines the functional dependencies that hold among the attributes of a relation schema?	CO7	L3
2	What undesirable dependencies are avoided when a relation is in 3NF?	CO7	L3
3	Why should NULL s in a relation be avoided as much as possible? Discuss the problem of spurious tuples and how we may prevent it.	CO8	L4
4	What is meant by the attribute preservation condition on a decomposition?	CO8	L4
5	Discuss the NULL value and dangling tuple problems.	CO8	L4
e	**Experiences**	-	-
1		CO7	L2
2			
3			

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4			CO8	L3
5				

E2. CIA EXAM – 2

a. Model Question Paper - 2

Crs Code:	15CS53	Sem:	5	Marks:	20	Time:	80minutes	
Course:	Databse Management System							

-	-	Note: Answer any 2 questions, each carry equal marks.	Marks	CO	Level
1	a	Discuss how each of the following constructs is used in SQL and discuss the various options for each constructs: 1) Nested queries 2) Aggregate functions 3) Triggers 4) Views and their updatability 5) Schema change statements 6) Group by and having clause	20	CO5	L3
	b	Define an COMPANY database and Consider the following view, DEPT_SUMMARY , CREATE VIEWAS SELECT FROM GROUP BY DEPT_SUMMARY (D , C , Total_s , Average_s) Dno , COUNT (*), SUM (Salary), AVG (Salary) EMPLOYEE Dno ; State which of the following queries and updates would be allowed on the view. If a query or update would be allowed, show what the corresponding query or update on the base relations would look like, and give its result when applied to the database. a. SELECT FROM * DEPT_SUMMARY ; b. SELECT FROM WHERE D , C DEPT_SUMMARY TOTAL_S > 100000; c. SELECT FROM WHERE D , AVERAGE_S DEPT_SUMMARY C > (SELECT C FROM DEPT_SUMMARY WHERE D =4); d. UPDATE SET WHERE DEPT_SUMMARY D =3			L3
	c	Describe the six clauses in the syntax of an SQL retrieval query. Show what type of constructs can be specified in each of the six clauses. Which of the six clauses are required and which are optional?			L3
	d	Discuss how NULL s are treated in comparison operators in SQL. How are NULL s treated when aggregate functions are applied in an SQL query? How are NULL s treated if they exist in grouping attributes?			L3
2	a	Explain the three tier application architecture?	20	CO6	L4
	b	What is CGI? Why was CGI introduced? What are the disadvantages of an architecture using CGI scripts?			L4
	c	Discuss insertion , deletion and modification anamolies. Why are they considered bad? Illustrate with examples			L4
	d	Explain JDBC classes and interfaces			L4
3	a	What is a functional dependency? What are the possible sources of the information that defines the functional dependencies that hold among the attributes of a relation schema?	20	CO7	L3
	b	Define first, second, and third normal forms when only primary keys are			L3

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		considered. How do the general definitions of 2NF and 3NF, which consider all keys of a relation, differ from those that consider only primary keys?			
	c	Define Boyce-Codd normal form. How does it differ from 3NF? Why is it considered a stronger form of 3NF?			L3
	d	Consider the universal relation R = {A, B, C, D, E, F, G, H, I, J} and the set of functional dependencies F = { {A, B}→{C}, {A}→{D, E}, {B}→{F}, {F}→{G,H}, {D}→{I, J} }. What is the key for R? Decompose R into 2NF and then 3NF relations.			L3
4	a	Discuss the NULL value and dangling tuple problems.	20	CO8	L4
	b	Define non-additive joint property of a decomposition and write an algorithm of testing for non-additive joint property			L4
	c	What is the dependency preservation property for a decomposition? Why is it important?			L4
	d	Define fourth normal form. When is it violated? When is it typically applicable?			L4

b. Assignment – 2

Note: A distinct assignment to be assigned to each student.

Model Assignment Questions							
Crs Code: 15CS53		Sem: 5		Marks: 5 / 10		Time: 90 – 120 minutes	
Course: Database Management System							
Note: Each student to answer 2-3 assignments. Each assignment carries equal mark.							

SNo	USN	Assignment Description	Marks	CO	Level
1		Discuss how each of the following constructs is used in SQL and discuss the various options for each constructs: 1) Nested queries 2) Aggregate functions 3) Triggers 4) Views and their updatability 5) Schema change statements 6) Group by and having clause	5	CO5	L3
2		Draw and explain three tier architecture and technology relevant to each tier. write the advantages of three tier architecture	5	CO6	L4
3		What is CGI? Why was CGI introduced? What are the disadvantages of an architecture using CGI scripts?	5	CO6	L4
4		Define non-additive joint property of a decomposition and write an algorithm of testing for non-additive joint property	5	CO8	L4
5		Discuss insertion , deletion and modification anamolies. Why are they considered bad? Illustrate with examples	5	CO6	L4
6		Define an COMPANY database and Consider the following view, DEPT_SUMMARY , CREATE VIEWAS SELECT FROM GROUP BY DEPT_SUMMARY (D , C , Total_s , Average_s) Dno , COUNT (*), SUM (Salary), AVG (Salary) EMPLOYEE Dno ; State which of the following queries and updates would be allowed on the view. If a query or update would be allowed, show what the corresponding query or update on the base relations would look like, and give its result when applied to the database. a. SELECT FROM * DEPT_SUMMARY ; b. SELECT FROM WHERE D , C	5	CO5	L3

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		DEPT_SUMMARY TOTAL_S > 100000; c. SELECT FROM WHERE D , AVERAGE_S DEPT_SUMMARY C > (SELECT C FROM DEPT_SUMMARY WHERE D =4); d. UPDATE SET WHERE DEPT_SUMMARY D =3 D =4; e. DELETE WHERE FROM DEPT_SUMMARY C > 4;			
7		Define first, second, and third normal forms when only primary keys are considered. How do the general definitions of 2NF and 3NF, which consider all keys of a relation, differ from those that consider only primary keys?	5	CO7	L3
8		Define Boyce-Codd normal form. How does it differ from 3NF? Why is it considered a stronger form of 3NF?	5	CO7	L3
9		What is the dependency preservation property for a decomposition? Why is it important?	5	CO8	L4
10		Consider the universal relation R = {A, B, C, D, E, F, G, H, I, J} and the set of functional dependencies F = { {A, B}→{C}, {A}→{D, E}, {B}→{F}, {F}→{G,H}, {D}→{I, J} }. What is the key for R? Decompose R into 2NF and then 3NF relations.	5	CO7	L3

D3. TEACHING PLAN - 3
Module – 5

Title:	Transaction processing	Appr Time:	16 Hrs
a	**Course Outcomes**	-	**Blooms**
-	The student should be able to:	-	**Level**
1	Demonstrate the transaction and query processing	CO9	L5
2	Analyze and implement the concurrency control and database recovery protocols in database	CO10	L5
b	**Course Schedule**		
Class No	**Module Content Covered**	**CO**	**Level**
1	Transaction Processing: Introduction to Transaction Processing, Transaction and System concepts, Desirable properties of Transactions,	CO9	L5
2	Characterizing schedules based on recoverability, Characterizing schedules based on Serializability, transaction support in SQL	CO9	L5
3	Concurrency Control in Databases: Two-phase locking techniques for Concurrency control	CO10	L5
4	Concurrency control based on Timestamp ordering,	CO10	L5
5	Multiversion Concurrency control techniques,	CO10	L5
6	Validation Concurrency control techniques	CO10	L5
7	Granularity of Data items and Multiple Granularity Locking. Introduction to Database Recovery Protocols: Recovery Concepts	CO10	L5
8	NO-UNDO/REDO recovery based on Deferred update	CO10	L5
9	Recovery techniques based on immediate update	CO10	L5
10	Shadow paging, Database backup and recovery from catastrophic failures	CO10	L5
c	**Application Areas**	**CO**	**Level**
1	Applying the characterizing schedules for transaction processing	CO10	L5
2	Understand the concurrency control techniques and database recovery protocols	CO9	L5

d	**Review Questions**		-	-
1	Draw a state diagram and discuss the typical states that a transaction goes through during execution.		CO9	L5
2	Discuss the atomicity, durability, isolation, and consistency preservation properties of a database transaction.		CO9	L5
3	Describe the four levels of isolation in SQL.		CO9	L5
4	What is a timestamp? How does the system generate timestamps?		CO10	L5
5	What are UNDO -type and REDO -type log entries?		CO10	L5
e	**Experiences**		-	-
1			CO10	L2
2				
3				
4			CO9	L3
5				

E3. CIA EXAM – 3

a. Model Question Paper - 3

Crs Code:	15CS53	Sem:		5		Marks:		20		Time:		80minutes		
Course:	Database Management System													
-	-	**Note: Answer any 2 questions, each carry equal marks.**									**Marks**		**CO**	**Level**
1	a	Draw a state diagram and discuss the typical states that a transaction goes through during execution.									20		CO9	L5
	b	Discuss ACID properties of a database transaction												L5
	c	Discuss the actions taken by the read_item and write_item operations on a database.												L5
	d	What is a schedule (history)? Define the concepts of recoverable, cascadeless, and strict schedules, and compare them in terms of their recoverability.												L5
2	a	Explain transaction support in SQL									20		CO9	L5
	b	What is the two-phase locking protocol? How does it guarantee serializability?												L5
	c	Discuss the timestamp ordering protocol for concurrency control. How does strict timestamp ordering differ from basic timestamp ordering?												L5
	d	What is multiple granularity locking? Under what circumstances is it used?												L5
3	a	What are UNDO -type and REDO -type log entries?									20		CO10	L5
	b	Describe the wait-die and wound-wait protocols for deadlock prevention.												L5
	c	Describe the shadow paging recovery technique. Under what circumstances does it not require a log?												L5
	d	Discuss the different types of failures. What is meant by catastrophic failure?												L5
4	a	What do the terms steal/no-steal and force/no-force mean with regard to buffer management for transaction processing?									20		CO10	L5
	b	Discuss the UNDO and REDO operations and the recovery techniques that use each.												L5
	c	What is meant by transaction rollback? What is meant by cascading rollback?												L5
	d	Describe the three phases of the ARIES recovery method.												L5

b. Assignment – 3

Note: A distinct assignment to be assigned to each student.

Model Assignment Questions									
Crs Code:	15CS53	Sem:	5	Marks:	5 / 10	Time:	90 – 120 minutes		
Course:	Database Management System								
Note: Each student to answer 2-3 assignments. Each assignment carries equal mark.									

SNo	USN	Assignment Description	Marks	CO	Level
1		Discuss ACID properties of a database transaction	5	CO9	L5
2		Explain transaction support in SQL	5	CO9	L5
3		Discuss the actions taken by the read_item and write_item operations on a database.		CO9	L5
4		What is a schedule (history)? Define the concepts of recoverable, cascadeless, and strict schedules, and compare them in terms of their recoverability.	5	CO9	L5
5		What is the two-phase locking protocol? How does it guarantee serializability?		CO9	L5
6		Describe the wait-die and wound-wait protocols for deadlock prevention.		CO10	L5
7		Discuss the timestamp ordering protocol for concurrency control. How does strict timestamp ordering differ from basic timestamp ordering?		CO9	L5
8		Discuss the UNDO and REDO operations and the recovery techniques that use each.		CO10	L5
9		Describe the shadow paging recovery technique. Under what circumstances does it not require a log?		CO10	L5
10		What do the terms steal/no-steal and force/no-force mean with regard to buffer management for transaction processing?		CO10	L5

F. EXAM PREPARATION

1. University Model Question Paper

Course:	Database Management System					Month / Year	May /2018	
Crs Code:	15CS53	Sem:	V	Marks:	80	Time:	180 minutes	
-	**Note**	Answer all FIVE full questions. All questions carry equal marks.				Marks	CO	Level
1	a	Explain the typical components module of a DBMS, with a neat diagram.					CO1	
	b	Define the following with examples a)Value set b)Complex attribute c)data model d)Schema construct e)metadate						
	c	Draw an ER diagram for a BANK database schema with at least five entity types. Also specify primary key and structural constraints.					CO2	
	d	What is a weak entity type? Explain the role of partial key in design of weak entity type.						
		OR						
-	a	Discuss the main characteristics of database approach and how it differs from traditional file systems				16 / 20	CO1	
	b	Describe the three schema architecture . Why do we need mappings among schema levels?						
	c	Define an entity or attribute . Explain the different types of attributes that occur in a ER diagram model with example					co2	
	d	Under what conditions can an attribute of a binary relationship type be migrated to become an attribute of the participating entity types?						

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2	a	Consider the following relations for a database that keeps track of student enrollment in courses and the books adopted for each course: STUDENT (Ssn,Name,Major,Bdate) COURSES(Course#,Cname,Dept) ENROLL(Ssn,Course#, Quarter, Grade) BOOK_ADOPTION(Course#,Querter,Book_isbn) TEXT(Book_isbn,Book_title,Publisher,Author)	16 / 20	CO3	
	b	Explain the relational algebra operations from set theory with examples			
	c	Consider the following RESORT database RESORT (resort no, resort name, resort type, resort addr, resort city, numsuite) SUITE(suit no, resort no, suite price) RESERVATION(reservation no, resort no, visitor no, check in, check out, totoal visitors, suite no) VISITOR(visitor no, firstname, lastname, visiter addr) 1) write the sql to list full details of all the resorts on los angeles 2) write the sql list full details of all the resorts having number of suits more than 30) 3) write the sql to list visitor in ascending order by firstname.		CO4	
	d	In SQL which command is used for table creation? Explain how constraints are specified in SQL during table creation with suitable example.			
		OR			
-	a	What is the difference between candidate key, primary key and unique key?	16 / 20	CO3	
	b	Discuss the various reasons that lead to the occurrence of NULL values in relations?			
	c	What are the rules that must be satisfied by the foreign key?		CO4	
	d	Explain how constraints are specified in SQL during table creation with suitable examples.			
3	a	Discuss how each of the following constructs is used in SQL, and discuss the various options for each construct. Specify what each construct is useful for. a. Nested queries. b. Joined tables and outer joins. c. Aggregate functions and grouping. d. Triggers. e. Assertions and how they differ from triggers. f. Views and their updatability. g. Schema change commands.	16 / 20	CO5	
	b	Describe conceptually how an SQL retrival query will be executed by specifying the conceptual order of executing each of the six clauses			
	c	What are the basic data types available for the attributes in SQL?		CO6	
	d	What is CGI? Why was CGI introduced? What are the disadvantages of an architecture using CGI scripts?			
		OR			
-	a	Specify the following views in SQL on the COMPANY database schema a) A view that has the department name, manager name, and manager salary for every department. b) A view that has the employee name, supervisor name, and employee salary for each employee who works in the 'Research' department. c) A view that has the project name, controlling department name, number of employees, and total hours worked per week on the project for each project. d) A view that has the project name, controlling department name, number	16 / 20	CO5	

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		of employees, and total hours worked per week on the project for each project with more than one employee working on it.			
	b	What are the basic data types available for the attributes in SQL?			
	c	Discuss insertion, deletion and modification anamolies. Why are they considered bad? Illustrate with examples.		CO6	
	d	Explain JDBC classes and interfaces.			
4	a	Define Boyce-Codd normal form. How does it differ from 3NF? Why is it considered a stronger form of 3NF?	16 / 20	CO7	
	b	Consider the universal relation R = {A, B, C, D, E, F, G, H, I, J} and the set of functional dependencies F = { {A, B}→{C}, {A}→{D, E}, {B}→{F}, {F}→{G,H}, {D}→{I, J} }. What is the key for R? Decompose R into 2NF and then 3NF relations.			
	c	Define non-additive joint property of a decomposition and write an algorithm of testing for non-additive joint property		C08	
	d	What is the dependency preservation property for a decomposition? Why is it important?			
		OR			
-	a	What is meant by the attribute preservation condition on a decomposition ? Why should NULL s in a relation be avoided as much as possible?	16 / 20	CO7	
	b	What is a functional dependency? What are the possible sources of the information that defines the functional dependencies that hold among the attributes of a relation schema?			
	c	Discuss the problem of spurious tuples and how we may prevent it.		CO8	
	d	What undesirable dependencies are avoided when a relation is in 3NF?			
5	a	Draw a state diagram and discuss the typical states that a transaction goes through during execution.	16 / 20	CO9	
	b	Discuss ACID properties of a database transaction			
	c	Describe the shadow paging recovery technique. Under what circumstances does it not require a log?		CO10	
	d	Discuss the different types of failures. What is meant by catastrophic failure?			
		OR			
	a	What is the two-phase locking protocol? How does it guarantee serializability?	16 / 20	CO9	
	b	Discuss the timestamp ordering protocol for concurrency control. How does strict timestamp ordering differ from basic timestamp ordering?			
	c	What do the terms steal/no-steal and force/no-force mean with regard to buffer management for transaction processing?		C010	
	d	Describe the three phases of the ARIES recovery method.			

2. SEE Important Questions

Course: Database Management System						Month / Year	May /2018
Crs Code: 15CS53	Sem:	5	Marks:	100	Time:		180 minutes
Note	Answer all FIVE full questions. All questions carry equal marks.				-	-	

Module	Qno.	Important Question	Marks	CO	Year
1	1	Explain the typical components of a DBMS with a neat diagram.	16 / 20		2018
	2	Discuss the main Characteristics of the database approach. How does it differ from Traditional file systems?			2014
	3	Explain the three-schema architecture. What is the logical data independence and physical data independence?			2016

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	4	Design an ER diagram for an insurance company. Assume suitable entity types like CUSTOMER,AGENT,BRANCH,POLICY,PAYMENT and the relation between them.			2015
	5	What are weak entity type? Explain the role of partial key in design of weak entity type?			2015
2	1	Define referential integrity constraint. Explain the importance of referential integrity constraint. How this constraint is implemented	16 / 20		2015
	2	What is valid state and an invalid state, with respect to a database			2013
	3	Given the schema EMP (Fname, Lname, SSN, Bdate, Address, Sex, Salary, SuperSSN, Dno) DEP T(Dname, Dnumber, MgrSSN, MGrstartdate) DEPT-LOC (Dnumber, Dloc) PROJECT(Pname, Pnumber, Ploc,Dnum) WORKS-ON (ESSN,PNo,Hours)			2016
	4	Briefly discuss the different types of update operations on relational database. show an example of a violation of referential integrity in each of the update operation For each of the update operations (Insert, Delete, and Update), we consider what kinds constraint violations may result from applying it and how we might choose to react.			2014
	5	Write queries in SQL for the following Select all EMPLOYEE SSNs , and all combinations of EMPLOYEE SSN and DEPARTMENT DNAME ? Show the resulting salaries if every employee working on the 'ProductX' project is given a 10 percent raise. Make a list of Project numbers for projects that involve an employee whose last name is 'Smith', either as a worker or as a manger of the department that controls the project.			2016
3	1	Explain insert, delete and update statements in SQL with example.	16 / 20		2015
	2	What is embedded SQL? With an example explain how would you Connect to a database, fetch records and display. Also explain the concept of stored procedure in brief.			2015
	3	Explain the syntax of a SELECT statement in SQL.write the SQL query for the following relation algebra expression.			2015
	4	How are Triggers and assertions defined in SQL?Explain			2016
	5	What is CGI? Why was CGI introduced? What are the disadvantages of an architecture using CGI scripts?			2018
4	1	What is the need for normalization? Explain the first,second and third normal forms with examples.	16 / 20		2016
	2	Explain informal design guidelines for relation schemas.			2016
	3	Discuss insertion, deletion, and modification anomalies. Why they are bad? Illustrate with example?			2014
	4	Which normal form is based on the concept of transitive dependency? Explain with an example the decomposition into 3NF			2016
	5	Explain multivalued dependency and fourth normal form 4NF with examples.			2016
5	1	What is a schedule? Explain with example serial, non serial and conflict serializable schedules.	16 / 20		2016
	2	What is Serializibility?How can seriaizability?Justify your answer?			2018
	3	Explain two Phase Locking Protocol and its disadvantages?			2016
	4	Explain Time stamp ordering algorithm.			2016
	5	Explain ARIES Algorithm.			2016