**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTHAPURAMU**
**COLLEGE OF ENGINEERING (AUTONOMOUS):: PULIVENDULA**

| | | | | | |
|---|---|---|---|---|---|
| **Course Code** | **:** | 15ACS12 | | | |
| **Course Title** | **:** | **Database Management System** | | | |
| **Course Structure** | **:** | Lectures | Tutorials | Practicals | Credits |
| | | 3 | 1 | 0 | 3 |
| **Course Coordinator** | **:** | Miss. S. Ghouhar Taj | | | |
| **Team of Instructors** | **:** | Mr. G. Murali | | | |

**I. Course Overview**

This introductory application-oriented course covers the relational database systems RDBMS - the predominant system for business, scientific and engineering applications at present. The topics are reinforced using tools such as Oracle or MS SQL Server in labs. The course includes Entity-Relation model, Normalization, Relational model, Relational algebra, and data access queries as well as an introduction to SQL.

## II. Prerequisite(s):

| **Level** | Credits | **Periods / Week** | **Prerequisites** |
|---|---|---|---|
| UG | 3 | 4 | Database Introduction |

**III. Assessment:**

| **FORMATIVE ASSESMENT** | |
|---|---|
| Mid Semester Test I for 20 Marks in first 2 units is conducted at8 the end of 9th week.<br><br>Mid Semester Test II for 20 Marks in last three units is conducted at the end of the course work.<br><br>Average of two tests is taken as final | 20 Marks |
| Mid semester Test Multiple Choice Test in first two and half Units is conducted for 10 Marks | 10 Marks |

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| Mid semester Test Multiple Choice Test in second two and half Units is conducted for 10 Marks<br><br>Average of two tests is taken as final | |
| Total ( Formative) | 30 Marks |
| **SUMMATIVE ASSESMENT** | |
| End Semester Examination in all units is conducted for 70 Marks | 70 marks |
| **Grand Total** | 100 Marks |

## IV. Course objectives:

1. To create database and query it using SQL queries, design forms and generate reports.
2. Learn to use integrity constraints, referential integrity constraints, triggers, assertions

## V. Course Outcomes:

1. Design databases
2. Retrieve information from data bases
3. Use procedures to program the data access and manipulation
4. Create user interfaces and generate reports

## VI. Program outcomes:

**Program Outcomes**

a An ability to apply knowledge of computing, mathematical foundations, algorithmic principles, and computer science and engineering theory in the modeling and design of computer-based systems to real-world problems (fundamental engineering analysis skills)

b An ability to design and conduct experiments, as well as to analyze and interpret data (information retrieval skills)

c An ability to design , implement, and evaluate a computer-based system, process, component, or program to meet desired needs, within realistic constraints such as economic, environmental, social, political, health and safety, manufacturability, and sustainability (Creative Skills)

d An ability to function effectively on multi-disciplinary teams (team work)

e An ability to analyze a problem, identify, formulate and use the appropriate computing and engineering requirements for obtaining its solution (engineering problem solving skills)

f An understanding of professional, ethical, legal, security and social issues and responsibilities (professional integrity)

g An ability to communicate effectively both in writing and orally (speaking / writing skills)

h The broad education necessary to analyze the local and global impact of computing and engineering solutions on individuals, organizations, and society (engineering impact assessment skills)

i Recognition of the need for, and an ability to engage in continuing professional development and life-long learning (continuing education awareness)

j A Knowledge of contemporary issues (social awareness)

k An ability to use current techniques, skills, and tools necessary for computing and engineering practice (practical engineering analysis skills)

l An ability to apply design and development principles in the construction of software and hardware systems of varying complexity (software hardware interface)

m An ability to recognize the importance of professional development by pursuing postgraduate studies or face competitive examinations that offer challenging and rewarding careers in computing (successful career and immediate employment).

## VII. Syllabus:

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTHAPURAMU**
**COLLEGE OF ENGINEERING (AUTONOMOUS):: PULIVENDULA**
**Regulation –R15**

**B.Tech. IIYear –II Sem (C.S.E)** **L T P C**
**3 1 0 3**

### Database Management Systems

**UNIT I**

**The Worlds of Database Systems** – file system VS a DBMS – Advantages of DBMS – Levels of abstraction in DBMS, Data Independency, Queries in DBMS

**The Entity-Relationship Model** – Database design and ER diagrams – Elements of ER models –Additional features ER models.

**The Relational Data Model** – Basics of the Relational Model –Integrity constraints over relations, From E/R Diagrams to Relational Designs – Introduction to views.

**UNIT II**

**Relational Algebra and Calculus** – Preliminaries, Relational algebra: Selection and Projection, Set Operations, Renaming, Joins, Division - Relational Calculus – Expressive power of Algebra and Calculus.

**The Database Language SQL** – Simple Queries in SQL –UNION, INTERSECT, EXCEPT– Nested queries, Aggregate operators.

**UNIT III**

**Constraints and Triggers** – Keys and Foreign keys – Constraints on Attributes and Tuples, Schemalevel

Constraints and Triggers.

Functional Dependencies – Rules about Functional Dependencies- Normal Forms based on FDs – 1NF, 2NF, 3NF, BCNF, Multivalve Dependencies, 4NF, 5NF.

**UNIT IV**

Transaction Management: Transactions, ACID properties, Serializability, Other isolation levels.

**Concurrency Control** – Serializability and Recoverability, Introduction to Lock management- Concurrency Control without Locking.

**UNIT V**

**Index Structures** – Indexes on Sequential Files – Secondary Indexes – B-Trees, B+ Trees – Hash Based Indexing.

**Introduction to Query Optimization**.

Crash Recovery: Introduction to ARIES- The Log- other Recovery- Related Structures- Checkpoints-Recovery from a System Crash.

## VIII. List of Text Books / References / Websites / Journals / Others

**Text Books:**

1. **"Database Systems, The Complete Book",** Hector Garcia-Molina, Jeffrey D. Ullman and Jennifer Widom, 6th impression, 2011, Pearson.
2. **"Data base Management Systems",** Raghu Rama Krishnan, Johannes Gehrke, 3rd Edition, 2003, McGraw Hill.

**Reference Books:**

1. "Fundamentals of Database Systems", Elmasri Navrate, 6th edition, 2013, Pearson.
2. "Data base Systems design", Implementation, and Management, Peter Rob & Carlos Coronel 7th Edition.
3. "Introduction to Database Systems", C.J.Date, Pearson Education.
4. "Data base System Concepts", Silberschatz, Korth, McGraw Hill, V edition.

## IX. Course Plan:

The course plan is meant as a guideline. There may probably be changes.

| Date | Course Learning Outcomes | Topics to be covered | Reference |
|---|---|---|---|
| **UNIT I** | | | |
| 28-11-19(2)<br>29-11-19(1)<br>2-12-19(1) | The worlds of database | File system vs a DBMS, advantage of DBMS, levels of abstraction in DBMS, data independency, queries in DBMS | T1:**1**:1-19<br>T2:1:8-16<br>R4:**1**:36-86 |
| 5-12-19(2)<br>6-12-19(1) | The entity-relationship model | Database design and ER diagram, elements of ER model, additional features ER models | T1:**2**:26-40<br>T2:2:25-45<br>R2:**4**:105-125<br>R1:**3**:200-230 |
| 9-12-19(1)<br>12-12-19(2) | The Relational Data Model | Basics of the Relational Model – From E/R Diagrams to Relational Designs – introduction to views | T1:**3**:61-87<br>T2:3:57-94<br>R1:**3**:60-67 |
| **UNIT-II** | | | |
| 13-12-19(1)<br>16-12-19(1)<br>19-12-19(2)<br>20-12-19(1)<br>23-12-19(1) | Relational Algebra and Calculus | Preliminaries, Relational algebra: Selection and Projection, Set Operations, Renaming, Joins, Division - Relational Calculus – Expressive power of Algebra and Calculus. | T1:**5**:189-203<br>T2:**4**:101-124<br>R1:6:147-183 |

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|---|---|---|---|
| 26-12-19(2)<br>27-12-19(1)<br>30-12-19(1)<br>2-1-20(2) | The database language SQL | Simple Queries in SQL – UNION,INTERSECT,EXCEPT-nested queries, aggregate operators | T1:**6**:239-310<br>T2:**5**:131-165<br><br>R2:**7**:225-280<br><br>R1:**4**:87-110 |
| 3-1-20(1)<br>6-1-20(1) | **Practical session** | | |
| **UNIT-III** | | | |
| 9-1-20(2)<br>10-1-20(1)<br>13-1-20(1) | Constraints and Triggers | Keys and Foreign keys – Constraints on Attributes and Tuples, Schemalevel-Triggers& Constrains | T1:**7**:316-345<br>T2:**3**:63-72 |
| 17-1-20(2)<br>23-1-20(2)<br>24-1-20(1) | Functional Dependencies | Rules about Functional Dependencies -- Design of Relational Database Schemas, Normal Forms based on FDs – Multivalued Dependencies, 4NF, 5NF | T1:**3**:82-126<br><br>T2:19:611-640<br><br>R2:**5**:173-176 |
| 27-1-20(1)<br>30-1-20(2) | Gate lectures on normal forms | | |
| **UNIT-IV** | | | |
| 31-1-20(1)<br>3-2-20(1)<br>6-2-20(2)<br>7-2-20(1) | Transaction Management | Transactions, ACID properties, Serializability, Other isolation levels. | T1:**8**:397-403<br>T2:**16**:519-525<br><br>R2:**10**:413-430 |
| 10-2-20(1)<br>13-2-20(2)<br>14-2-20(1)<br>17-2-20(1) | Concurrency Control | Serializability and recoverability, introduction to lock management, concurrency control without locking | T2:**17**:549-572<br><br>R2:**22**:778-800 |
| 20-2-20(2)<br>24-2-20(1) | **Gate Lectures** | | |
| **UNIT-V** | | | |
| 27-2-20(2)<br>28-2-20(1)<br>2-3-20(1)<br>5-3-20(2)<br>6-3-20(1)<br>9-3-20(1) | Index Structures | Indexes on Sequential Files – Secondary Indexes – B-Trees, B+ Trees – Hashing. | T1:**13**:605-657<br><br>T2:**10**:358-364 |
| 12-3-20(2)<br>13-3-20(1)<br>16-3-20(1) | Introduction to Query Optimization | introduction to ARIES, the log-other recovery, related structure, checkpoint, recovery from a system crash | T1:18:580-590<br><br>T2:18:582- |

| | | | |
|---|---|---|---|
| | | | 595<br><br>R1:**23**:808-820 |
| 19-3-20(2)<br>20-3-20(1)<br>23-3-20(1) | **Revision and Gate lectures** | | |

## X. Mapping course outcomes leading to the achievement of the program outcomes:

| Course Outcomes | Program Outcomes | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **a** | **B** | **c** | **d** | **E** | **F** | **g** | **h** | **i** | **j** | **k** | **l** | **m** |
| **1** | | **S** | **S** | | **H** | **S** | | | | | | | **S** |
| **2** | | | **S** | | | **H** | | | | | | | **S** |

**S = Supportive** **H = Highly Related**

**Justification of Course syllabus covering Course Outcomes:**

By covering the syllabus a student can understand the designing of algorithm and flowcharts. Student is able to develop applications using C Program Constructs.

**Justification of CO's –PO's Mapping Table:**

By mapping CO-1 to the PO's B which are related to the course CO1: The student is able to analyze and design the problem.

By mapping CO-1 to the PO's C, which are related to the course CO1: The student is able to Implement the Problem and evaluate computer-based system program to meet.

By mapping CO-1 to the PO's E, which are related to the course CO1: The student is able to identify, formulate and use the appropriate computing and engineering requirements.

By mapping CO-1 to the PO's F, which are related to the course CO1: the student is able to understanding of professional, ethical, legal, security and social issues.

By mapping CO-1 to the PO's M, which are related to the course CO1: the student is able to recognize the importance of professional development by facing competitive examinations that offer challenging and rewarding careers in computing.

By mapping CO-2 to the PO's C, which are related to the course CO2: The student is able to understand the constrains, Develop the creative skills & Provides Security and Successful Carrier

By mapping CO-2 to the PO's F which are related to the course CO3: The student is able to understands professional, ethical, legal, security and social issues and responsibilities

By mapping CO-2 to the PO's M which are related to the course CO3: The student is able to understand the professional development by facing competitive examinations.