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To be implemented from 2020 - 2021
Department of Computer Science & Engineering

Class: - **TY B. Tech**	Semester - **V**	**L**	**T**	**P**	**Credits**
Course Code: **CS3012**	Course Name: **Database Management Systems**	3	-	-	3

Course Description:

The Database Management System course is designed to learn development of back end of any application software. This course aims to study various concepts related Database Management system like database design, Normalization and implementation using SQL and PL/SQL. Also, the course focuses on issues related to storage management, transaction management and concurrency control.

Course Learning Outcomes:

After successful completion of the course, students will be able to:

1. Describe the purpose and nature of database system for storing and fast access to the data
2. Sketch E-R models to represent simple database application scenarios
3. Apply relational database design concepts to remove data redundancy and to retrieve data easily
4. Write the queries to manipulate and access data using procedural and non-procedural Languages
5. Explain various protocols, issues and techniques related to transaction management for consistent & stable database

Prerequisites:

➤ Basic knowledge of File System & Client Server architecture.
➤ Basic knowledge of Data structure related concepts.

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	Course Content	
Unit No	**Description**	**Hrs**
1	**Introduction to database concepts and data model** Purpose of Database Systems, Data abstraction, Data Models, Overall System Design, Entities and Entity sets, Mapping Constraints, E-R Diagram, Reducing E-R Diagrams to Tables, Generalization, specialization and Aggregation, Relational Algebra, Tuple Calculus.	06
2	**SQL and PL/SQL** Introduction to SQL and PL/SQL, Set operations, Joins, Aggregate operations, Nested queries etc., PL/SQL Cursor, stored procedure and Trigger.	06
3	**Relational Database Design** Domain Constraints, Referential Integrity, Functional Dependencies, Canonical cover, Pitfalls in Relational Database Design, Decomposition and Normalization using Functional Dependencies.	06
4	**Storage and File Structure** Physical storage media, Magnetic Disk, RAID, Tertiary storage, Storage access, File Organization, Organization of Records in Files, Data Dictionary Storage.	04
5	**Indexing and Hashing** Basic Concepts, Indexing, B+ Tree Index Files, B-Tree Index Files, Static Hash Functions, Dynamic Hash Functions, Comparison of Indexing and Hashing, Multiple Key Accesses.	06
6	**Concurrency Control and Database Security, Crash Recovery** Transaction concept, Transaction state, Concurrent Executions, Serializability, Testing for Serializability, Lock-Based Protocols, Graph based Protocols, Time-Stamp Based Protocols, Validation Techniques and Multiple Granularity, Failure Classification, The storage structure, Log-Based Recovery, Buffer Management, Checkpoints, Shadow Paging, Database Security, SQL injection attack.	08

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References -

Text Books:

1. F. Korth, Abraham Silberschatz, Sudarshan, "Data Base System Concept" (McGraw Hill Inc.)

2. Ram Krishnan and Johanses Gehrke, "Database Management System" (McGraw Hill Inc.)

Reference Books:

1. J.D. Ullman, "Principles of DataBase Systems", Galgotia Publications.

2. Wiederhold,l "Database Design", McGraw Hill Inc.

3. Masri, Navathe, "Fundamentals of Database Systems", Bengamin Cummings Publications.

4. Michael V, "Database design, application development & administration", Mannino's Publications.

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Class: - TY B. Tech	Semester - V	L	T	P	Credits
Course Code: **CS3032**	Course Name: **System Software**	3	-	-	3

Course Description:

The purpose of this course is to provide students to understand the design of various system-level programs related to assembler, loader, macro, compiler. It aims to provide a platform for understanding and applying various running system software's & programming language processing. To learn compiler parsing techniques, construction of abstract syntax trees, symbol tables, intermediate machine representations and actual code generation. It understands and appreciate principle engineering of compilers through a focus on fundamental rather than advanced compilation techniques.

Course Learning Outcomes:

On successful completion of course, the student should able to:

1. Explain the role of system programs in development phase and able to apply appropriate knowledge of computing
2. Illustrate the logical analysis & design aspect of macro with macro preprocessing activities
3. Determine the aspect of language processing from linker and loaders perspective
4. Analyze different phases of compilers and practice the compiler construction tools such as LEX and YACC to build systems program modules
5. Design an effective intermediate and optimized code generator
6. Describe the various properties of optimization and generation

Prerequisites:

➢ Need to have basic knowledge of programming language & its processing forms.
➢ Need to have knowledge of operating system & its low-level forms.

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Course Content		
Unit No	**Description**	**Hrs**
1	**Introduction to System Software and Assemblers:** Introduction to system software, goals, system programs, language processing activities, fundamentals of language processing, fundamentals of language specification, elements of assembly language programming, simple assembly scheme, pass structure of assemblers, design of two pass assembler, single pass assembler.	06
2	**Macros and Macro Processors:** Macro definition and call, macro expansion, nested macro calls, advanced macro facilities, design of a macro pre-processor.	06
3	**Linkers and Loaders:** Relocation and linking, design of a linker, self-relocating programs, linker for MS DOS, linking for overlays, loaders.	06
4	**Introduction of Compilers:** Phases of the compiler, scanning- role of lexical analyzer, parsing-programming language grammars, language processor development tools (LEX, YACC).	06
5	**Intermediate Code Generation:** Directed acyclic graphs, three-address code Intermediate languages - Declarations, Assignment Statements, Boolean Expressions, Array references, Back patching.	06
6	**Code Optimization and Generation:** Sources of optimization, Basic blocks and Flow graphs, optimization of basic blocks, Loops in flow graphs, Code improving transformations, Issues in the design of a code generator, run time storage management, Next-use information, Peephole optimization, Code generation algorithm.	06

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References –

Textbooks:

1. "System Programming and Operating Systems", D.M. Dhamdhere, Tata McGraw-Hill Edition.
2. "System Software", Santanu Chattopadhyay, Prentice-Hall India.
3. "Compilers: Principles, Techniques, and Tools", Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffrey D. Ullman, Pearson Education Asia.

Reference Books:

1. "System Software: An Introduction to Systems Programming" Leland L. Beck, Person Education.
2. "Crafting A Compiler with C", Charles Fischer, Richard LeBlanc (Pearson publication) (For practical use only).
3. "LINUX System Programming" Robert Love O'Reilly.

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Class: - **TY B. Tech**	Semester - **V**	L	T	P	Credits
Course Code: **CS3052**	Course Name: **Design & Analysis of Algorithms**	3	-	-	3

Course Description:

The Design and Analysis of Algorithm is concerned with solving problems by designing a solution in terms of algorithm and also analyzing performance to check the efficiency of an algorithm. This course provides an overview of different algorithm strategies like DAC, Greedy Method, Dynamic Programming and Branch Bound. In spite of this, it also covers the nondeterministic algorithm and limitations of computer algorithms and how it can be solved using randomized algorithms and proving NP-Completeness.

Course Learning Outcomes:

After successful completion of the course, students will be able to:

1. Study basic algorithmic strategies
2. Analyze the performance or complexity of algorithms
3. Identify appropriate algorithm design techniques for solving problems
4. Design an algorithm to solve problem in systematic way
5. Explain non-deterministic and randomized algorithms

Prerequisites:

- Basic knowledge of Data Structure
- Basic knowledge of Fundamentals C Programming Language
- The knowledge about basic proof techniques, logarithms, Mathematics etc.

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Course Content		
Unit No	**Description**	**Hrs**
1	**Fundamentals of Algorithms and Performance Analysis** Algorithm definition, Algorithm Specification, Performance Analysis-Space complexity, Time complexity, Randomized Algorithms. Divide and conquer-General method, applications -Binary search, Merge sort, Quick sort.	06
2	**Greedy Method** General method, Applications–Knapsack problem, Job sequencing with deadlines, Minimum cost spanning trees, Single source shortest path problem.	06
3	**Dynamic Programming** General Method, Applications– Multistage graph, All pairs shortest path problem, Optimal binary search trees, 0/1 knapsack problem, Reliability design, Traveling sales person problem.	06
4	**Backtracking** Graph Traversing Techniques–Breadth first search, Depth First Search, Finding articulation point. Backtracking-General method, Applications—The N-queen problem, sum of subsets problem, graph coloring, Hamiltonian cycles.	06
5	**Branch and Bound** General Method, Applications– 0/1 Knapsack problem, LC Branch and Bound solution, FIFO Branch and Bound solution, Traveling sales person problem.	06
6	**NP-Hard and NP-Complete problems** Non-deterministic algorithms, Randomized and probabilistic algorithms, Monte Carlo and Las Vegas Algorithms, NP -Hard and NP-Complete classes, Proof of completeness, Reducibility, Cook's theorem.	06

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References -

Text Books:

1. Ellis Horowitz, Sartaj Sahni and S. Rajasekharan, Fundamentals of Computer Algorithms, Computer Science Press.

2. P. H. Dave, H. B. Dave, Design and Analysis of Algorithms, Pearson Education.

Reference Books:

1. Cormen, Leiserson, Rivest, and Stein, Introduction to Algorithms, MIT Press.

2. Aho, Ullman and Hopcroft, Design and Analysis of algorithms, Pearson Education.

3. R. Neapolitan and K. Naimipour, Jones and Bartlett Student edition, Foundations of Algorithms, eBook.

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Class: - TY B. Tech	Semester - V	L	T	P	Credits
Course Code: CS3072	Course Name: **Open Source Technologies**	2	-	4	4

Course Description:

This course in an introduction to Python programming. Python programming language is becoming popular day by day. In advanced domains like Artificial Intelligence, Machine Learning and Deep Learning, Python is extensively used. Python is amongst top programming languages considered for development.

Course Learning Outcomes:

After successful completion of the course, students will be able to:

1. Apply fundamentals of Python to solve real world problems
2. Use appropriate control structures in Python to optimize the program
3. Apply the knowledge of File Operations to read and write files using Python
4. Apply Object Oriented Programming concepts using Python for real world problems
5. Develop a program in Python to handle the exceptions
6. Demonstrate the knowledge of RDBMS and Python programming to build database-based applications

Prerequisites:

➤ Basic knowledge of Programming
➤ Basic knowledge of Operating Systems

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Course Content		
Unit No	**Description**	**Hrs**
1	**Introduction to Python:** Installation and Working with Python, Python variables, Operators, Data Types, String, List and Dictionary Manipulations.	02
2	**Control structures:** Conditional blocks using if, else and elif, for loops, for loop using ranges, string, list and dictionaries, while loops, loop manipulation using pass, continue, break and else, functions.	05
3	**File Operations:** Reading config files in python, writing log files in python, read functions, read(), readline() and readlines(), write functions, write() and writelines(), manipulating file pointer using seek, file operations.	04
4	**Object Oriented Programming – OOPs** Concept of class, object and instances, constructor, class attributes and destructors, real time use of class in live projects, inheritance, overlapping and overloading operators, multithreading.	05
5	**Exception Handling:** Avoiding code break using exception handling Safe guarding file operation using exception handling, Handling and helping developer with error code, Programming using Exception handling.	04
6	**Database Interaction:** Introduction, database connections, executing queries, transactions, handling error	04

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References -

Text Books:

1. Head First Python, O'Reilly Media, Paul Barry

2. Learn Python the Hard Way: Zed Shaw's Hard Way, Addison Wesley

Reference Books:

1. The Complete Reference Python, McGraw Hill Education

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Class: - TY B. Tech	Semester - V	L	T	P	Credits
Course Code: **CS3092**	Course Name: **Web Technology**	2	-	4	4

Course Description:

This course teaches techniques for the designing applications for World Wide Web that applications generally utilize a server and a client (web browser). Also provides information about web technologies that relate to the interface between web servers and their clients. This subject contains client-side technologies like JavaScript, AngularJS and server-side technology i.e. PHP.

Course Learning Outcomes:

After successful completion of the course, students will be able to:

1. Design static and dynamic web pages using scripting languages like HTML and CSS
2. Develop a dynamic web application using JavaScript and jQuery to demonstrate data validation
3. Demonstrate knowledge of AngularJS by designing dynamic web applications
4. Develop a server-side web application using PHP
5. Implement advanced PHP libraries for feature rich web application
6. Demonstrate the knowledge of advanced PHP using standard PHP frameworks

Prerequisites:

➢ Knowledge of Markup Language.
➢ Understanding of programming concepts.

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\multicolumn{3}{c}{**Course Content**}		
Unit No	**Description**	**Hrs**
1	**HTML5 and Bootstrap:** Introduction to Web, HTML 5, working of HTML 5, tags, CSS 3.0, classes border, margin, padding, background, tables aligns, bootstrap.	04
2	**JavaScript and jQuery:** JavaScript, variables, operators, data types, functions, objects, events, jQuery, selectors, events, effects, animation, ajax.	04
3	**AngularJS:** The Basics of AngularJS, How Web Pages Get to Your Browser, What Is a Browser, What Is AngularJS, Data Binding and Your First AngularJS Web Application. Modules, Scopes, Controllers, Expressions, Filters, Introduction to Directives, Built-In Directives.	04
4	**Introduction to PHP:** Introduction, Installation, Variables, Comments, Data types, Conditional and Looping structure, Operators functions, Arrays and Object-oriented programming in PHP.	03
5	**Advanced PHP:** Super global variables, Input controls and Validation functions, Session Management, Database handling in PHP, JPGraph, GDLibrary.	04
6	**PHP Framework:** MVC architecture concept, Framework installation, Routing Basics, Creating Controller, Creating View, Creating Model, Laravel framework.	05

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References -

Text Books:

1. HTML5 Black Book: Covers CSS3, Javascript, XML, XHTML, Ajax, PHP and Jquery", Kogent Learning Solutions Inc. Dreamtech Press
2. Html, Xthml, CSS & XML by Example", Teodore Gugoiu Publication -FIREWAL MEDIA
3. Laravel 5 Essentials, Martin Bean, PACKT publication

Reference Books:

1. "Beginning PHP5", Dave W. Mercer, Allan Kent, Steven D. Nowicki, David Mercer, Wrox Publication
2. "Commence Web Development with PHP and MySQL", Sagar S. Sawant & Ashwini B. Patil, Aruta Publication
3. "Real-World Solutions for Developing High-Quality PHP Frameworks and Applications", Sebastian Bergmann, Stefan Priebsch, Wrox

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Class: - **TY B. Tech**	Semester - **V**	**L**	**T**	**P**	**Credits**
Course Code: **CS3112**	Course Name: **Mobile Application Development**	**2**	**-**	**4**	**4**

Course Description:

Mobile application development covers theory and technologies for the development of distributed applications for mobile devices as well as introducing design principles for applications for small devices. It addresses android for mobile devices. The subject also provides a basis for understanding how different techniques can be used to develop distributed mobile applications. The core modules of this course include designing, developing, testing, signing, packaging and distributing high quality mobile apps. This course aims to teach mobile application development using Android as the development platform.

Course Learning Outcomes:

After successful completion of the course, students will be able to:

1. Setup the Android development environment
2. Utilize the appropriate User Interface controls in Android app
3. Implement SQLite and Shared Preferences concepts to store data in Android app
4. Implement Location and Notification based functionalities in Android app
5. Design and develop a WebView based Android app
6. Build and deploy Android app on Google Play Store
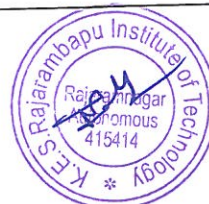

Prerequisites:

➢ Basic knowledge of Programming
➢ Basic knowledge of android mobile phone

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Course Content		
Unit No	**Description**	**Hrs**
1	**Introduction to Android** OOPs, Basics of Java, Basics of Bootstrap, Android introduction (History, Growth, Features, importance of android in Mobile World). Introduction to Android Development (History, Architecture, Core Building Blocks, SDK, Eclipse, Android Studio), installing android studio and setting up SDKs and Emulator. (Environment Setup). Creating First Android App (Hello Android App, Check Android Project Structure, Android Manifest, Understanding Build Process with Gradle, Debugging with Android Monitor in Android Studio).	04
2	**Android Basics and Android UI (Layouts and Widgets)** Android Activity, Intent, Intent Filters, Services, Broadcast Receivers, Content Providers, Fragments. Android UI - View, Layouts, Layout Controls, Widgets. (Gridview, ListView, RecyclerView, Menus are important parts), Defining Styles and Themes, Events Handling with Android Layouts, Passing Data between android activities, Android Manifest and Gradle Files.	04
3	**Android Storage and Database Connection (SQLite)** Preferences, Internal and External Storage, SQLite class, uses, Database Creation and Connection, SQLite operations (Insert, Update Delete etc.), Networking with Android (Simple Chat Application).	04
4	**Android Services, Notifications and Multimedia** Android Services Introduction. (Lifecycle and Implementation), Location Based Services. (Google maps and location services), Notifications (Implementation, Google Cloud Messaging), Multimedia (Audio/video player), Android Content Providers.	04
5	**Android Web Services and Introduction to Frameworks** Android WebView and WebView controls, Introduction to JSON, XML and Parsing, Third Party Frameworks - Bootstrap, jQuery Mobile, W3.css, Cordova, Ionic, Introduction of PhoneGap Content Management Systems	04

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	(CMS) (WordPress, Drupal, Joomla) Creating an app with WebView, frameworks and CMS.	
6	**Building, Debugging, Testing, Publishing and Analyzing App** Signing Android Applications, Versioning and GIT, Debugging with Android Monitor (Android Studio), Testing Android App (Junit), Publishing Android App (Introduction to Google Play, Google Play Developer Console, Marketing (AdWords), Earning with Android (Google AdSense), Analyzing Application (Google Firebase introduction)	04

References -

Text Books:

1. Mobile application development – Anubhav Pradhan, Anil V Deshpande
2. Teach Yourself Android Application Development In 24 Hours –Lauren Darcy, Shane Conder, SAMS Publication
3. Android Application Development All in one for Dummies -Barry Burd, Wileys Publication.
4. Android Programming: The Big Nerd Ranch Guide (Big Nerd Ranch Guides) Kindle Edition

Reference Books:

1. Android Essential –Chris Haseman, Apress Publication
2. The Android Developer's Cookbook, J. Steele, N. To, Addison-Wesley
3. Programming Android: Java Programming for the New Generation of Mobile Devices, O' Reilly.
4. Professional Android 2 Application Development, R. Meier, Wiley
5. Android Wireless Application Development, Second Edition, Shane Conder, Lauren Darcey, Addsion Wesely.

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Class: - TY B. Tech	Semester - V	L	T	P	Credits
Course Code: **CS3132**	Course Name: **Network Programming**	2	-	4	4

Course Description:

The course introduces network programming concepts. It gives an overview of the principles of computer networks, including an overview of the OSI reference model and various popular network protocol suites. It concentrates on implementing socket programming for various networking protocols using TCP and UDP. It also covers programming of inter-process communication (IPC) and remote procedure calls.

Course Learning Outcomes:

After successful completion of the course, students will be able to:

1. Show various concepts related with network programming using C, C++.
2. Implement Socket programming in C++ using different Socket options.
3. Exhibit TCP Client Server communication using network programming.
4. Demonstrate UDP socket programming and Name resolutions.
5. Apply inter-process communication and RPC in given context.

Prerequisites:

➢ Basic knowledge of Computer Networks and Unix systems.
➢ Basic knowledge of C, C++ and Linux shell scripting.

Course Content		
Unit No	Description	Hrs
1	**Introduction to Network Programming**	04

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	OSI model, Unix standards, TCP and UDP & TCP connection establishment and Format, Buffer sizes and limitation, standard internet services, Protocol usage by common internet application.	
2	**Sockets** Address structures, value – result arguments, Byte ordering and manipulation function and related functions Elementary TCP sockets – Socket, connect, bind, listen, accept, fork and exec function, concurrent servers. Close function and related function	04
3	**TCP Client Server** Introduction, TCP Echo server functions, Normal startup, terminate and signal handling server process termination, Crashing and Rebooting of server host shutdown of server host.	04
4	**I/O Multiplexing and Socket Options** I/O Models, select function, Batch input, shutdown function, poll function, TCP Echo server, getsockopt and setsockopt functions. Socket states, Generic socket option IPV6 socket option ICMPV6 socket option IPV6 socket option and TCP socket options	04
5	**UDP Sockets and Name and Address Conversions** Introduction UDP Echo server function, lost datagram, summary of UDP example, Lack of flow control with UDP, determining outgoing interface with UDP, DNS, gethost by Name function, Resolver option, Function and IPV6 support, uname function, other networking information	04
6	**Inter-process Communication and RPC** Introduction, File and record locking, Pipes, FIFOs streams and messages, Name spaces, system IPC, Message queues, Semaphores, Terminal line disciplines, Pseudo-Terminals, Terminal modes, Control Terminals, rlogin Overview, RPC Transparency Issues.	04

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References -

Text Books:

1. UNIX Network Programming, Vol. I, Sockets API, W.Richard Stevens, Pearson Edn. Asia.

2. UNIX Network Programming, W.Richard Stevens. PHI.

Reference Books:

1. UNIX Systems Programming using C++ T CHAN, PHI.

2. UNIX for Programmers and Users, Graham GLASS, King abls, Pearson Education

3. Advanced UNIX Programming M. J. ROCHKIND, Pearson Education