Semester-V

S.No.	Course Type	Course Code	Course Title	Hrs./ Week			Credits
				L	T	P	
1	PCC	CS07	Database Management System	2	1	-	3
2	PCC	CS08	Operating System	2	1	-	3
3	PCC	CS09	Theory of Computation	3	-	-	3
4	PCC	CS10	Software Engineering & Project Management	3	-	-	3
5	HSMC	HS06	Humanities and Social Sciences Open Courses - II	2	-	-	2
6	IFC	EC01	Interdisciplinary Foundation Course-II	2	-	-	2
7	LC	CS07(P)	Database Management System Lab	-	-	4	2
8	LC	CS08(P)	Operating System Lab	-	-	2	1
9	SBC	CS03(P)	Web Development Technologies	-	-	2	1
10	PROJ	CS02	Mini Project	–	–	4	2
11	PROJ	-	Internship-I	Credits to be added in Sixth Semester.			
12	LLC	LLC03	Liberal Learning Course -III	Credits to be added in Sixth Semester.			
13	MLC	MLC03	Environmental Studies	1	-	-	Audit
						Total Credits	22

Humanities and Social Sciences Open Courses (HSMC) – II, HS06 (Any One Course)
(A) Industrial Safety and Psychology
(B) Project Management
(C) Business Communication

Interdisciplinary Foundation Course(IFC)-II, EC01 (Offered by Electronics & Communication Department)

- **Sensors and Automation**

Liberal Learning Course-III, LLC03 (Any One Course from NCC/NSO/NCA**)**
Note: pool of choices will be the same as in LLC01 and LLC02.

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V-Semester

PCC-CS07	Database Management System	2L: 1T:0P (3 hrs.)	3 credits

Prerequisite: None

CourseObjective:

The main objective of this course is to understand fundamental of database management system.

Course Contents: (45 Hrs.)

Module 1: **(08hrs.)**

DBMS Concepts and architecture Introduction, Database approach v/s Traditionalfile accessing approach, Advantages, of database systems, Data models, Schemas and instances, Data independence, Data Base Language and interfaces,Overall Database Structure, Functions of DBA and designer, ER data model: Entitles and attributes, Entity types, Defining the E-R diagram, Concept of Generalization, Aggregation and Specialization. Transforming ER diagram in to the tables. Various other data models object- oriented data Model, Network data model, and Relational data model, Comparison between the three types of models.

Module 2: **(10 hrs.)**

Relational Data models: Domains, Tuples, Attributes, Relations, Characteristics of relations, Keys, Key attributes of relation, Relational database, Schemas, Integrity constraints. Referential integrity, Relational algebra and Relational algebra operations like select, Project, Join, Division, union. Relational calculus: Tuple oriented and domain oriented relational calculus and its operations.

SQL: SQL queries, Data extraction from single, multiple tables, DDL, DML, integrity constraints,various joins: natural join, equi- join, self - join, outer join. Usage of like, any, all, exists, in Special operators, Complex queries;

Module 3: **(9 hrs.)**

Data Base Design: Introduction to normalization, Normal forms, Functional dependency, Decomposition, Dependency preservation and lossless join, problems with null valued and dangling tuples, multi-valued dependencies. Query Optimization : Introduction, steps o f optimization, various algorithms to implement select, project and join operations of relational algebra, optimization methods: heuristic based, cost estimation based.

Module4: (09hrs.)

Transaction Processing Concepts: -Transaction system, Testing of Serializability, Serializability of schedules, conflict & view serializable schedule, recoverability, Recovery from transaction failures. Log based recovery. Check points deadlock handling. ConcurrencyControl Techniques: Concurrency Control, locking Techniques for concurrency control, time stamping protocols for concurrency control, validation based protocol,multiplegranularity. Multi version schemes, Recovery with concurrent transaction.

Module 5: (09 hrs.)

SQL/MySQL: Architecture, physical files, memory structures, background process. Concept of table spaces, segments, extents and block. Cursor management: nested and parameterized cursors, Oracle exception handling mechanism. Stored procedures, in, out, in out type parameters, usage of parameters in procedures. User defined functions their limitations. Triggers, mutating errors, instead of triggers.

Course Outcomes:

1. Describe basic concepts of DBMS and Explain ER model.
2. Solve queries using Relational Algebra, Relational Calculus and SQL.
3. Explain database schema and discuss the Query optimization methods.
4. Describe transaction processing, concurrency control and recovery technique.
5. Analyze the Various DBMS software like Oracle, SQL/PL SQL etc.

List of Text / Reference Books:

1. Date C J, “An Introduction to Database System”, Pearson Educations, 8th Edition,2003.
2. Korth, Silbertz,Sudarshan, “Fundamental of Database System”, McGraw Hill,5th Edition,2006.
3. Peter Rob, “ Data Base System:Design Implementation & Management”, Cengage Learninig 4th Edition,2000.
4. Elmasri, Navathe, “Fundamentals of Database Systems”, Pearson Educations,7th Edition 2017.
5. Atul Kahate ,“ Introduction to Database Management System”, Pearson Educations,2004.
6. Oracle 9i Database Administration Fundamental-I, Volume I, Oracle Press, TMH.
7. Paneerselvam,”DataBase Management System”, PHI Learning,3rd Edition,2018.
8. J. D. Ullman, “Principles of Database and Knowledge – Base Systems”, Computer Science Press,2nd Edition 1988.
9. Serge Abiteboul, Richard Hull, Victor Vianu,“Foundations of Databases”, Addison-Wesley,1995

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PCC-CS08	Operating System	3L:0T:0P(3hrs.)	3 credits

Prerequisite: Computer Organization & Architecture

Course Objective:

This Course provides a comprehensive introduction of Operating System, Process Management, Memory Management, File Management and I/O management.

Course Contents: (40 Hrs.)

Module 1: **(06 hrs.)**

Introduction to Operating Systems: Function, Evolution, Different Types, Desirable Characteristics and features of an O/S, Operating Systems Services: Types of Services, Different ways of providing these Services – Utility Programs, System Calls, Operating System Structure, and Spooling & Buffering.

Module 2: **(11 hrs.)**

CPU Scheduling: Process Concept, Scheduling Concepts, Types of Schedulers, Scheduling Criteria, Process State Diagram, Scheduling Algorithms, Operation on Process, Algorithms Evaluation, System calls for Process Management; Multiple Processor Scheduling; Concept of Threads.

Module 3: **(06 hrs.)**

Concurrent Processes: Real and Virtual Concurrency, Mutual Exclusion, Synchronization, Inter- Process Communication, Critical Section Problem, Solution to Critical Section Problem: Semaphores – Binary and Counting Semaphores, WAIT & SIGNAL Operations, and their implementation. Deadlocks: Deadlock Problems, Characterization, Prevention, Avoidance, Recovery.

Module 4: **(11 hrs.)**

Memory Management: Different Memory Management Techniques – Partitioning, Swapping, Segmentation, Paging, Paged Segmentation, Comparison of these techniques, Techniques for supporting the execution of large programs: Overlay, Dynamic Linking and Loading, Virtual Memory – Concept, Implementation by Demand Paging etc., Page replacement algorithms.

Module 5: **(06 hrs.)**

File Systems: File Concept, User's and System Programmer's view of File System, Disk Organization, Tape Organization, Different Modules of a File System, Disk Space Allocation Methods – Contiguous, Linked and Indexed. Directory Structures, File Protection, System Calls for File Management, Disk Scheduling Algorithms. Introduction to Network, Distributed and Multiprocessor Operating Systems. Case Studies: Unix/Linux, WINDOWS, and other Contemporary Operating Systems.

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Course Outcomes:

1. State the core concepts of operating system, evolution and types of operating system.
2. Illustrate CPU &process scheduling concepts.
3. Illustrate various input output concepts, inter process communication and deadlock.
4. Describe the concept of memory management techniques.
5. State the core concepts of file, disk management and various types of operating system.

List of Text / Reference Books:

1. Avi Silberschatz, Peter Galvin, Greg Gagne, “Operating System Concepts Essentials”, Wiley Asia Student Edition, 10th Edition, 2018.
2. William Stallings, “Operating Systems: Internals and Design Principles”, Prentice Hall of India, 5th Edition, 2005.
3. Charles Crowley, “Operating System: A Design-oriented Approach”, Irwin Publishing, 1st Edition.
4. Gary J. Nutt, “Operating Systems: A Modern Perspective”, Addison-Wesley, 2nd Edition.
5. Maurice Bach, “Design of the Unix Operating Systems”, Prentice-Hall of India, 8th
1. Edition.
6. Daniel P. Bovet, Marco Cesati, “Understanding the Linux Kernel”, O'Reilly and Associates, 3rd Edition.
7. Andrew S. Tanenbaum, “Modern Operating Systems”, Prentice Hall, 3rd Edition,2007.
8. Bovet &Cesati, “Understanding the Linux Kernel”, O’Reily, 3rd Edition.

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V-Semester

PCC-CS09	Theory of Computation	3L:0T:0P(3hrs.)	3 credits

Prerequisite: Discrete structure

Course Objective:

The main objective of this course is to understand fundamental of Theory of Computation.

Course Contents:(40 Hrs.)

Module 1: **(08hrs)**

Introduction of Automata Theory: Examples of automata machines, Finite Automata as a language acceptor and translator, Moore machines and mealy machines, composite machine, Conversion from Mealy to Moore and vice versa.

Module2: **(08hrs)**

Types of Finite Automata: Non-Deterministic Finite Automata (NDFA), Deterministic finite automata machines, conversion of NDFA to DFA, minimization of automata machines, regular expression, Arden's theorem. Meaning of union, intersection, concatenation and closure, 2- way DFA.

Module 3: **(08 hrs)**

Grammars: Types of grammar, context sensitive grammar, and context free grammar, regular grammar. Derivation trees, ambiguity in grammar, simplification of context free grammar, conversion of grammar to automata machine and vice versa, Chomsky hierarchy of grammar, killing null and unit productions. Chomsky normal form and Greibach normal form.

Module 4: **(08 hrs)**

Push down Automata: example of PDA, deterministic and non-deterministic PDA, conversion of PDA into context free grammar and vice versa, CFG equivalent to PDA, Petrinet model.

Module 5: **(08 hrs)**

Turing Machine: Techniques for construction. Universal Turing machine Multitap, multihead and multidimensional Turing machine, N-P complete problems.

Decidability and Recursively Enumerable Languages, decidability, decidable languages, un-decidable languages, Halting problem of Turing machine & the post correspondence problem

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V-Semester

Course Outcomes:

1. Explain the basic concepts of switching and finite automata theory & languages.
2. Relate practical problems to languages, automata, computability and complexity.
3. Construct abstract models of computing, check their power to recognize the languages and analyze the grammar, its types, simplification and normal form.
4. Interpret rigorously formal mathematical methods to prove properties of languages, grammars and automata.
5. Develop an overview of how automata theory, languages and computation are applicable in engineering application.

List of Text/Reference Books:

1. Daniel I.A. Cohen,"Introduction to Computer Theory",Wiley India, 2nd Edition,2003.
2. John E Hopcroft, Jeffrey D. Ullman and Rajeev Motwani, "Introduction to Automata Theory, Languages and Computation", Pearson Education, 2nd Edition,2001.
3. K.L.P Mishra &N.Chandrasekaran,"Theory of Computer Science", PHI Learning, 3rdEdition,2006.
4. Peter Linz, "Introduction to Automata Theory and Formal Languages", Narosa Publishing. 3rdEdition,2007.
5. John C Martin, "Introduction to languages and the theory of computation", TATA McGraw Hill, 3rd Edition 2013.
6. Harry R. Lewis and Christos H. Papadimitriou, "Elements of the Theory of Computation", Pearson Education Asia,2nd edition, 1998.
7. Dexter C. Kozen, "Automata and Computability", Undergraduate Texts in Computer Science, Springer,1st edition,2012.
8. Michael Sipser, "Introduction to the Theory of Computation", PWS Publishing., 3rd edition,2012.

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V-Semester

PCC-CS10	Software Engineering & Project Management	3L:0T:0P(3hrs.)	3 credits

Prerequisite: Knowledge of structure programming language and Application development.

Course Objective:

The purpose of this subject is to cover the underlying concepts and techniques used in Software Engineering& Project Management.

Course Contents: (40 Hrs.)

Module 1: (08hrs)

The Software Product and Software Process

Software Product and Process Characteristics, Software Process Models: Linear Sequential Model, Prototyping Model, RAD Model, Evolutionary Process Models like Incremental Model, Spiral Model, Component Assembly Model, RUP and Agile processes. Software Process customization and improvement, CMM, Product and Process Metrics, Feasibility Analysis, Cost Estimation Model.

Module 2: (08 hrs)

Requirement Elicitation, Analysis, and Specification

Functional and Non-functional requirements, Specifications, Requirement Validation, Traceability. Requirement Sources and Elicitation Techniques, Use case Modeling, System and Software Requirement

Module 3: (08 hrs)

Software Design

The Software Design Process, Design Concepts and Principles, Software Modeling and UML, Architectural Design, Architectural Views and Styles, User Interface Design, Function- oriented Design, SA/SD Component Based Design and Design Metrics.

Module 4: (08hrs)

Software Analysis and Testing

Software Static and Dynamic analysis, Code inspections, Software Testing, Fundamentals, Software Test Process, Testing Levels, Test Criteria, Test Case Design, Test Oracles, Test Techniques, Black-Box Testing, White-Box Unit Testing and Unit, Testing Frameworks, Integration Testing, System Testing and other Specialized, Testing, Test Plan, Test Metrics, Testing Tools.

Module 5: (08hrs)

Software Maintenance & Software Project Measurement

Need and Types of Maintenance, Software Configuration Management (SCM), Software Change Management, Version Control, Change control and Reporting, Program Comprehension Techniques, Re-engineering, Reverse Engineering, Tool Support. Project Management Concepts, Project and Process Planning, Resources Allocations, Project Scheduling and Tracking, Risk Assessment and Mitigation, Software Quality Assurance (SQA). Project Plan, Project Metrics.

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V-Semester

Course Outcomes:

1. Decompose the given project in various phases of a lifecycle.
2. Choose appropriate process model depending on the user requirements.
3. Perform various life cycle activities like Analysis, Design, Implementation, Testing & Maintenance.
4. Know various processes used in all the phases of the product.
5. Apply the knowledge, techniques, and skills in the development of a software product

List of Text/Reference Books:

1. Pankaj Jalote ,"An Integrated Approach to Software Engineering", Narosa Pub, 2005
2. Rajib Mall, "Fundamentals of Software Engineering" Second Edition, PHI Learning,Fouth Edition, 2014.
3. P, S. Pressman "Software Engineering. A Practitioner's Approach" New edition, McGraw Hills,7th edition,2010.
4. Sommerville,"SoftwareEnginerring",Pearson Education, 9th Edition,2011.
5. Richard H.Thayer,"SoftwareEnginerring& Project Managements", WileyIndia
6. Waman S.Jawadekar,"Software Enginerring", TMH,2004.
7. Bob Hughes, M.Cotterell, Rajib Mall "Software Project Management", McGrawHill,Sixth Edition,2017
8. Schwalbe, Kathy "Information Technology Project Management" 8th Edition, 2016.
9. Kieron Conway "Software project Management from concept to development Black Book" Dreamtech Press.

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V-Semester

LC-CS07(P)	Database Management System Lab	0L: 0T:2P (4 hrs.)	2 credits

Prerequisite: Basics of DBMS.

Course Objective: Learn structured query language (SQL) to an intermediate / advanced level.

Course Contents:

Module 1:
Installation: SQL Server or Oracle or MySQL, Overview of using SQL tool, SQL Syntax, Data types in SQL: Numeric data types, Date and Time data types, Character and String data types, Unicode character string data types, Binary data types, and Miscellaneous data types, Creating Tables, Oracle and SQL Data Definition language (DDL), Data manipulation language (DML) Data Control language (DCL)

Module 2:
DDL Commands, Create, Alter, Drop, Truncate, and Rename. Data Definition Language Operations, Create a Database, Use Database, Rename a Database, Drop Database, Add a Column to exiting Table, Add multiple columns to existing Table, Modify an existing column, rename a Column, Drop a Column, Truncate a Table, and Drop a Table. Integrity Constraints

Module 3:
DML Commands, select, insert, update, and delete. Data Manipulation Language Operations, Retrieving data from a table, inserting data into a table, updating existing data into a table, and deleting all records from a table. logical operation (and, or, not), like, wildcards, in, between, aliases, any, all, union, intersect, sql aggregate functions, count, sum, avg, max, min, clauses:order by, group by, having,

Module 4:

Joins: inner join, left join, right join, full join,self join, sub query: nested query. Correlated sub query exists, not exists, DCL commands such as grant and revoke,views:views creation and dropping.

Module 5:
PL/SQL**,** practicing on triggers **-** creation of trigger, insertion using trigger, deletion using trigger, updating using trigger procedures-creation of stored procedures, execution of procedure, and modification of procedure. design and implementation of any data base system (like banking, university etc).

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Course Outcomes:

1. Describe basic concepts of Sql and its data type.
2. Apply data definationlangunagecommond and analyze its output.
3. Apply data manipulation langunagecommond and analyze its output.
4. Apply data control langunagecommond and analyze its output.
5. Describe Procedure, trigger and design database project.

List of Text / Reference Books:

1. Date C J, "An Introduction to Database System", Pearson Educations, 8th Edition,2003.
2. Korth, Silbertz,Sudarshan, "Fundamental of Database System", McGraw Hill,5th Edition,2006.
3. Peter Rob, " Data Base System:Design Implementation & Management", Cengage Learninig4th Edition,2000.
4. Elmasri, Navathe, "Fundamentals of Database Systems", Pearson Educations,7th Edition 2017.
5. Atul Kahate ," Introduction to Database Management System", Pearson Educations,2004.
6. Oracle 9i Database Administration Fundamental-I, Volume I, Oracle Press, TMH.
7. Paneerselvam,"DataBase Management System", PHI Learning,3rd Edition,2018.
8. J. D. Ullman, "Principles of Database and Knowledge – Base Systems", Computer SciencePress,2nd Edition 1988.
9. Serge Abiteboul, Richard Hull, Victor Vianu,"Foundations of Databases", Addison-Wesley,1995.

List of Experiments:

1. Introduction to Oracle and SQL
2. Write the queries for Data Definition language (DDL)
3. Write the queries for Data manipulation language (DML)
4. Use of various types of Integrity Constraints
5. Write the queries for Data Control language (DCL)
6. Use of SELECT command with different clauses.
7. Write SQL queries using logical operation (AND, OR, NOT)
8. Write SQL queries for aggregate functions (Max, Min, Sum, Avg, and Count)
9. Write SQL queries for group by and having
10. Write SQL queries for sub queries and nested queries
11. Write an SQL query to implement JOINS
12. Write SQL queries to create views
13. Write program by the use of PL/SQL
14. Design and implementation of any Data base system (like Banking, University etc).

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V-Semester

LC-CS08(P)	Operating System Lab	0L: 0T: 2P (2 hrs.)	1 credit

Prerequisite: None.

Course Objective

To equip students with a comprehensive understanding of the fundamental concepts and mechanisms in operating systems, focusing on process management, memory management, and file systems.

Course Contents:

Module1:

Process Management: CPU Scheduling, FCFS, Convoy Effect, FCFS with Overhead, SJF, SRTF, Round Robin Algorithm, Longest Job First, Priority Scheduling.

Module2:

Synchronization: Producer Consumer, Reader Writers, Dining Philosophers Problem,Banker's algorithms.

Module3:

Memory Management: Page replacement algorithm, Belady's Anomaly, Stack algorithms.

Module 4:

File system IO: Disk scheduling (FCFS, SSTF, Scan, C-scan, Look, C-look).

Module5:

Threads and system calls: Communications related system calls

Course Outcomes:

1. Understand process management and implement CPU scheduling for efficient resource utilization.
2. Implement synchronization mechanisms to prevent concurrency problems and deadlocks
3. Implement paging and page replacement algorithms.
4. Apply various disk scheduling algorithms.
5. Understand system calls, threads, and advanced OS concepts in network.

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List of Text / Reference Books:

1. Operating System Concepts Essentials by Avi Silberschatz, Peter Galvin, and Greg Gagne (10th Edition, 2018).
2. Modern Operating Systems by Andrew S. Tanenbaum (3rd Edition, 2007).
3. Understanding the Linux Kernel by Daniel P. Bovet and Marco Cesati (3rd Edition).
4. William Stallings' Operating Systems: Internals and Design Principles (5th Edition, 2005).
5. Operating Systems: A Modern Perspective by Gary J. Nutt (2nd Edition).

List of Experiments:

1. To implement FCFS CPU scheduling algorithm.
2. To implement SJF CPU scheduling algorithm.
3. To implement Priority CPU Scheduling algorithm.
4. To implement Round Robin CPU scheduling algorithm.
5. To compare various CPU Scheduling Algorithms over different Scheduling Criteria.
6. To implement classical, inter process communication problem (producer consumer).
7. To implement classical, inter process communication problem (Reader Writers).
8. To implement classical, inter process communication problem (Dining Philosophers).
9. To implement Banker’s algorithms.
10. To implement & compare various page replacement algorithms.
11. To implement & Compare various Disk & Drum scheduling Algorithms.
12. To implement Remote Procedure Call (RPC).

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V-Semester

SBC-CS03(P)	**Web Development Technologies**	**0L: 0T: 2P(2hrs.)**	**1 credit**

Prerequisite: None.

Course Objective:

This course introduces students to the fundamental concepts and skills necessary to design and create websites. Through a combination of theoretical instruction and hands-on projects, students will learn about the principles of design, HTML, CSS, and basic web development tools.

Course Contents:

Module1:
Introduction to Web Design, Overview of the web design process, Understanding the role of a web designer, Historical perspective of web design, Current trends and best practices in web design, Current trends and best practices in web design.

Module2:
HTML Basics, Introduction to HTML (Hypertext Markup Language), Understanding HTML syntax and structure, creating a basic HTML document, working with HTML tags and elements.

Module3:
CSS Basics, Introduction to CSS (Cascading Style Sheets), Understanding CSS syntax and selectors, Applying styles to HTML elements, working with text, colors, and backgrounds in CSS.

Module4:
Images and Multimedia, Optimizing images for the web, incorporating images and multimedia into web pages, Using CSS for image styling and effects, Accessibility considerations for multimedia content.

Module5:
Introduction to JavaScript, Basics of JavaScript programming language, Adding interactivity to web pages with JavaScript, Working with DOM (Document Object Model), Introduction to JavaScript libraries/frameworks (optional).PHP and MySQL: Basic commands with PHP examples, Connection to server, creating database, selecting a database, create a table, inserting data, altering data in table, queries and deleting data.

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V-Semester

List of Experiments:

1. Create a simple webpage with headings, paragraphs, and lists.
2. Experiment with different HTML tags and attributes.
3. Embed images and links into your webpage.
4. Create a form with various input types (text, checkbox, radio buttons, etc.).
5. Apply different styles (colors, fonts, margins, padding) to HTML elements.
6. Experiment with CSS selectors (class, ID, element).
7. Create a navigation menu using CSS.
8. Implement basic layout techniques (floats, positioning, flexbox) to structure your webpage.
9. Create a simple "Hello, World!" script.
10. Use JavaScript to manipulate HTML elements (change text, styles, attributes).
11. Create interactive elements like buttons with event listeners.
12. Implement basic form validation using JavaScript.
13. Explore JavaScript libraries like jQuery for DOM manipulation and event handling.
14. Use jQuery to simplify common JavaScript tasks and animations.
15. Create a form with different input types (text, password, email).
16. Implement client-side form validation using JavaScript.
17. Experiment with form submission methods (GET vs. POST).
18. Develop a CRUD (Create, Read, Update, and Delete) application like Task Management System using PHP and MySQL.

List of Text / Reference Books:

1. HTML & CSS: The Complete Reference, Fifth Edition by Thomas Powell.
2. Beginning HTML5 and CSS3: The Web Evolved.
3. CSS Pocket Reference, 5th Edition by Eric Meyer Released April 2018 Publisher(s): O'Reilly.
4. Unraveling Bootstrap 3.3, Istvan Novak.
5. Developing Web Applications in PHP and AJAX, Harwani, McGraw Hill.

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V-Semester

PROJ-CS02(P)	**Mini Project**	**0L: 0T: 4P (4 hrs.)**	**2 credits**

Prerequisite: Knowledge of programming languages, databases, software engineering, problem-solving, teamwork, communication, project planning, and relevant tools and technologies.

Course Objective:

To provide computer science and engineering students with hands-on experience in project development, enhancing their technical, problem solving, teamwork, and project management skills while applying theoretical knowledge to real-world challenges.

Course Contents:

Module 1: Project Initiation and Proposal

Introduction to mini projects, emphasizing real-world applications and problem-solving. Students brainstorm and generate project ideas, conduct feasibility studies, and write detailed proposals covering objectives, scope, literature review, methodology, and expected outcomes. The module concludes with the proposal approval process, involving presentation to and feedback from faculty.

Module 2: Project Planning and Design

Focuses on project planning, defining tasks, setting milestones, and creating timelines. Students manage resources, estimate budgets, and form teams, assigning roles and responsibilities. Detailed system design is covered, including high-level architecture, detailed design (UML diagrams, flowcharts), and database design (ER diagrams, normalization, and indexing).

Module 3: Development and Implementation

Students set up development environments, adhere to coding standards, and develop project modules, integrating front-end and back-end components. User interface design, including prototyping and user experience, is emphasized. The module also covers comprehensive testing phases: unit testing, integration testing, and system testing.

Module 4: Documentation and Quality Assurance

Teaches technical documentation, including user manuals and comprehensive project reports. Students submit regular progress reports and prepare a final project report. Quality assurance practices are covered, focusing on compliance with standards, peer reviews, and effective bug tracking and management techniques.

Module 5: Presentation and Final Submission

Students prepare and deliver project presentations, highlighting key aspects and results. They conduct live project demonstrations and engage in Q&A sessions. The module includes collecting feedback

from evaluators, submitting the final report, and reflecting on the learning experience, discussing potential improvements and future project scope.

Course Outcomes:

1 Devise project ideas, conduct feasibility studies, write and present proposals, incorporating feedback.
2 Develop project plans, set milestones, estimate budgets, form teams, and create detailed system designs.
3 Develop modules,follow coding standards and perform comprehensive testing.
4 Prepare documentation, submit progress reports, ensure quality, and manage bug tracking effectively.
5 Ability to demonstration of project, gather feedback from evaluators, submit project reports with software engineering standards.

List of Text / Reference Books:

1. Project Management: A Systems Approach to Planning, Scheduling, and Controlling, 13th Edition, Harold Kerzner, ISBN: 978-1-119-80537-3
2. "Software Engineering: A Practitioner's Approach" by Roger S. Pressman.
3. "Software Engineering" by Ian Sommerville.
4. “Software Quality Assurance: Principles and Practice" by Nina S. Godbole.