INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)
Dundigal, Hyderabad - 500 043

COMPUTER SCIENCE AND ENGINEERING

COURSE DESCRIPTION FORM

Course Title	**ADVANCED DATABASE MANAGEMENTSYSTEM**			
Course Code	BCS005			
Course Structure	Lectures	Tutorials	Practicals	Credits
	3	-	-	3
Course Coordinator	Mr. C Raghavendra, Assistant Professor			
Team of Instructors	-			

I. COURSE OVERVIEW

This course introduces the core principles and techniques required in the design and implementation of database systems. This introductory application-oriented course covers the relational database systems RDBMS - the predominant system for business, scientific and engineering applications at present. It includes Entity-Relational model, Normalization, Relational model, Relational algebra, and data access queries as well as an introduction to SQL. It also covers essential DBMS concepts such as: Transaction Processing, Concurrency Control and Recovery. It also provides students with theoretical knowledge and practical skills in the use of databases and database management systems in information technology applications

II. PREREQUISITE(S)

Level	Credits	Periods/ Week	Prerequisites
PG	3	3	Fundamentals of database, Programming concepts

III. MARKS DISTRIBUTION

Subject	SEE Examination	CIA Examination	Total Marks
Advanced Database Management System	70 Marks	30 Marks	100 Marks

Semester End Examination 70 Marks All the Units (1, 2, 3, 4 and 5)	70 Marks (3 Hours)	5 questions to be answered. Each question carries 14 Marks

<table>
<tr><td rowspan="6">Average of two CIA Examinations</td><td colspan="4">Continuous Internal Assessment (CIA) - 1</td></tr>
<tr><td rowspan="3">30 Marks
(2 Hours)</td><td rowspan="3">Units
I, II and
III (half)</td><td rowspan="2">Continuous Internal Examination (CIE)
(2 hours)
[4 questions to be answered out of 5 questions from Part- A & B]</td><td>Part - A
5 questions to be answered out of 5 questions, each carries 1 mark.</td></tr>
<tr><td>Part - B
4 questions each carry 5 Marks.</td></tr>
<tr><td>Technical Seminar and Term Paper</td><td>5 marks</td></tr>
<tr><td colspan="4">Continuous Internal Assessment (CIA) - 2</td></tr>
<tr><td rowspan="3">30 Marks
(2 Hours)</td><td rowspan="3">Units
III (half)
IV and V</td><td rowspan="2">Continuous Internal Examination (CIE)
(2 hours)
[4 questions to be answered out of 5 questions from Part- A & B]</td><td>Part – A
5 questions to be answered out of 5 questions, each</td></tr>
<tr><td>Part - B
4 questions each carry 5 Marks.</td></tr>
<tr><td>Technical Seminar and Term Paper</td><td>5 marks</td></tr>
</table>

IV. EVALUATION SCHEME

S. No	Component	Duration	Marks
1	CIE - I Examination	2 hour	25
2	Technical Seminar and Term Paper	10 minutes seminar and 1000 words document	05
TOTAL			30
3	CIE - II Examination	2 hour	25
4	Technical Seminar and Term Paper	10 minutes seminar and 1000 words document	05
TOTAL			30
CIA Examination marks to be considered as average of above two CIA's			
5	EXTERNAL Examination	3 hours	70
GRAND TOTAL			100

V. COURSE OBJECTIVES

The course should enable the students to:

- **I.** Design databases using data models.
- **II.** Query and manage databases.
- **III.** Distinguish between centralized and distributed databases.
- **IV.** Implement applications involving complex transaction processing.
- **V.** Do query evaluation and query optimization

I. COURSE OUTCOMES

At the end of the course the students are able to:

1. **Describe** basic database concepts, Data Models, Schemas, Instances, and Components in the DBMS architecture.
2. **Identify** the entities, relationships and demonstrate the features of E-R model.
3. **Implement** practical solutions to GIS database problems using OO/OR database, spatial database, data warehousing and data mining approaches
4. **Evaluate** simple strategies for executing a distributed query to select the strategy that minimizes the amount of data transfer.
5. **Demonstrate** the issues involved in data integration for distributed query processing
6. **develop** practical skills in the use of these models and approaches to be able to select and apply the appropriate methods for a particular case
7. **Implement** transactions, concurrency control, and be able to do Database recovery and Query optimization.
8. **Analysed** internal structures, query evaluation and optimization.

II. HOW PROGRAM OUTCOMES ARE ASSESSED

Program Outcomes		Level	Proficiency assessed by
PO1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.	H	Seminar
PO2	**Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.	H	Seminar
PO3	**Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.	S	Projects
PO4	**Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysi and interpretation of data, and synthesis of the information to provide valid conclusions.	S	Projects
PO5	**Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.	S	Projects
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.	N	--
PO7	**Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.	N	--
PO8	**Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.	N	--
PO9	**Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.	N	--

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.	N	--
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 multidisciplinary environments.	N	--
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.	S	Projects

III. HOW PROGRAM SPECIFIC OUTCOMES ARE ASSESSED

Program Specific Outcomes		Level	Proficiency assessed by
PSO1	**Professional Skills:** The ability to research, understand and implement computer programs in the areas related to algorithms, system software, multimedia, web design, big data analytics, and networking for efficient analysis and design of computer-based systems of varying complexity.	H	Lectures, Seminars
PSO2	**Problem-solving Skills:** The ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver a quality product for business success.	S	Projects
PSO3	**Successful Career and Entrepreneurship:** The ability to employ modern computer languages, environments, and platforms in creating innovative career paths, to be an entrepreneur, and a zest for higher studies.	S	Guest Lectures

N - None **S - Supportive** **H - Highly related**

IV. SYLLABUS

UNIT – I
INTRODUCTION

History of Data base Systems. Data base System Applications, data base System VS file System; Data Models: ER Model, relational model, other models; Database Languages: DDL, DML; Introduction to the Relational Model: Integrity constraint over relations, Enforcing integrity constraints, querying relational data, logical data base design; Introduction to Views: Destroying, altering tables and views; Introduction of object database systems: Structured data types, operations on structured data, encapsulation and ADTS, Inheritance.

UNIT – II
ORDBMS

Database design for ORDBMS, ORBMS implementation and challenges, OODBMS, comparison of RDBMS, OODBMS and ORDBMS. Introduction to Parallel databases, architectures for parallel databases, Parallel Query Evaluation: Data partitioning and parallelizing sequential operator evaluation code, parallelizing individual operations, and parallel query optimization.

UNIT – III
DISTRIBUTED DATABASES

Introduction to distributed databases: Features of distributed databases vs centralized databases, Why distributed databases.

DDBMS: Levels of transparency, reference architecture for DDB, types of data fragmentation, distribution transparency for read-only and update applications, distributed database access primitives, Integrity constraints in distributed databases.

UNIT – IV

DISTRIBUTED DATABASE DESIGN

Distributed database design: framework for distributed database design, the design of database fragmentation, allocation of fragments; Distributed Query processing: Equivalence of transformations for queries, transforming global queries into fragment queries, distributed grouping and aggregation functions, parametric queries.

UNIT – V

QUERY OPTIMIZATION

A framework for query optimization, join queries and general queries. non-join queries in a distributed DBMS, joins in a distributed DBMS, cost based query optimization. DBMS Vs IR systems, Introduction to Information retrieval, Indexing for text search, web search engine, managing text in a DBMS, a data model for XML, Querying XML data, and efficient evaluation of XML queries.

TEXT BOOKS

1. Raghuramakrishnan and Johannes Gehrke, "Database Management Systems", 3rd Edition, TMH, 2006.
2. S Ceri and G Pelagatti, "Distributed databases principles and systems", 1st Edition, TMH, 2008.

REFERENCE BOOKS

1. Silberschatz, Korth, "Database System Concepts", 6th Edition, TMH, 2010.
2. Elmasri R, Navathe S B, Somayajulu D V L N, and Gupta S K, "Fundamentals of Database Systems", 5th Edition, Pearson Education,2009.
3. C. J. Date, "Introduction to Database Systems", 8th Edition, Pearson Education, 2009.

V. COURSE PLAN

At the end of the course, the students are able to achieve the following course learning outcomes.

Lecture No.	Course learning outcomes	Topics to be covered	Reference
1 – 3	**Understand** the basic concepts of databases and different type s of data models, languages	**Introduction**: History of Data base Systems. Data base System Applications, data base System VS file System; Data Models: ER Model, relational model, other models; Database Languages: DDL, DML.	T1:1.1-1.2
4 – 6	**Describe** overall architecture of DBMS.	Introduction to the Relational Model: Integrity constraint over relations, Enforcing integrity constraints, querying relational data, logical data base design.	T1:2
7 – 9	**Understand** the basic concepts of object database systems.	Introduction to Views: Destroying, altering tables and views; Introduction of object database systems: Structured data types, operations on structured data, encapsulation and ADTS, Inheritance.	T2:2.1-2.2
10 – 13	**Understand** the basic concepts of ORDBMS, ORBMS and Parallel databases,	Database design for ORDBMS, ORBMS implementation and challenges, OODBMS, comparison of RDBMS, OODBMS and ORDBMS. Introduction to Parallel	T1:4

		databases, architectures for parallel databases, Parallel Query Evaluation.	
14 – 16	**Implementing** the concept of data portioning and parallel query optimization.	Data partitioning and parallelizing sequential operator evaluation code, parallelizing individual operations, and parallel query optimization.	T1:4
17 – 20	**Understand** the concepts of distributed databases.	Introduction to distributed databases: Features of distributed databases vs centralized databases, Why distributed databases. models, validating models.	T2: 6
21 – 22	**Understand** the concepts of data fragmentation and data integrity constraints in distributed database.	DDBMS: Levels of transparency, reference architecture for DDB, types of data fragmentation, distribution transparency for read-only and update applications, distributed database access primitives, Integrity constraints in distributed databases.	T2: 5
23 – 25	**Develop** and execute solutions to solve real-time applications using distributed datable and query processing.	Distributed database design: framework for distributed database design, the design of database fragmentation, allocation of fragments	T2:7
25 – 28		Distributed Query processing: Equivalence of transformations for queries, transforming global queries	T2:10
29 – 35	**Evaluate** join queries and general queries in distributed database.	A framework for query optimization, join queries and general queries. non-join queries in a distributed DBMS, joins in a distributed DBMS, cost based query optimization	T2:8 T2:3
35 – 38	**Understand** the importance and issues Information Retrieval.	DBMS Vs IR systems, Introduction to Information retrieval, Indexing for text search, web search engine	T1:6 T1:17
39 -- 42	**Understanding** the concept of querying XML data.	Managing text in a DBMS, a data model for XML, Querying XML data, and efficient evaluation of XML queries.	T1: 17
43 – 45			T1:16

XI MAPPING COURSE OBJECTIVES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

Course Objectives	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
I	H	H										S	H	H	
II		H	S		S								S	H	
III	S	H	S										H		S
IV	H	S											H	S	
V	H	S											H	S	S

S - Supportive **H - Highly related**

XII MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES ANDPROGRAM SPECIFIC OUTCOMES

Course Objectives	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	H			S									H	S	
2	S	H	S									S	H		S
3	S	H			S								S		
4	H			S								S	S	S	
5	S	H	S		S							S	H		S
6	H	S		S									S		
7	H				S							S	H	S	
8	H			S									H	S	
9	S	H	S									S	H		S

S - Supportive **H - Highly related**

Prepared by: Mr. C Raghavendra, Assistant Professor

HOD, CSE