



AVANTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

(Approved by A.I.C.T.E., New Delhi, & Permanently Affiliated to J.N.T.U-GV, Vizianagaram)

NAAC "B++" Accredited Institute

Cherukupally (Village), Near Tagarapuvalasa Bridge, Vizianagaram (Dist) -531162.

www.aietta.ac.in, principal@aietta.ac.in

Department of Computer Science and Engineering

Program: B. Tech - Computer Science and Engineering

Regulation: R19

Course Outcomes

No. of Courses: 81

I-I Sem	Course: English
CO-1	Understand Social Or Transactional Dialogues Spoken By Native Speakers Of English And Identify The Context, Topic, And Pieces Of Specific Information
CO-2	Ask And Answer General Questions On Familiar Topics And Introduce Oneself/Others
CO-3	Employ Suitable Strategies For Skimming And Scanning To Get The General Idea Of A Text And Locate Specific Information
CO-4	Recognize Paragraph Structure And Be Able To Match Beginnings/Endings/Headings With Paragraphs
CO-5	Form Sentences Using Proper Grammatical Structures And Correct Word Forms
I-I Sem	Course: Mathematics – I
CO-1	Utilize Mean Value Theorems To Real Life Problems (L3)
CO-2	Solve The Differential Equations Related To Various Engineering Fields (L3)
CO-3	Familiarize With Functions Of Several Variables Which Is Useful In Optimization (L3)
CO-4	Apply Double Integration Techniques In Evaluating Areas Bounded By Region (L3)
CO-5	Students Will Also Learn Important Tools Of Calculus In Higher Dimensions. Students Will Become Familiar With 2- Dimensional And 3-Dimensional Coordinate Systems (L5)
I-I Sem	Course: Applied Chemistry
CO-1	Outline the properties of polymers and various additives added and different 1 methods of forming plastic materials. Interpret the mechanism of conduction in 4 conducting polymers
C O-2	Explain the theory of construction of battery and fuel cells. Categorize the reasons for corrosion and study some methods of corrosion control.
CO-3	Understand the importance of materials like nano-materials and fullerenes, Liquid crystals and superconductors and their uses. Understand the preparation of semiconductors
CO-4	Obtain the knowledge of computational chemistry and understand importance 3 molecular machines
CO-5	Understand the principles of different analytical instruments & explain the different applications of analytical instruments. Design sources of energy by different natural sources
I-I Sem	Course: Fundamentals Of Computer Science



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CO-1	Recognize The Computer Networks, Types Of Networks And Topologies.
CO-2	Illustrate the concept of input and output devices of Computers how it works and recognize the basic terminology used in computer programming.
CO-3	Recite The Advanced Computer Technologies Like Distributed Computing & Wireless Networks.
CO-4	Summarize The Concepts Of Operating Systems And Databases.
CO-5	Understand an operating system and its working, and solve common problems related to operating systems
I-I Sem Course: Engineering Drawing	
CO-1	The student will learn how to visualize 2d & 3d objects.
CO-2	Construct scales and draw Orthographic projections
CO-3	Able to draw projections of points
CO-4	Understand and draw projections of planes
CO-5	Conversion of isometric view to orthographic view and vice versa
I-I Sem Course: English Lab	
CO-1	To develop and improve listening Skills
CO-2	To develop and improve speaking Skills
CO-3	To develop and improve reading Skills
I-I Sem Course: Applied Chemistry Lab	
CO-1	Enhance the thinking capabilities in the modern trends in Engineering & Technology
CO-2	Analyze the need, design and perform a set of experiments
CO-3	Learn and apply basic techniques used in chemistry laboratory for volumetric analysis; 6 redox titrations with different indicators; EDTA titrations
I-I Sem Course: IT Workshop	
CO-1	Assemble And Disassemble Components Of A PC
CO-2	Construct A Fully Functional Virtual Machine, Summarize Various Linux Operating System Commands,
CO-3	Secure A Computer From Cyber Threats, Learn And Practice Programming Skill In Github, Hackerrank, Codechef, Hackerearth Etc.
CO-4	Recognize Characters & Extract Text From Scanned Images, Create Audio Files And Podcasts



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CO-5	Create Video Tutorials And Publishing, Use Office Tools For Documentation, Build Interactive Presentations, Build Websites, Create Quizzes & Analyze Responses.
I-I Sem Course: Environmental Science	
CO-1	Discover knowledge in ecological perspective and value of environment.
CO-2	Understand the significance of various natural resources and its management
CO-3	Demonstrate a comprehensive understanding of the world's biodiversity and the importance of its conservation.
CO-4	Categorize different types of pollutions and their control measures. Discover effective methods of waste Management. Analyze global environmental problems and come out with best possible solutions.
CO-5	Understand environmental laws and sustainable development.
I-II Course: Mathematics – II	
CO-1	Develop The Use of Matrix Algebra Techniques That Is Needed by Engineers for Practical Applications (L6)
CO-2	Solve System of Linear Algebraic Equations Using Gauss Elimination, Gauss Jordan, Gauss Seidel (L3)
CO-3	Evaluate Approximating the Roots of Polynomial and Transcendental Equations by Different Algorithms (L5)
CO-4	Apply Newton's Forward & Backward Interpolation and Lagrange's Formulae for Equal and Unequal Intervals (L3)
CO-5	Apply Different Algorithms for Approximating the Solutions of Ordinary Differential Equations to Its Analytical Computations (L3)
I-II Course: Mathematics – III	
CO-1	Interpret The Physical Meaning of Different Operators Such as Gradient, Curl and Divergence (L5)
CO-2	Estimate The Work Done Against a Field, Circulation and Flux Using Vector Calculus (L5)
CO-3	Apply The Laplace Transform for Solving Differential Equations (L3)
CO-4	Find or compute the Fourier Series of Periodic Signals (L3)
CO-5	Know And Be Able to Apply Integral Expressions for The Forwards and Inverse Fourier Transform to A Range of Non-Periodic Waveforms (L3)
I-II Course: Applied Physics	
CO-1	Explain The Concept of Polarization in Dielectric Materials.
CO-2	Summarize Various Types of Polarization of Dielectrics.



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CO-3	Interpret Lorentz Field and Claussius- Mosotti Relation in Dielectrics.
CO-4	Classify The Magnetic Materials Based on Susceptibility and Their Temperature Dependence
CO-5	Explain The Applications of Dielectric and Magnetic Materials.
I-II Course: Programming for Problem Solving Using C	
CO-1	To Write Algorithms and To Draw Flowcharts for Solving Problems
CO-2	To Convert Flowcharts/Algorithms to C Programs, Compile and Debug Programs
CO-3	To Use Different Operators, Data Types and Write Programs That Use Two-Way/ Multi-Way Selection
CO-4	To Select the Best Loop Construct for A Given Problem
CO-5	To Design and Implement Programs to Analyze the Different Pointer Applications
I-II Course: Digital Logic Design	
CO-1	An Ability to Define Different Number Systems, Binary Addition and Subtraction, 2's Complement Representation and Operations with This Representation.
CO-2	An Ability to Understand the Different Switching Algebra Theorems and Apply Them for Logic Functions
CO-3	An Ability to Define the Karnaugh Map For A Few Variables and Perform an Algorithmic Reduction of Logic Functions
CO-4	Students Will Be Able to Design Various Logic Gates Starting from Simple Ordinary Gates to Complex Programmable Logic Devices & Arrays.
CO-5	Students Will Be Able to Design Various Sequential Circuits Starting from Flip-Flop To Registers And Counters.
I-II Course: Applied Physics Lab	
CO-1	Fundamental understanding of design of an instrument with targeted accuracy for physical measurements.
CO-2	Investigate the properties of Thin Films and Light sources
CO-3	Analyze the Elastic nature of materials.
I-II Course: Communication Skills Lab	
CO-1	To develop and improve listening Skills
CO-2	To develop and improve speaking Skills
CO-3	To develop and improve reading Skills



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I-II	Course: Programming for Problem Solving Using C Lab
CO-1	Gains Knowledge on various concepts of a C language
CO-2	Able to draw flowcharts and write algorithms.
CO-3	Able design and development of C problem solving skills.
I-II	Course: Constitution of India
CO-1	Understand Historical Background of The Constitution Making and Its Importance for Building A Democratic India
CO-2	Understand The Functioning of Three Wings of The Government Ie., Executive, Legislative and Judiciary.
CO-3	Understand The Value of The Fundamental Rights and Duties for Becoming Good Citizen of India.
CO-4	Analyze The Decentralization of Power Between Central, State and Local Self-Government.
CO-5	Apply The Knowledge in Strengthening of The Constitutional Institutions Like CAG, Election commission And UPSC For Sustaining Democracy 1. Know the Sources, Features and Principles of Indian Constitution 2. Learn About Union Government, State Government and Its Administration 3. Get Acquainted with Local Administration and Pachayati Raj 4. Be Aware of Basic Concepts and Developments of Human Rights 5. Gain Knowledge on Roles and Functioning of Election Commission
II-I	Course: Mathematical Foundations of Computer Science
CO-1	Demonstrate Skills in Solving Mathematical Problems
CO-2	Comprehend Mathematical Principles and Logic
CO-3	Demonstrate Knowledge of Mathematical Modeling and Proficiency in Using Mathematical Software
CO-4	Manipulate And Analyze Data Numerically And/Or Graphically Using Appropriate Software
CO-5	Communicate Effectively Mathematical Ideas/Results Verbally or In Writing
II-I	Course: Software Engineering
CO-1	Ability To Transform an Object-Oriented Design into High Quality, Executable Code
CO-2	Skills To Design, Implement, And Execute Test Cases At The Unit And Integration Level
CO-3	Compare Conventional And Agile Software Methods
CO-4	To provide the idea of decomposing the given problem into Analysis, Desing, Implementation, Testing and Maintenance phases.



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CO-5	To provide an idea of using various process models in the software industry according to given circumstances
II-I Course: Python Programming	
CO-1	Develop Essential Programming Skills In Computer Programming Concepts Like Data Types, Containers
CO-2	Apply The Basics Of Programming In The Python Language
CO-3	Solve Coding Tasks Related Conditional Execution, Loops
CO-4	Solve Coding Tasks Related To The Fundamental Notions And Techniques Used In Object oriented Programming
CO-5	Create and animate a variety of shapes and develop an application with graphical user interface (GUI).
II-I Course: Data Structures	
CO-1	Summarize The Properties, Interfaces, And Behaviors Of Basic Abstract Data Types
CO-2	Discuss The Computational Efficiency Of The Principal Algorithms For Sorting & Searching
CO-3	Use Arrays, Records, Linked Structures, Stacks, Queues, Trees, And Graphs In Writing Programs
CO-4	Demonstrate Different Methods For Traversing Trees
CO-5	Ability to analyze algorithms and algorithm correctness.
II-I Course: Object Oriented Programming Through C++	
CO-1	Classify Object Oriented Programming And Procedural Programming
CO-2	Apply C++ Features Such As Composition Of Objects, Operator Overloads, Dynamic Memory Allocation, Inheritance And Polymorphism, File I/O, Exception Handling
CO-3	Build C++ Classes Using Appropriate Encapsulation And Design Principles
CO-4	Apply Object Oriented Or Non-Object Oriented Techniques To Solve Bigger Computing Problems
CO-5	Demonstrate the use of various OOPs concepts with the help of programs.
II-I Course: Computer Organization	
CO-1	Develop A Detailed Understanding Of Computer Systems
CO-2	Cite Different Number Systems, Binary Addition And Subtraction, Standard, Floating-Point, And Micro Operations
CO-3	Develop A Detailed Understanding Of Architecture And Functionality Of Central Processing Unit



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CO-4	Exemplify In A Better Way The I/O And Memory Organization
CO-5	Illustrate Concepts Of Parallel Processing, Pipelining And Inter Processor Communication
II-I Course: Python Programming Lab	
CO-1	Write, Test And Debug Python Programs
CO-2	Use Conditionals And Loops For Python Programs
CO-3	Use Functions And Represent Compound Data Using Lists, Tuples And Dictionaries
II-I Course: Data Structures Through C++ Lab	
CO-1	Apply The Various Oops Concepts With The Help Of Programs
CO-2	Use Basic Data Structures Such As Arrays And Linked List.
CO-3	Programs To Demonstrate Fundamental Algorithmic Problems Including Tree Traversals, Graph Traversals, And Shortest Paths
II-I Course: Essence Of Indian Traditional Knowledge	
CO-1	Understand The Concept Of Traditional Knowledge And Its Importance
CO-2	Know The Need And Importance Of Protecting Traditional Knowledge
CO-3	Know The Various Enactments Related To The Protection Of Traditional Knowledge
CO-4	Understand The Concepts Of Intellectual Property To Protect The Traditional Knowledge
CO-5	Understand the importance of Intellectual property in different sectors
II-I Course: Employability Skills- I	
CO-1	Establish Effective Communication With Employers, Supervisors, And Co-Workers
CO-2	Identify To Explore Their Values And Career Choices Through Individual Skill Assessments
CO-3	Adapts Positive Attitude And Appropriate Body Language
CO-4	Interpret The Core Competencies To Succeed In Professional And Personal Life
CO-5	Build team and lead it for problem solving.
II-II Course: Probability And Statistics	
CO-1	Classify The Concepts Of Data Science And Its Importance (L4) Or (L2)



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CO-2	Interpret The Association Of Characteristics And Through Correlation And Regression Tools (L4)
CO-3	Make Use Of The Concepts Of Probability And Their Applications (L3)
CO-4	Apply Discrete And Continuous Probability Distributions (L3)
CO-5	Design The Components Of A Classical Hypothesis Test (L6)
II-II Course: Java Programming	
CO-1	Able To Realize The Concept Of Object Oriented Programming & Java Programming Constructs
CO-2	Able To Realize The Concept Of Object Oriented Programming & Java Programming Constructs
CO-3	Apply The Concept Of Exception Handling And Input/ Output Operations
CO-4	Able To Design The Applications Of Java & Java Applet
CO-5	Able To Analyze & Design The Concept Of Event Handling And Abstract Window Toolkit
II-II Course: Operating Systems	
CO-1	Describe Various Generations Of Operating System And Functions Of Operating System
CO-2	Describe The Concept Of Program, Process And Thread And Analyze Various CPU Scheduling Algorithms And Compare Their Performance
CO-3	Solve Inter Process Communication Problems Using Mathematical Equations By Various Methods
CO-4	Compare Various Memory Management Schemes Especially Paging And Segmentation In Operating System And Apply Various Page Replacement Techniques
CO-5	Outline File Systems In Operating System Like UNIX/Linux And Windows
II-II Course: Database Management Systems	
CO-1	Describe A Relational Database And Object-Oriented Database
CO-2	Create, Maintain And Manipulate A Relational Database Using SQL
CO-3	Describe ER Model And Normalization For Database Design
CO-4	Examine Issues In Data Storage And Query Processing And Can Formulate Appropriate Solutions
CO-5	Outline The Role And Issues In Management Of Data Such As Efficiency, Privacy, Security, Ethical Responsibility, And Strategic Advantage
II-II Course: Formal Languages And Automata Theory	



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CO-1	Classify Machines By Their Power To Recognize Languages
CO-2	Summarize Language Classes & Grammars Relationship Among Them With The Help Of Chomsky Hierarchy
CO-3	Employ Finite State Machines To Solve Problems In Computing
CO-4	Illustrate Deterministic And Non-Deterministic Machines
CO-5	Quote The Hierarchy Of Problems Arising In The Computer Science
II-I Course: Java Programming Lab	
CO-1	Evaluate Default Value Of All Primitive Data Type, Operations, Expressions, Control-Flow, Strings
CO-2	Determine Class, Objects, Methods, Inheritance, Exception, Runtime Polymorphism, User Defined Exception Handling Mechanism
CO-3	Illustrating Simple Inheritance, Multi-Level Inheritance, Exception Handling Mechanism
II-II Course: UNIX Operating System Lab	
CO-1	To Use Unix Utilities And Perform Basic Shell Control Of The Utilities
CO-2	To Use The Unix File System And File Access Control
CO-3	To Use Of An Operating System To Develop Software
II-II Course: Database Management Systems Lab	
CO-1	Utilize SQL To Execute Queries For Creating Database And Performing Data Manipulation Operations
CO-2	Examine Integrity Constraints To Build Efficient Databases
CO-3	Apply Queries Using Advanced Concepts Of SQL
II-II Course: Professional Ethics & Human Values	
CO-1	Identify And Analyze An Ethical Issue In The Subject Matter Under Investigation Or In A Relevant Field
CO-2	Identify The Multiple Ethical Interests At Stake In A Real-World Situation Or Practice
CO-3	Articulate What Makes A Particular Course Of Action Ethically Defensible
CO-4	Assess Their Own Ethical Values And The Social Context Of Problems
CO-5	Identify Ethical Concerns In Research And Intellectual Contexts, Including Academic Integrity, Use And Citation Of Sources, The Objective Presentation Of Data, And The Treatment Of Human Subjects



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II-II	Course: Socially Relevant Project
CO-1	Use Scientific Reasoning To Gather, Evaluate, And Interpret Ideas
CO-2	Analyze And Design Solutions To Solve The Ideas
CO-3	Use One Or More Creative Tools To Complete The Projects
III-I	Course: Data Warehousing And Data Mining
CO-1	Design A Data Warehouse System And Perform Business Analysis With OLAP Tools
CO-2	Apply Suitable Pre-Processing And Visualization Techniques For Data Analysis
CO-3	Apply Frequent Pattern And Association Rule Mining Techniques For Data Analysis
CO-4	Apply Appropriate Classification Techniques For Data Analysis
CO-5	Apply Appropriate Clustering Techniques For Data Analysis
III-I	Course: Computer Networks
CO-1	Illustrate The OSI And TCP/IP Reference Model
CO-2	Analyze MAC Layer Protocols And LAN Technologies
CO-3	Design Applications Using Internet Protocols
CO-4	Implement Routing And Congestion Control Algorithms
CO-5	Develop Application Layer Protocols
III-I	Course: Compiler Design
CO-1	Design, Develop, And Implement A Compiler For Any Language
CO-2	Use LEX And YACC Tools For Developing A Scanner And A Parser
CO-3	Design And Implement LL And LR Parsers
CO-4	Design Algorithms To Perform Code Optimization In Order To Improve The Performance Of A Program In Terms Of Space And Time Complexity
CO-5	Apply Algorithms To Generate Machine Code
III-I	Course: Artificial Intelligence
CO-1	Outline Problems That Are Amenable To Solution By AI Methods, And Which AI Methods May Be Suited To Solving A Given Problem



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CO-2	Apply The Language/Framework Of Different AI Methods For A Given Problem
CO-3	Implement Basic AI Algorithms- Standard Search Algorithms Or Dynamic Programming
CO-4	Design And Carry Out An Empirical Evaluation Of Different Algorithms On Problem Formalization, And State The Conclusions That The Evaluation Supports
CO-5	Demonstrate an ability to share in discussions of AI, its current scope and limitations, and societal implications.
III-I Course: Professional Elective- I Computer Graphics	
CO-1	Illustrate The Basics Of Computer Graphics, Different Graphics Systems And Applications Of Computer Graphics With Various Algorithms For Line, Circle And Ellipse Drawing Objects For 2D Transformations
CO-2	Apply Projections And Visible Surface Detection Techniques For Display Of 3D Scene On 2D Screen
CO-3	Illustrate Able To Create The General Software Architecture Of Programs That Use 3D Object Sets With Computer Graphics
CO-4	Use of geometric transformations on graphics objects and their application in composite form.
CO-5	Render projected objects to naturalize the scene in 2D view and use of illumination models for this.
III-I Course: Principles Of Programming Languages	
CO-1	Describe The Syntax And Semantics Of Programming Languages And Gain Practical Knowledge In Lexical Analysis And Parsing Phases Of A Compiler
CO-2	Make Use Of Different Constructs In Programming Languages With Merits And Demerits
CO-3	Design And Implement Sub Programs In Various Programming Languages
CO-4	Developing The Knowledge On Different Programming Language Features Like Objectorientation, Concurrency, Exception Handling And Event Handling
CO-5	Analyzing Functional Paradigm And Ability To Write Small Programs Using Scheme And ML And Develop Programs Logic Paradigm And Ability To Write Small Programs Using Prolog
III-I Course: Advanced Data Structures	
CO-1	Illustrate Several Sub-Quadratic Sorting Algorithms.
CO-2	Demonstrate Recursive Methods
CO-3	Apply Advanced Data Structures Such As Balanced Search Trees, Hash Tables, Priority Queues And The Disjoint Set Union/Find Data Structure



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CO-4	An ability to compare various file systems and its operating systems exmples.
CO-5	An ability to analyze memory management and deadlocks.
III-I Course: Software Testing Methodologies	
CO-1	Identify And Understand Various Software Testing Problems, Apply Software Testing Knowledge And Engineering Methods And Solve These Problems By Designing And Selecting Software Test Models, Criteria, Strategies, And Methods
CO-2	Design And Conduct A Software Test Process For A Software Project
CO-3	Analyze The Needs Of Software Test Automation
CO-4	Use Various Communication Methods And Skills To Communicate With Their Teammates To Conduct Their Practice-Oriented Software Testing Projects
CO-5	Basic Understanding And Knowledge Of Contemporary Issues In Software Testing, Such As Component-Based, Web Based And Object Oriented Software Testing Problems
III-I Course: Advanced Computer Architecture	
CO-1	Illustrate The Types Of Computers, And New Trends And Developments In Computer Architecture
CO-2	Outline Pipelining, Instruction Set Architectures, Memory Addressing
CO-3	Apply ILP Using Dynamic Scheduling, Multiple Issue, And Speculation
CO-4	Illustrate The Various Techniques To Enhance A Processors Ability To Exploit Instruction-Level Parallelism (ILP), And Its Challenges
CO-5	Apply Multithreading By Using ILP And Supporting Thread-Level Parallelism (TLP)
III-I Course: Computer Networks Lab	
CO-1	Apply The Basics Of Physical Layer In Real Time Applications
CO-2	Apply Data Link Layer Concepts, Design Issues, And Protocols
CO-3	Apply Network Layer Routing Protocols And IP Addressing
III-I Course: Computer Networks Lab	
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CO-2	Apply Data Link Layer Concepts, Design Issues, And Protocols
CO-3	Apply Network Layer Routing Protocols And IP Addressing



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III-I	Course: AI Tools & Techniques Lab
CO-1	Identify Problems That Are Amenable To Solution By AI Methods
CO-2	Identify Appropriate AI Methods To Solve A Given Problem
CO-3	Use Language/Framework Of Different AI Methods For Solving Problems
III-I	Course: Data Mining Lab
CO-1	Extend The Functionality Of R By Using Add-On Packages
CO-2	Examine Data From Files And Other Sources And Perform Various Data Manipulation Tasks On Them
CO-3	Code Statistical Functions In R
III-I	Course: Employability Skills –II
CO-1	Recite The Corporate Etiquette.
CO-2	Make Presentations Effectively With Appropriate Body Language
CO-3	Be Composed With Positive Attitude
CO-4	Apply Their Core Competencies To Succeed In Professional And Personal Life
CO-5	Master the presentation skill and be ready for facing interviews
III-II	Course: Web Technologies
CO-1	Illustrate The Basic Concepts Of HTML And CSS & Apply Those Concepts To Design Static Web Pages
CO-2	Identify And Understand Various Concepts Related To Dynamic Web Pages And Validate Them Using Javascript
CO-3	Outline The Concepts Of Extensible Markup Language & AJAX
CO-4	Develop Web Applications Using Scripting Languages & Frameworks
CO-5	Create And Deploy Secure, Usable Database Driven Web Applications Using PHP And RUBY
III-II	Course: Distributed Systems
CO-1	Elucidate The Foundations And Issues Of Distributed Systems
CO-2	Illustrate The Various Synchronization Issues And Global State For Distributed Systems



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CO-3	Illustrate The Mutual Exclusion And Deadlock Detection Algorithms In Distributed Systems
CO-4	Describe The Agreement Protocols And Fault Tolerance Mechanisms In Distributed Systems
CO-5	Describe The Features Of Peer-To-Peer And Distributed Shared Memory Systems
III-II	Course: Design And Analysis Of Algorithms
CO-1	Describe Asymptotic Notation Used For Denoting Performance Of Algorithm
CO-2	Analyze The Performance Of A Given Algorithm And Denote Its Time Complexity Using The Asymptotic Notation For Recursive And Non-Recursive Algorithms
CO-3	List And Describe Various Algorithmic Approaches
CO-4	Solve Problems Using Divide And Conquer, Greedy, Dynamic Programming, Backtracking And Branch And Bound Algorithmic Approaches
CO-5	Apply Graph Search Algorithms To Real World Problems
III-II	Course: (Managerial Economics And Financial Accountancy)
CO-1	The Knowledge Of Understanding Of The Input-Output-Cost Relationships And Estimation Of The Least Cost Combination Of Inputs
CO-2	The Pupil Is Also Ready To Understand The Nature Of Different Markets And Price Output Determination Under Various Market Conditions And Also To Have The Knowledge Of Different Business Units
CO-3	The Learner Is Able To Prepare Financial Statements And The Usage Of Various Accounting Tools For Analysis.
CO-4	The Learner Can Able To Evaluate Various Investment Project Proposals With The Help Of Capital Budgeting Techniques For Decision Making
III-II	Course: Web Technologies Lab
CO-1	Analyze And Apply The Role Of Languages Like HTML, CSS, XML
CO-2	Review Javascript, PHP And Protocols In The Workings Of The Web And Web Applications
CO-3	Apply Web Application Terminologies, Internet Tools, E – Commerce And Other Web Services
IV-1	Course: Cryptography and Network Security
CO-1	Identify Information Security Goals, Classical Encryption Techniques And Acquire Fundamental Knowledge On The Concepts Of Finite Fields And Number Theory
CO-2	Compare And Apply Different Encryption And Decryption Techniques To Solve Problems Related To Confidentiality And Authentication



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CO-3	Apply The Knowledge Of Cryptographic Checksums And Evaluate The Performance Of Different Message Digest Algorithms For Verifying The Integrity Of Varying Message Sizes.
CO-4	Apply Different Digital Signature Algorithms To Achieve Authentication And Create Secure Applications
CO-5	Apply Network Security Basics, Analyze Different Attacks On Networks And Evaluate The Performance Of Firewalls And Security Protocols Like SSL, Ipv6, And PGP
IV-1	Course: UML & Design Patterns
CO-1	Illustrate Software Design With UML Diagrams
CO-2	Design Software Applications Using OO Concepts
CO-3	Identify Various Scenarios Based On Software Requirements
CO-4	Apply UML Based Software Design Into Pattern Based Design Using Design Patterns
CO-5	Illustrate The Various Testing Methodologies For OO Software
IV-1	Course: Machine Learning
CO-1	Identify Machine Learning Techniques Suitable For A Given Problem
CO-2	Solve The Problems Using Various Machine Learning Techniques
CO-3	Apply Dimensionality Reduction Techniques
CO-4	Design Application Using Machine Learning Techniques
CO-5	Develop an appreciation for what is involved in learning from data
IV-1	Course: Professional Elective- III Mobile Computing
CO-1	Interpret Wireless Local Area Networks (WLAN): MAC Design Principles, 802.11 WIFI
CO-2	Discuss Fundamental Challenges In Mobile Communications And Potential Techniques In GSM
CO-3	Demonstrate Mobile IP In Network Layer
CO-4	Elaborate TCP/IP Protocols And Database Issues
CO-5	Illustrate Different Data Delivery Methods And Synchronization Protocols
IV-1	Course: Data Science
CO-1	Describe What Data Science Is And The Skill Sets Needed To Be A Data Scientist
CO-2	Illustrate In Basic Terms What Statistical Inference Means. Identify Probability Distributions Commonly Used As Foundations For Statistical Modelling, Fit A Model To Data



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CO-3	Use R To Carry Out Basic Statistical Modeling And Analysis
CO-4	Apply Basic Tools (Plots, Graphs, Summary Statistics) To Carry Out EDA
CO-5	Describe The Data Science Process And How Its Components Interact
IV-1 Course: Nosql Databases	
CO-1	Identify What Type Of Nosql Database To Implement Based On Business Requirements (Key-Value, Document, Full Text, Graph, Etc.)
CO-2	Apply Nosql Data Modeling From Application Specific Queries
CO-3	Use Atomic Aggregates And Denormalization As Data Modelling Techniques To Optimize Query Processing
CO-4	Compare and contrast RDBMS with different NoSQL databases
CO-5	Demonstrate the detailed architecture and performance tune of Document-oriented NoSQL databases.
IV-1 Course: Internet Of Things	
CO-1	Describe The Usage Of The Term 'The Internet Of Things' In Different Contexts
CO-2	Discover The Various Network Protocols Used In Iot and Familiar With The Key Wireless Technologies Used In Iot Systems, Such As Wi-Fi, 6lowpan, Bluetooth And Zigbee
CO-3	Define The Role Of Big Data, Cloud Computing And Data Analytics In A Typical Iot System Design A Simple Iot System Made Up Of Sensors, Wireless Network Connection, Data Analytics And Display/Actuators, And Write The Necessary Control Software
CO-4	Build And Test A Complete Working Iot System
CO-5	realize the revolution of Internet in Mobile Devices, Cloud & Sensor Networks
IV-1 Course: Software Project Management	
CO-1	Apply The Process To Be Followed In The Software Development Life-Cycle Models.
CO-2	Apply The Concepts Of Project Management & Planning.
CO-3	Implement The Project Plans Through Managing People, Communications And Change
CO-4	Conduct Activities Necessary To Successfully Complete And Close The Software Projects
CO-5	Implement Communication, Modeling, And Construction & Deployment Practices In Software Development.
IV-1 Course: Professional Elective- IV Web Services	



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CO-1	Recite The Advantages Of Using XML Technology Family
CO-2	Analyze The Problems Associated With Tightly Coupled Distributed Software Architecture
CO-3	Learn The Web Services Building Block
CO-4	Implement E-Business Solutions Using XML Based Web Services
CO-5	Understand the principles of SOA
IV-1	Course: Cloud Computing
CO-1	Interpret The Key Dimensions Of The Challenge Of Cloud Computing
CO-2	Examine The Economics, Financial, And Technological Implications For Selecting Cloud Computing For Own Organization
CO-3	Assessing The Financial, Technological, And Organizational Capacity Of Employer's For Actively Initiating And Installing Cloud-Based Applications
CO-4	Evaluate Own Organizations' Needs For Capacity Building And Training In Cloud Computing related IT Are
CO-5	Illustrate Virtualization For Data-Center Automation
IV-1	Course: Mean Stack Technologies
CO-1	Enumerate The Basic Concepts Of Web & Markup Languages
CO-2	Develop Web Applications Using Scripting Languages & Frameworks
CO-3	Make Use Of Express JS And Node JS Frameworks
CO-4	Illustrate The Uses Of Web Services Concepts Like Restful, React Js
CO-5	Apply Deployment Techniques & Working With Cloud Platform
IV-1	Course: Ad-Hoc And Sensor Networks
CO-1	Evaluate The Principles And Characteristics Of Mobile Ad Hoc Networks (Manets) And What Distinguishes Them From Infrastructure-Based Networks
CO-2	Determine The Principles And Characteristics Of Wireless Sensor Networks
CO-3	Discuss The Challenges In Designing MAC, Routing And Transport Protocols For Wireless Ad-Hoc Sensor Networks
CO-4	Illustrate The Various Sensor Network Platforms, Tools And Applications
CO-5	Demonstrate The Issues And Challenges In Security Provisioning And Also Familiar With The Mechanisms For Implementing Security And Trust Mechanisms In Manets And Wsns
IV-1	Course: Cyber Security & Forensics



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CO-1	Enumerate The Computer Forensics Fundamentals
CO-2	Describe The Types Of Computer Forensics Technology
CO-3	Analyze Various Computer Forensics Systems
CO-4	Illustrate The Methods For Data Recovery, Evidence Collection And Data Seizure
CO-5	Identify The Role Of CERT-In Security
IV-1 Course: UML Lab	
CO-1	Know The Syntax Of Different UML Diagrams
CO-2	Create Use Case Documents That Capture Requirements For A Software System
CO-3	Create Class Diagrams That Model Both The Domain Model And Design Model Of A Software System
IV-1 Course: IPR & Patents	
CO-1	IPR Laws And Patents Pave The Way For Innovative Ideas Which Are Instrumental For Inventions To Seek Patents
CO-2	Student Get An Insight On Copyrights, Patents And Software Patents Which Are Instrumental For Further Advancements
CO-3	Identify different types of Intellectual Properties (IPs), the right of ownership, scope of protection as well as the ways to create and to extract value from IP
CO-4	Recognize the crucial role of IP in organizations of different industrial sectors for the purposes of product and technology development.
CO-5	Be familiar with the processes of Intellectual Property Management (IPM) and various approaches for IPM and conducting IP and IPM auditing and explain how IP can be managed as a strategic resource and suggest IPM strategy.
IV-1 Course: Management And Organizational Behavior	
CO-1	After Completion Of The Course The Student Will Acquire The Knowledge On Management Functions, Global Leadership And Organizational Structure
CO-2	Will Familiarize With The Concepts Of Functional Management That Is HRM And Marketing Of New Product Developments
CO-3	The Learner Is Able To Think In Strategically Through Contemporary Management Practices
CO-4	The Learner Can Develop Positive Attitude Through Personality Development And Can Equip With Motivational Theories
CO-5	The Student Can Attain The Group Performance And Grievance Handling In Managing The Organizational Culture
IV-II Course: Professional Elective-V Deep Learning	
CO-1	Demonstrate the mathematical foundation of neural network



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CO-2	Describe the machine learning basics
CO-3	Differentiate architecture of deep neural network
CO-4	Build a convolutional neural network
CO-5	Build and train RNN and LSTMs
IV-11	Course: Quantum Computing
CO-1	Analyze the behaviour of basic quantum algorithms
CO-2	Implement simple quantum algorithms and information channels in the quantum circuit model
CO-3	Simulate a simple quantum error-correcting code
CO-4	Prove basic facts about quantum information channels
CO-5	trained to design QC circuits and reversible logics for real world problems
IV-11	Course: DevOps
CO-1	Enumerate the principles of continuous development and deployment, automation of configuration management, inter-team collaboration, and IT service agility
CO-2	Describe DevOps & DevSecOps methodologies and their key concepts
CO-3	Illustrate the types of version control systems, continuous integration tools, continuous monitoring tools, and cloud models
CO-4	Set up complete private infrastructure using version control systems and CI/CD tools
CO-5	Learn why automation, culture, and metrics are essential to a successful DevOps project
IV-11	Course: Block Chain Technologies
CO-1	Demonstrate The Foundation Of The Block Chain Technology And Understand The Processes In Payment And Funding.
CO-2	Identify The Risks Involved In Building Block Chain Applications.
CO-3	Review Of Legal Implications Using Smart Contracts
CO-4	Choose The Present Landscape Of Blockchain Implementations And Understand Crypto Currency Markets
CO-5	Examine How To Profit From Trading Crypto Currencies
IV-11	Course: Big Data Analytics
CO-1	Illustrate Big Data Challenges In Different Domains Including Social Media, Transportation, Finance And Medicine



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CO-2	Use Various Techniques For Mining Data Stream
CO-3	Design And Develop Hadoop
CO-4	Identify The Characteristics Of Datasets And Compare The Trivial Data And Big Data For Various Applications
CO-5	Explore The Various Search Methods And Visualization Techniques
IV-II	Course: Image Processing
CO-1	Know and understand the basics and fundamentals of digital image processing, such as digitization, sampling, quantization, and 2D-transforms
CO-2	Operate on images using the techniques of smoothing, sharpening and enhancement.
CO-3	Use the restoration concepts and filtering techniques
CO-4	Illustrate the basics of segmentation
CO-5	Learn different techniques employed for the enhancement of images.
IV-II	Course: Mobile Application Development
CO-1	Install and configure Android application development tools
CO-2	Design and develop user Interfaces for the Android platform
CO-3	Use state information across important operating system events
CO-4	Apply Java programming concepts to Android application development
CO-5	Apply essential Android Programming concepts
IV-II	PROJECT
CO-1	Formulate., and apply mathematical, science and engineering principles to solve real time engineering problems
CO-2	Test the existing data, communicate and conduct research on complex problems using modern tools
CO-3	Validate the obtained results on contemporary issues related to society and environment
CO-4	Determine effectively the engineering principles used in their project individually and as a team as per the norms of engineering practice
CO-5	Structure future work to promote life long learning in the context of technological adaptation.



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