

2021 Syllabus

Semester – I

Course Title	ADVANCED DATABASE MANAGEMENT SYSTEM
Total Hrs.	75
Hrs./Week	5
Sub.Code	21PCCS13
Course Type	DSC –III
Credits	4
Marks	100

General Objective:

To learn and apply knowledge of Database Management System in the emerging trends.

Course Objectives:

The learners will be able to:

CONo.	Course Objectives
CO-1	Describe the data models, the need for normalization and the various database architectures.
CO-2	Understand the architecture of the Parallel and Distributed databases.
CO-3	Apply the knowledge of the Parallel and Distributed databases to maintain an efficient database system.
CO-4	Employ the efficient database system for Big Data and Block Chain.
CO-5	Prepare themselves to advanced topics and techniques that pave the way for research.

UNIT I: DATABASE DESIGN

Relational Database Design: Features of Good Relational Designs - Decomposition Using Functional Dependencies - Normal Forms - Functional-Dependency Theory - **Algorithms for Decomposition Using Functional Dependencies** - Decomposition Using Multivalued Dependencies - Atomic Domains and First Normal Form.

UNIT II: PARALLEL AND DISTRIBUTED DATABASES

Database-System Architectures: Overview - Centralized Database Systems - Server System Architectures - Parallel Systems - Distributed Systems - Transaction Processing in Parallel and Distributed Systems. Parallel and Distributed Storage: Overview - Data Partitioning - Dealing with Skew in Partitioning - Replication - Parallel Indexing - Distributed File Systems - Parallel Key-Value Stores.

UNIT III: QUERY AND TRANSACTION PROCESSING

Query Processing: **Parallel Sort, Join** - Other Operations - **Parallel Evaluation of Query Plans - Query Processing on Shared-Memory Architectures** - Query Optimization for Parallel Execution - **Parallel Processing of Streaming Data** - Distributed Query Processing. Transaction Processing: Distributed Transactions - Commit Protocols -

Concurrency Control in Distributed Databases - Replication - Extended Concurrency Control Protocols - Replication with Weak Degrees of Consistency - Coordinator Selection.

UNIT IV: BIG DATA AND BLOCKCHAIN DATABASES

Big Data: Big Data Storage Systems - The MapReduce Paradigm - Beyond MapReduce: Algebraic Operations - Streaming Data - Graph Databases. Blockchain Databases: Blockchain Properties- Achieving Blockchain Properties via Cryptographic Hash Functions - Consensus - Data Management in a Blockchain - Smart Contracts - Performance Enhancement - Emerging Applications.

UNIT V: POSTGRESQL

Interacting with PostgreSQL - System Architecture - Storage and Indexing - Query Processing and Optimization - Transaction Management in PostgreSQL - SQL Variations and Extensions - Foreign Data Wrappers - PostgreSQL Internals for Developers.

TEXTBOOKS:

1. Abraham Silberschatz, Henry F Korth , S Sudarshan, “Database System Concepts”, 7th edition , McGraw-Hill Education, 2020.
Unit I: (Chapters 7), Unit IIⓈ Chapters 20, 21), Unit III: (Chapters 22, 23)
Unit IV:(Chapters 10, 26)

ONLINE RESOURCE(S):

1. <https://www.db-book.com/db7/online-chapters-dir/32.pdf>
Unit V: Chapters 32

REFERENCE BOOKS:

1. RamezElmasri, Shamkant B Navathe, “Fundamental of Database Systems”, Pearson, 7th edition 2016.
2. Thomas M. Connolly, Carolyn E. Begg., “Database Systems a practical approach to Design , Implementation and Management “, Pearson Education, 2015.

Semester – II

Course Title	ADVANCED JAVA PROGRAMMING
Total Hrs.	75
Hrs./Week	5
Sub.Code	21PCCS21
Course Type	DSC-IV
Credits	4
Marks	100

General Objective:

To learn and understand the advanced Java Programming such as JDBC, Servlet and JSP.

Course Objectives: The learners will be able to:

CONo.	Course Objectives
CO-1	Understand the concepts of Applet and Event Handling.
CO-2	Apply database connections with JDBC process.
CO-3	Compare the access of TCP/IP and UDP networks.
CO-4	Develop dynamic Web applications using Servlet.
CO-5	Design the web applications using JSP.

UNIT I: APPLET AND EVENT HANDLING

The Applet Class : Two Types of Applets - Applet Basics - The Applet Class - Applet Architecture - An Applet Skeleton - Simple Applet Display Methods - Requesting Repainting - Using the Status Window The HTML APPLET Tag - Passing Parameters to Applets - The AudioClip Interface - The AppletStub Interface - Outputting to the Console

Event Handling: Two Event Handling Mechanisms - The Delegation Event Model - Event Classes - The KeyEvent Class - The MouseEvent Class - The MouseWheelEvent Class - The TextEvent Class - The WindowEvent Class - Sources of Events - Event Listener Interfaces - Using the Delegation Event Model - Adapter Classes - Inner Classes

UNIT II: AWT AND ITS CONTROLS

Introducing the AWT: AWT Classes - Window Fundamentals – Working with Frame Windows - Setting the Window’s Dimensions - Hiding and Showing a Window - Creating a Frame Window in an AWT-Based Applet - Handling Events in a Frame Window - Creating a Windowed Program - Displaying Information Within a Window

Using AWT Controls, Layout Managers, and Menus: AWT Control Fundamentals – Labels - Using Buttons - Applying Check Boxes – CheckboxGroup - Choice Controls - Using Lists - Managing Scroll Bars - Handling Scroll Bars -Using a TextField - Using a TextArea - Understanding Layout Managers - Menu Bars and Menus - Dialog Boxes – FileDialog.

UNIT III: JDBC AND NETWORKING

Accessing Databases with JDBC: Introduction - Relational Databases -A books Database – SQL: Basic - Setting up a Java DB Database - Creating the Chapter’s Databases on Windows - Manipulating Databases with JDBC - Connecting to and

Querying a Database - Querying the books Database - RowSet Interface - PreparedStatements - Stored Procedures - Transaction Processing.

Networking : Networking Basics - The Networking Classes and Interfaces - InetAddress - Inet4Address and Inet6Address - TCP/IP Client Sockets - URL - URLConnection - HttpURLConnection - The URI Class - Cookies - TCP/IP Server Sockets - Datagrams – Remote Method Invocation (RMI).

UNIT IV: JAVA SERVLETS

Introduction: Servlets - Web Applications, Servlets and HTTP Servlets, Filters, Security, Internationalization - Servlet Life Cycle - Servlets for the World Wide Web - Requests, Responses, and Headers - GET and POST, HTTP Response Codes - Coding an HttpServlet - Deploying a Servlet, Web Application Deployment Descriptor Structure - Servlet Configuration - Limitations of Configuration: web.xml Additions, Client/Server Servlet Programming, HttpServletRequest and HttpServletResponse, HttpServletResponse - HttpServletRequest - ServletContext - Initial Web Application Parameters - Servlet Event Listeners.

UNIT V: JAVA SERVER PAGES

Java Server Pages: JSP 2.0 Specification - JSP Life Cycle - The Difference Between Servlets and JSP - JSP Syntax and Semantics - Elements and Template Data, Two Types of Syntax, Scripting Elements , Directives, JSP Configuration, Standard JSP Actions, Whitespace Preservation, Attributes, Comments, Quoting and Escape Characters. Implicit Objects - config, pageContext, out, page - JSP in XML Syntax - XML Rules - JSP Documents.

TEXTBOOKS:

1. Herbert Schildt, “Java the Complete Reference”, Oracle Press, 9th edition, 2014. Unit I(Chapter 23, 24), Unit II(Chapter25,26), Unit III(Chapter 22).
2. Paul Deitel and Harvey Deitel, “Java: How to Program”, Pearson Publication; 10th Edition, 2015.Unit III(Chapter 24)
3. Jayson Falkner, Kevin Jones, “Servlets and JavaServer Pages™: The J2EE™ Technology Web Tier”, Addison-Wesley Professional, 2004. Unit IVChapter 2), Unit V (Chapter 3)

REFERENCE BOOKS:

1. Herbert Schildt, “Java: A Beginner Guide”, Oracle Press, 8th Edition, 2018.
2. Murach’s, “Java Servlets and JSP”, Mike Murach& Associates Publishers, 2nd Edition, 2014.

Semester – II

Course Title	COMPILER DESIGN
Total Hrs.	60
Hrs./Week	4
Sub.Code	21PECS21B
Course Type	DSE-2B
Credits	4
Marks	100

General Objective:

To understand the basic principles, algorithms, data structures and phases of Compiler Design.

Course Objectives:

The learners will be able to:

CONo.	Course Objectives
CO-1	Understand the basic knowledge of various compilation steps.
CO-2	Apply the syntax for different type of grammar
CO-3	Analyze the concept of semantic for regular expressions.
CO-4	Decide the structure of intermediate code generation
CO-5	Compile the intermediate code generation in the run-time environment

UNIT I: LEXICAL ANALYSIS

Language Processors, The Structure of a Compiler, Parameter passing mechanism – Symbol table - The role of the lexical analyzer - Input buffering - Specification of tokens - Recognition of tokens – Finite automata - Regular expression to automata.

UNIT II: SYNTAX ANALYSIS

The role of the parser - Context-free grammars - Writing a grammar - Top down Parsing - Bottom-up Parsing - LR parsers- LALR parsers.

UNIT III: SEMANTIC ANALYSIS

Inherited and Synthesized attributes – Dependency graphs – Ordering the evaluation of attributes – S- attributed definitions – L-attributed definitions – Applications of Syntax Directed translation – Syntax Directed translations schemes - Storage organization – Stack allocation of space.

UNIT IV: INTERMEDIATE CODE GENERATION

Variants of Syntax trees – Three Address code – Types and Declarations - Translation of Expressions – Type checking - Control flow - Back patching - Switch Statements - Procedure calls.

UNIT V: CODE GENERATION AND CODE OPTIMIZATION

Issues in the design of a code generator - The target language – Address in the Target Code – Basic Block and Flow graphs – Optimization of Basic Blocks - A simple code generator – Peephole Optimization.

TEXT BOOK(S):

1. Alfred V. Aho, Monica S.Lam, Ravi Sethi and Jeffrey D. Ullman, “Compilers- Principles, Techniques and Tools”, Second Edition, Pearson Education Asia, 2009. Unit 1 –(Chapter 1, 2, 3), Unit 2 –(Chapter 4), Unit 3 –(Chapter 5, 7) Unit 4 – (Chapter 6, 8), Unit 5 –(Chapter 8)

REFERENCE(S):

1. A.V. Aho, Ravi Sethi, J.D. Ullman, Compilers-Principles, Techniques and Tools, Addison- Wesley, 2003.
2. Fischer Leblanc, Crafting Compiler, Benjamin Cummings, Menlo Park, 1988.
3. Kenneth C.Louden, Compiler Construction Principles and Practice, Vikas publishing House, 2004.
4. Allen I. Holub, Compiler Design in C, Prentice Hall of India, 2001.
5. S.GodfreyWinster, S.Aruna Devi, R.Sujatha, “Compiler Design”, yesdee Publishers, Third Reprint 2019.

Semester – III

Course Title	ARTIFICIAL INTELLIGENCE
Total Hrs.	60
Hrs./Week	4
Sub.Code	21PECS31A
Course Type	DSE-3A
Credits	4
Marks	100

General Objective:

To provide a strong foundation of fundamental concepts in Artificial Intelligence, Natural Language Processing and fuzzy sets.

Course Objectives: The learners will be able to:

CO No.	Course Objectives
CO-1	Discuss the concepts of Artificial Intelligence.
CO-2	Examine the methods of solving problems using Artificial Intelligence.
CO-3	Describe the concepts of Predicate Logic
CO-4	Outline the leading trends and systems in NLP
CO-5	Relate the basic concepts of modelling in systems using fuzzy sets

UNIT I: APPROACHES TO AI

What is Artificial Intelligence? : – The AI Problems – What is an AI Techniques? – Problems, Problems spaces and search: Defining the Problems as a State Space Search – Production Systems – Problem Characteristics – Production System Characteristics – Issues in the Design of Search Programs

UNIT II: KNOWLEDGE REPRESENTATION

Heuristic Search Techniques: Generate and Test – Hill Climbing – Best-First Search – Problem Reduction – Constraint Satisfaction – Means Ends Analysis – Representation and Mappings – Approaches to Knowledge Representation – Issues in Knowledge Representation.

UNIT III: PREDICATE LOGIC

Representing Simple facts in Logic – Representing Instance and Is a relationships – Computable functions and Predicates – Resolutions – Natural Deductions – Representing Knowledge Using Rules: Procedural versus Declarative Knowledge – Forward versus Backward Reasoning – Matching – Control Knowledge.

UNIT IV: PLANNING AND NATURAL LANGUAGE PROCESSING

The Minimax Search Procedure – Adding Alpha-beta Cutoffs – Iterative Deepening – Planning: Components of a Planning System – Goal Stack Planning – Nonlinear Planning Using Constraint Posting – Hierarchical Planning – Natural Language Processing.

UNIT V: FUZZY SETS

Introduction to Fuzzy logic – Classical Sets - Fuzzy Sets – Classical Relations - Fuzzy Relations - Membership Functions – Fuzzification – **Methods of Membership Value Assignments** –Defuzzification Methods – **Fuzzy Inference Systems – Fuzzy Decision Making – Fuzzy Logic Control Systems**

TEXT BOOK(S):

1. Elaine Rich, Kevin Knight, “Artificial Intelligence”, 3/e, TataMcGraw Hill Publishing Ltd., - New Delhi, 1991. Unit I – (Chapter 1,2), Unit II-(Chapter 3, 4), Unit III- (Chapter 5, 6), Unit IV –(Chapter 12, 13, 15),
2. S.N Sivanandam S.N Deepa “Principles of Soft Computing”, 3/e Wiley –India, 2007. Unit V- (Chapter 10, 11, 12, 13, 15.8, 16, 17)

REFERENCE(S):

1. Introduction to Artificial Intelligence and Expert Systems, Dan W.Patterson, Prentice Hall of India, New Delhi, 1992
2. Artificial Intelligence, A Modern Approach, Stuart J. Russell and Peter Norvig, Pearson Education, reprint 2003.
3. Introduction to Expert Systems, 3/e, Peter Jackson, Pearson Education, Reprint 2003
4. Artificial Intelligence, A New Synthesis, Nils J. Nilsson Harcourt Asia Pvt. Ltd., 1998

Semester – IV

Course Title	INTERNET OF THINGS
Total Hrs.	75
Hrs./Week	5
Sub. Code	21PCCS41
Course Type	DSC-X
Credits	4
Marks	100

General Objective:

To understand the concept of Internet of Things to develop IoT Devices for the real-time applications.

Course Objectives:

The learners will be able to:

CONo.	Course Objectives
CO-1	Understand the fundamentals of Internet of Things
CO-2	Illustrate the various types of IoT architecture
CO-3	Organize the different types of IoT protocols to maintain IoT standards.
CO-4	Differentiate between the Web of Things and IoT.
CO-5	Produce the IoT devices for Industry applications.

UNIT I: INTRODUCTION To IoT

Internet of Things - Physical Design- Logical Design- IoT Enabling Technologies - IoT Levels and Deployment Templates - Domain Specific IoTs - IoT and M2M - IoT System Management with NETCONF-YANG- IoT Platforms Design Methodology.

UNIT II: IoT ARCHITECTURE

M2M high-level ETSI architecture - IETF architecture for IoT - OGC architecture - IoT reference model - Domain model - information model - functional model - communication model - IoT reference architecture

UNIT III: IoT PROTOCOLS

Protocol Standardization for IoT – Efforts – M2M and WSN Protocols – SCADA and RFID Protocols – Unified Data Standards – Protocols – IEEE 802.15.4 – BACNet Protocol – Modbus– Zigbee Architecture – Network layer – 6LowPAN - CoAP – Security

UNIT IV: WEB OF THINGS

Web of Things versus Internet of Things – Two Pillars of the Web – Architecture Standardization for WoT– Platform Middleware for WoT – Unified Multitier WoT Architecture – WoT Portals and Business Intelligence. Cloud of Things: Grid/SOA and Cloud Computing – Cloud Middleware – Cloud Standards – Cloud Providers and Systems – Mobile Cloud Computing – The Cloud of Things Architecture.

UNIT V: APPLICATIONS

The Role of the Internet of Things for Increased Autonomy and Agility in Collaborative Production Environments - Resource Management in the Internet of Things: Clustering, Synchronisation and Software Agents. Applications - Smart Grid - Electrical Vehicle Charging.

TEXT BOOK(S):

1. ArshdeepBahga, Vijay Madiseti, "Internet of Things – A hands- on approach", Universities Press, 2015.
2. Dieter Uckelmann, Mark Harrison, Michahelles, Florian (Eds), "Architecting the Internet of Things", Springer, 2011.
3. Jan Ho" ller, VlasiosTsiatsis , Catherine Mulligan, Stamatis , Karnouskos, Stefan Avesand. David Boyle, "From Machine-to- Machine to the Internet of Things - Introduction to a New Age of Intelligence", Elsevier, 2014.
4. Networks, Crowds, and Markets: Reasoning About a Highly Connected World - David Easley and Jon Kleinberg, Cambridge University Press - 2010.
5. Olivier Hersent, David Boswarthick, Omar Elloumi , "The Internet of Things – Key applications and Protocols", Wiley, 2012.
6. The Internet of Things in the Cloud - A Middleware Perspective By Honbo Zhou Copyright Year 2013