SIR C.R.REDDY COLLEGE OF ENGINEERING, ELURU

DEPARTMENT OF INFORMATION TECHNOLOGY

COURSE HANDOUT

SUBJECT: DATABASE MANAGEMENT SYSTEMS

CLASS: II/IV B.Tech. II SEMESTER, A.Y.2022-23

INSTRUCTORS: SRI B RAMESH BABU &

SMT M VIJAYA SUDHA

Course Handout Index

S. No	Description

College Vision & Mission

Vision: To emerge as a premier institution in the field of technical education and research in the state and as a home for holistic development of the students and contribute to the advancement of society and the region.

Mission: To provide high quality technical education through a creative balance of academic and industry oriented learning; to create an inspiring environment of scholarship and research; to instill high levels of academic and professional discipline; and to establish standards that inculcate ethical and moral values that contribute to growth in career and development of society in general.

Department Vision & Mission

Vision: To be a premier department in the region in the field of Information Technology through academic excellence and research that enable graduates to meet the challenges of industry and society.

Mission: To Provide dynamic teaching-learning environment to make the students industry ready and advancement in career; to inculcate professional and leadership quality for better employability and entrepreneurship; to make high quality professional with moral and ethical values suitable for industry and society.

Program Educational Objectives (PEOs)

PEO1: Solve real world problems through effective professional skills in Information Technology industry and academic research.

PEO2: Analyze and develop applications in Information Technology domain and adapt to changing technology trends with continuous learning.

PEO3: Practice the profession in society with ethical and moral values.

Program Outcomes (POs)

PO1: Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2: Problem Analysis: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using the first principles of mathematics, natural sciences, and engineering sciences.

PO3: Design/Development of Solutions: Design solutions for complex engineering problems and system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, society, and environmental considerations.

PO4: Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5: Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6: The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7: Environment and Sustainability: Understand the impact of the professional engineering solutions in society and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9: Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multi-disciplinary settings.

PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11: Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one' s own work, as a member and leader in a team, to manage projects and in multi-disciplinary environments.

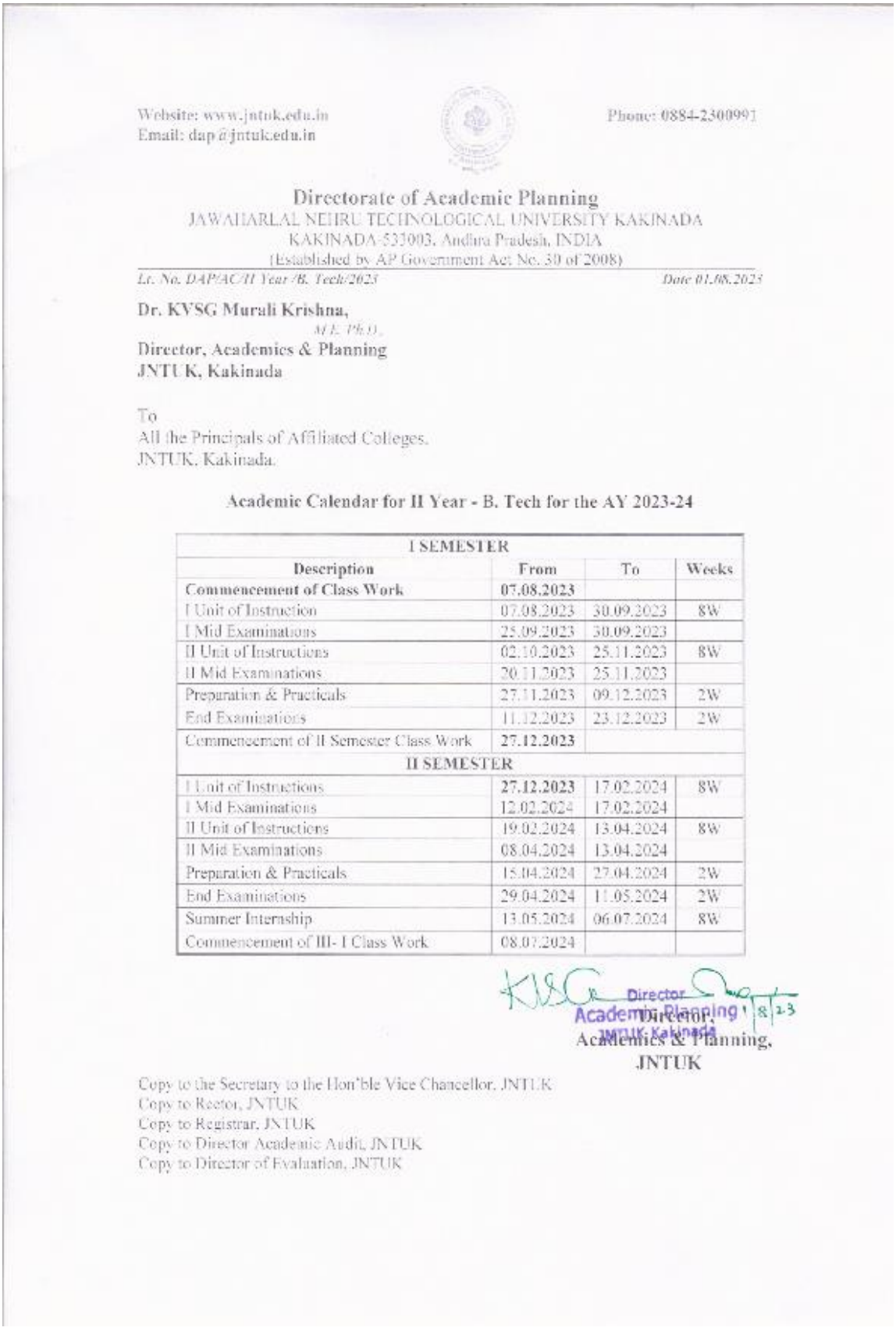
PO12: Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes (PSOs)

PSO1: Design Skill: Design and develop software' s in the area of relevance under realistic constraints.

PSO2: New Technology: Adapt new and fast emerging technologies in the field of Information Technology.

JNTUK Academic Calendar



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Directorate of Academic Planning
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA
KAKINADA-533003, Andhra Pradesh, INDIA
(Established by AP Government Act No. 30 of 2008)

Lr. No. DAP/AC/II Year /B. Tech/2023 *Date 01.08.2023*

Dr. KVSG Murali Krishna,
M.E, Ph.D.,
Director, Academics & Planning
JNTUK, Kakinada

To
All the Principals of Affiliated Colleges,
JNTUK, Kakinada.

Academic Calendar for II Year - B. Tech for the AY 2023-24

I SEMESTER			
Description	**From**	**To**	**Weeks**
Commencement of Class Work	**07.08.2023**		
I Unit of Instruction	07.08.2023	30.09.2023	8W
I Mid Examinations	25.09.2023	30.09.2023	
II Unit of Instructions	02.10.2023	25.11.2023	8W
II Mid Examinations	20.11.2023	25.11.2023	
Preparation & Practicals	27.11.2023	09.12.2023	2W
End Examinations	11.12.2023	23.12.2023	2W
Commencement of II Semester Class Work	**27.12.2023**		
II SEMESTER			
I Unit of Instructions	**27.12.2023**	17.02.2024	8W
I Mid Examinations	12.02.2024	17.02.2024	
II Unit of Instructions	19.02.2024	13.04.2024	8W
II Mid Examinations	08.04.2024	13.04.2024	
Preparation & Practicals	15.04.2024	27.04.2024	2W
End Examinations	29.04.2024	11.05.2024	2W
Summer Internship	13.05.2024	06.07.2024	8W
Commencement of III- I Class Work	08.07.2024		

Director
Academic Planning
JNTUK, Kakinada
8/8/23

Director,
Academics & Planning,
JNTUK

Copy to the Secretary to the Hon'ble Vice Chancellor, JNTUK
Copy to Rector, JNTUK
Copy to Registrar, JNTUK
Copy to Director Academic Audit, JNTUK
Copy to Director of Evaluation, JNTUK

Course Description

Behind the development and design of this course is to know how to design, manipulate and manage databases. The course participants are exposed to the various forms, types and models of

database systems to enable them make viable choices. Supportive and complimentary concepts of managing data and documents are thoroughly examined to give a wholesome view of data/information management. The ultimate aim is to encourage the usage of database management systems for effective data management.

Course Objectives

The objectives of the course are to

1. To learn the evolution of DBMS Versus File systems, data models, and layers of abstraction.
2. To understand conceptual and physical aspects of database design.
3. To learn formal and commercial query language specifications.
4. To understand concurrency control, recovery management, and other related issues.

Course Outcomes

At the end of this course, students will be able to:

CO1	Students will be able to **Understand** the basic concepts of Data Base, Relational Model, Transaction Management, Concurrency Control, and Crash Recovery.
CO2	Students will be able to **Apply** ER Model for designing Conceptual Data Base AND Relational Model for designing Logical Data Base.
CO3	Students will be able to **Analyze** the concepts of Schema Refinement and Normalization.
CO4	Students will be able to **Design** Data Base applications using SQL Queries

Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
L1	L2	L3	L4	L5	L6

II Year – I Semester		**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**
DATABASE MANAGEMENT SYSTEMS					

Syllabus

UNIT-I:

Introduction: Database system, Characteristics (Database Vs File System), Database Users(Actors on Scene, Workers behind the scene), Advantages of Database systems, Database applications. Brief introduction of different Data Models; Concepts of Schema, Instance and data independence; Three tier schema architecture for data independence; Database system structure, environment, Centralized and Client Server architecture for the database.

UNIT-II:

Relational Model: Introduction to relational model, concepts of domain, attribute, tuple, relation, importance of null values, constraints (Domain, Key constraints, integrity constraints) and their importance BASIC SQL: Simple Database schema, data types, table definitions (create, alter), different DML operations (insert, delete, update), basic SQL querying (select and project) using where clause, arithmetic & logical operations, SQL functions(Date and Time, Numeric, String conversion).

UNIT-III:

Entity Relationship Model: Introduction, Representation of entities, attributes, entity set, relationship, relationship set, constraints, sub classes, super class, inheritance, specialization, generalization using ER Diagrams. SQL: Creating tables with relationship, implementation of key and integrity constraints, nested queries, sub queries, grouping, aggregation, ordering, implementation of different types of joins, view(updatable and non-updatable), relational set operations.

UNIT-IV:

Schema Refinement (Normalization): Purpose of Normalization or schema refinement, concept of functional dependency, normal forms based on functional dependency(1NF, 2NF and 3 NF), concept of surrogate key, Boyce-codd normal form(BCNF), Lossless join and dependency preserving decomposition, Fourth normal form(4NF), Fifth Normal Form (5NF).

UNIT-V:

Transaction Concept: Transaction State, Implementation of Atomicity and Durability, Concurrent Executions, Serializability, Recoverability, Implementation of Isolation, Testing for Serializability, Failure Classification, Storage, Recovery and Atomicity, Recovery algorithm.

Indexing Techniques: B+ Trees: Search, Insert, Delete algorithms, File Organization and Indexing, Cluster Indexes, Primary and Secondary Indexes , Index data Structures, Hash Based Indexing: Tree base Indexing ,Comparison of File Organizations, Indexes and Performance Tuning

Lesson Plan

S. No	Unit	Topic	Teaching Aids	CO
1.	I	**Introduction**	BB	CO1
2.		Database system	BB	CO1
3.		Characteristics	BB	CO1

4.		Database Users	BB	CO1
5.		Advantages of Database systems	BB	CO1
6.		Database applications	PPT	CO1
7.		Brief introduction of different Data Models Vectors	PPT	CO1
8.		Concepts of Schema	PPT	CO1
9.		Instance and data independence	BB/PPT	CO1
10.		Three tier schema architecture for data independence	BB	CO1
11.		Database system structure	BB/PPT	CO1
12.		Environment	BB	CO1
13.		Centralized and Client Server architecture for the database.	BB/PPT	CO1
14.	II	Introduction to relational model	BB	CO1
15.		Concepts of domain	BB/PPT	CO1
16.		Attribute, tuple, relation	BB/PPT	CO1
17.		Importance of null values	BB/PPT	CO1
18.		Constraints	BB	CO1
19.		BASIC SQL: Simple Database schema	BB	CO1
20.		Data types	BB	CO1
21.		Table definitions (create, alter)	BB/PPT	CO1
22.		Different DML operations (insert, delete, update)	BB	CO1
23.		Basic SQL querying (select and project) using where clause	BB/PPT	CO1
24.		Arithmetic & logical operations	BB	CO1
25.		SQL functions(Date and Time, Numeric, String conversion).	BB	CO1
26.	III	Entity relationship model: introduction	BB/PPT	CO2
27.		Representation of entities, attributes	BB	CO2
28.		Entity set, relationship, relationship set	BB/PPT	CO2
29.		Constraints, sub classes, super class	BB	CO2
30.		Inheritance	BB/PPT	CO2
31.		Specialization, generalization using ER Diagrams	BB/PPT	CO2
32.		Specialization, generalization using ER Diagrams	BB	CO2
33.		Implementation of key and integrity constraints	BB	CO2

34.		Nested queries	BB	CO2
35.		Sub queries		CO2
36.		Grouping	BB/PPT	CO2
37.		Aggregation		CO2
38.		Ordering	BB	CO2
39.		Implementation of different types of joins	BB	CO2
40.		View (updatable and non-updatable)	BB/PPT	CO2
41.		Relational set operations	BB	CO2
42.	IV	Schema refinement (normalization)	BB	CO3
43.		Purpose of Normalization or schema refinement	BB/PPT	CO3
44.		Concept of functional dependency	BB	CO3
45.		Normal forms based on functional dependency (1NF, 2NF and 3 NF)	BB/PPT	CO3
46.		Concept of surrogate key	BB	CO3
47.		Boyce-codd normal form(BCNF)	BB	CO3
48.		Lossless join and dependency preserving decomposition	BB	CO3
49.		Fourth normal form(4NF)	BB	CO3
50.		Fifth normal form (5nf)	BB/PPT	CO3
51.	V	Transaction Concept	BB/PPT	CO4
52.		Transaction State	BB	CO4
53.		Implementation of Atomicity and Durability	BB/PPT	CO4
54.		Concurrent Executions	BB	CO4
55.		Serializability	BB/PPT	CO4
56.		Recoverability	BB	CO4
57.		Implementation of Isolation	BB/PPT	CO4
58.		Testing for Serializability	BB/PPT	CO4
59.		Failure Classification	BB	CO4
60.		Storage, Recovery and Atomicity	BB/PPT	CO4
61.		Recovery algorithm	BB	CO4
62.		Indexing Techniques	BB/PPT	CO4
63.		B+ Trees: Search, Insert, Delete algorithms	BB	CO4
64.		File Organization and Indexing	BB	CO4

65.		Cluster Indexes	BB/PPT	CO4
66.		Primary and Secondary Indexes	BB	CO4
67.		Index data Structures	BB/PPT	CO4
68.		Hash Based Indexing: Tree base Indexing	BB	CO4
69.		Comparison of File Organizations	BB	CO4
70.		Indexes and Performance Tuning	BB/PPT	CO4

Evaluation Pattern

The assessment of the student's performance in each course will be as per the details given:

S. No	Components	Internal	External	Total
1	Theory	30	70	100
2	Engineering Graphics/Design/Drawing	30	70	100
3	Practical	15	35	50
4	Mini Project/Internship/Industrial Training/ Skill Development programmes/Research Project	-	50	50
5	Project Work	60	140	200

Continuous Internal Theory Evaluation:

a) For theory subjects, during a semester, there shall be two mid-term examinations. Each mid-term examination consists of (i) one online objective examination (20 multiple choice questions) for 10 marks for a duration of 20 minutes (ii) one descriptive examination (3 full questions for 5 marks each) for 15 marks for a duration of 90 minutes and (iii) one assignment for marks. All the internal exams shall be conducted as per university norms from first 50% of the syllabi.

b) In the similar lines, the second online, descriptive examinations assignment shall be conducted on the rest of the 50% syllabus.

c)Internal marks can be calculated with 80% weightage for better of the two mids and 20% Weightage for other mid exam.

Example: Mid-1 marks = Marks secured in (online examination-1+descriptive examination-1 +one assignment-1)

Mid-2 marks = Marks secured in (online examination-2+descriptive examination-2 +one assignment-2)

Final internal Marks = (Best of (Mid-1/Mid-2) marks x 0.8 + Least of (Mid-1/Mid-2) marks x 0.2)

Timetable

SIR CRREDDY COLLEGE OF ENGINEERING, ELURU
DEPARTMENT OF INFORMATION TECHNOLOGY
II/IV B.Tech I.T - I SEMESTER A.Y 2023-2024

TIME TABLE
A – Section

With effect from: 07.08.23 **Class Teachers: Dr. K.Satyanarayana / Sri.B.Ramesh Babu** **LH-45**

	1	2	3	4		5	6	7	8
DAY	**09:00 To 09:50**	**09:50 To 10:40**	**11:00 to 11:50**	**11:50 To 12:40**		**1:40 to 2:30**	**02:30 to 03:20**	**03:20 To 04:10**	**04:10 To 5:00**
MON	M-III	OOPS	DM&GT	OS(T)		OOPS LAB			M-III(M)
TUE	DM&GT	OOPS	OS	DBMS(T)		OS LAB			OOPS(M)
WED	DBMS	DM&GT	COI	OOPS		OS	M-III(T)	Counseling	OS(M)
THU	OS	DBMS	M-III	DM&GT(T)		SOC-I LAB			DBMS(M)
FRI	M-III	DBMS	OOPS(T)	OS		DBMS LAB			DM&GT(M)
SAT	OOPS	DM&GT	M-III	DBMS		OS/OOPS(R)	DM&GT(R)	DBMS(R)	M-III(R)

***T – Tutorial**
***R- Remedial Classes**
***M- Make Up Classes**

THOERY:

Mathematics-III	: Smt. S.Sireesha	**R2021011**
Object oriented Programming through C++	: Dr. K.Satyanarayana	**R2021051**
Operating Systems	: Smt. B.Lalitha Bhavani	**R2021052**
Database Management Systems	: Sri. B.Ramesh Babu	**R2021121**
Discrete Mathematics and Graph Theory	: Sri. G.Vihari	**R2021122**

LAB:

Object oriented Programming through C++ Lab	: Dr. K.Satyanarayana / Smt.N.Durga Prasasnna / Smt. R.Bhagya Sri **R2021055**
Operating Systems Lab	: Smt. B.Lalitha Bhavani /Smt. J.Malathi **R2021056**
Database Management systems Lab	: Sri. B. Ramesh Babu /Smt. M.Vijaya Sudha / Sri. S.Uma Sheshagiri Rao **R2021123**
Skill oriented Course -1	: Sri. G.Vihari ./ Smt. N. Durga Prasanna **R2021125**
Constitution of India	: Smt.R.Bhagya Sri **R2021010**

G. Krishnaveni
Dept. Time Table In charge

HOD,
Dept. of. I.T

HEAD OF THE DEPARTMENT
Information Technology
Sir C.R.R. College of Engg.

PRINCIPAL
Principal
Sir C.R.R.College of Engineering
ELURU - 534 007

SIR CRREDDY COLLEGE OF ENGINEERING, ELURU
DEPARTMENT OF INFORMATION TECHNOLOGY
II/IV B.Tech I.T - I SEMESTER A.Y 2023-2024

TIME TABLE

B – Section

With effect from: 07.08.23 **Class Teachers: Smt.B.Lalitha Bhavani / Sri.G.Vihari** LH-46

	1	2	3	4		5	6	7	8
DAY	**09:00 To 09:50**	**09:50 To 10:40**	**11:00 to 11:50**	**11:50 To 12:40**	L	**1:40 to 2:30**	**02:30 to 03:20**	**03:20 To 04:10**	**04:10 To 5:00**
MON	DM&GT	DBMS	M-III	OOPS	U	DBMS(T)	OS	Counseling	M-III(M)
TUE	OS	SOC-I LAB			N	M-III	DM&GT	OOPS(T)	OOPS(M)
WED	M-III	OOPS	OS	DBMS	C	OOPS LAB			OS(M)
THU	DM&GT	OOPS	OS(T)	DBMS	H	DBMS LAB			DBMS(M)
FRI	OOPS	OS	M-III(T)	DM&GT		M-III	DM&GT(T)	COI	DM&GT(M)
SAT	DBMS	OS LAB				OS/OOPS(R)	DM&GT(R)	DBMS(R)	M-III(R)

***T – Tutorial**
***R- Remedial Classes**
***M- Make Up Classes**

THOERY:

Mathematics-III	: Smt. T. Anusha	**R2021011**
Object oriented Programming through C++	: Dr. K.Satyanarayana	**R2021051**
Operating Systems	: Smt. B.Lalitha Bhavani	**R2021052**
Database Management Systems	: Smt. M.Vijaya Sudha	**R2021121**
Discrete Mathematics and Graph Theory	: Sri. G.Vihari	**R2021122**

LAB:

Object oriented Programming through C++ Lab	: Smt. N.Durga Prasasnna / Dr. K.Satyanarayana / Smt. R.Bhagya Sri **R2021055**
Operating Systems Lab	: Smt. J.Malathi /Smt. B.Lalitha Bhavani **R2021056**
Database Management systems Lab	: Smt. M.Vijaya Sudha / Sri. B.Ramesh Babu Sri. S.Uma Sheshagiri Rao **R2021123**
Skill oriented Course -1	: Smt. N. Durga Prasanna / Sri. G.Vihari **R2021125**
Constitution of India	: Smt.R.Bhagya Sri **R2021010**

G. Krishnaveni
Dept. Time Table In charge

HOD,
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HEAD OF THE DEPARTMENT
Information Technology
Sir C.R.R. College of Engg.

PRINCIPAL

Principal
Sir C.R.R.College of Engineering
ELURU - 534 007

Google Class room link:

https://classroom.google.com/c/NjE3MjY2NDU2OTUw

class code: yfgm4ih

Unit-wise questions

UNIT – 1
Introduction to DBMS

1. What is dbms? Discuss the characteristics of DBMS?
2. Explain in detail about the database users.
3. What are the advantages and disadvantages of dbms?
4. What are the applications of database?
5. Explain briefly different data models in dbms.
6. Discuss the concepts of schema.
7. Explain the instance and data independence.
8. Explain briefly the three tier schema architecture.
9. Discuss the structure of database system.
10. Explain in detail the Centralized and Client Server architecture for the database.

UNIT – 2
Relational Model

1. What is relational model in DBMS?
2. Explain the following terms: i) Domain ii) Attribute iii) Tuple iv) Null.
3. What is constraint? Explain different types of constraints.
4. What is meant by database scheme?
5. Explain briefly the data types used in the SQL.
6. What are Dr.E.F.Coddlaws for fully functional relational database management systems? Explain.
7. Explain about TCL, DDL, DML commands with suitable examples.
8. Give the form of a basic SQL query. Write SQL queries to demonstrate the usage of SQL date and time data types and functions.
9. Discuss in brief about arithmetic and logic operations in SQL?

UNIT – 3
Entity Relationship Model

1. Explain Entity set, Attribute set and Relationship set. List and explain the symbols used to draw ER Diagram.
2. What are the constraints in the data model?
3. What is the difference between super class and sub class? Explain the concept of inheritance.
4. Explain briefly generalization and specialization with neat ER diagrams.
5. Explain the following SQL constructs with examples:
   (i) order by (ii) group by and having (iii) as select (iv) schema.
6. Explain the following SQL constructs with examples:
   (i) Nested query (ii) sub query (iii) groupig.
7. Briefly discuss about the aggregation functions with suitable examples.
8. What are the different types of joining command used in SQL, explain with suitable examples?
9. What are the advantages of views? Listout the constraints for defining updateable and non-updateable views.
10. Discuss various relational set operator used in SQL, explain with suitable examples?

UNIT – 4
Schema Refinement (Normalization)

1. Explain briefly functional dependency.
2. Discuss briefly state full and partial dependencies.
3. Explain in detail about transitive and multi-valued dependencies.
4. What is meant by join dependencies?
5. What is a normal form? Explain 1NF with example.
6. What is a normal form? Explain 2NF with example.
7. What is a normal form? Explain 3NF with example.
8. Discuss the BCNF and 4th normal form with examples.
9. Explain the concept of surrogate key.

Unit-5
Transaction Concept

1. Discuss various anomalies that arise with concurrent execution of transactions.
2. Discuss about recovery with Concurrent Transactions.
3. Explain various data structures that are required for database management

recovery by log-based schemes.

4. What is the order of B+ tree? Describe the format of nodes in a B+ tree. Why are at the leaf level linked?
5. State and explain the properties of a transaction in DBMS.
6. Explain briefly the B+ tree insertion and deletion algorithm with an example.
7. Explain the following: i) primary, secondary and clustered indexes
   ii) Dense and sparse indexes
8. With an example, explain about view serializability and conflict serializability.
9. Explain about Extendible Hash based indexing technique with an example.
10. Explain the concept of Indexes and Performance Tuning.

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