SVKM's Narsee Monjee Institute of Management Studies
Mukesh Patel School of Technology Management & Engineering

Program: B Tech (All program except CSBS, CSDS), MBA Tech Mechanical and Computer, B Tech Integrated Mechanical and Computer				**Semester :** III / IV / VII /VIII	
Course: Complex Variables and Transforms				**Code:** 702BS0C057	
Teaching Scheme				**Evaluation Scheme**	
Lecture (Hours per week)	**Practical (Hours per week)**	**Tutorial (Hours per week)**	**Credit**	**Internal Continuous Assessment (ICA) (Marks - 50)**	**Term End Examinations(TEE) (Marks- 100)**
3	0	1	4	Marks Scaled to 50	Marks Scaled to 50

Pre-requisite: Calculus, Linear Algebra and Differential Equations

Course Objective

This course aims to instil in students an understanding of Complex Variables, Laplace Transforms, Fourier series, Fourier Transforms and their applications. It equips the students with mathematics fundamentals necessary to formulate, solve and analyse complex engineering problems.

Course Outcomes

After completion of the course, the student will be able to -

1. demonstrate understanding of the concepts of Complex variables, Laplace Transforms, Fourier series and Fourier Transforms
2. solve problems based on complex variables, Laplace Transforms, Fourier series and Fourier Transforms
3. apply the techniques of Complex variables, Laplace Transforms, Fourier series and Fourier Transforms to solve engineering problems

Detailed Syllabus

Unit	**Description**	**Duration**
1	**Complex Variables – Differentiation** Complex differentiation, Cauchy-Riemann equation, analytic functions, harmonic functions, harmonic conjugate, Elementary analytic functions (exponential, trigonometric, logarithmic functions), Conformal mappings: definition and problems, Mobius transformation and their properties.	**07**
2	**Complex Variables – Integration** Contour Integrals: definition and problems, Cauchy-Goursat theorem, Cauchy Integral formula, Zeros and singularities of analytic functions, Taylor's series, Laurent's series, Residues, Cauchy Residue theorem.	**08**
3	**Laplace Transforms** Definition of Laplace Transform, Laplace Transform of 1, e^{at}, $\sin at$, $\cos at$, $\sinh at$, $\cosh at$, t^n, Properties of Laplace Transforms: Linearity property, First and second shifting theorems of Laplace Transform, Change of scale property, $L\{t^n f(t)\}$, $L\left\{\frac{f(t)}{t}\right\}$, $L\{f^n(t)\}$, $L\left\{\int_0^t f(u)\,du\right\}$, Evaluation of Inverse Laplace Transform by partial fraction, Convolution theorem, Laplace Transforms of Periodic functions, Unit step functions, Dirac delta functions. Applications: Evaluation of Integrals using Laplace Transforms, Solving initial and boundary value problems involving ordinary differential equations.	**11**

4	**Fourier Series** Orthogonality and Orthonormality, Periodic function, Trigonometric Series, Dirichlet's conditions, Euler's formulae (Derivative of Fourier coefficients a_0, a_n, b_n is not expected), Fourier Series of Functions for the interval $[\alpha, \alpha+2\pi]$ and $[\alpha, \alpha+2c]$, Functions having points of discontinuity, Even and odd functions, half range sine and cosine expansions, Complex form of Fourier Series. Applications: Applications to Wave equation, Heat equation and Laplacian equation.	**12**
5	**Fourier Transforms** Fourier integral theorem, Fourier sine and cosine integral. Fourier Transform, Fourier Sine Transform, Fourier Cosine Transform, Properties of Fourier Transforms (Linearity property, Change of scale property, Shifting property), Inverse Fourier Transform, Inverse Fourier Sine Transform, Inverse Fourier Cosine Transform, Finite Fourier Transform. Applications: Solving differential equations using Fourier Transforms.	**07**
	Total	**45**

Text Books

1. B. V. Ramana, *Higher Engineering Mathematics*, 1st Edition, McGraw Hill Education, 2017.
2. T. Veerarajan, *Engineering Mathematics,* 3rd Edition, McGraw Hill Education, 2007.

Reference Books

1. Erwin Kreyszig, *Advanced Engineering Mathematics*, 10th Edition, Wiley India, 2017.
2. B. S. Grewal, *Higher Engineering Mathematics*, 44th Edition, Khanna Publishers, 2017.
3. James Ward Brown, Ruel V. Churchill, *Complex Variables and Applications*, 8th Edition, McGraw Hill Education", 2014.

Tutorial Work

Minimum Ten Tutorial exercises based on the syllabus.

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Program: B Tech (Artificial Intelligence, Data Science, Computer Engineering, Information Technology, CSE (Cyber), AI and ML, AI and DS, CSBS, CSE (DS), Computer Science) MBA Tech (All Programs) B Tech Integrated (Computer Engineering)	**Semester :** III/IV/ VIII
Course: Database Management Systems	**Code:** 702AI0C001

Teaching Scheme				**Evaluation Scheme**	
Lecture (Hours per week)	**Practical (Hours per week)**	**Tutorial (Hours per week)**	**Credit**	**Internal Continuous Assessment (ICA) (Marks - 50)**	**Term End Examinations (TEE) (Marks - 100)**
2	2	0	3	Marks Scaled to 50	Marks Scaled to 50

Pre-requisite: Nil

Course Objective

The objective of the course is to provide a comprehensive introduction to the fundamental concepts for design and development of database systems, with an emphasis on how to organize, maintain and retrieve - efficiently, and effectively - information from a database management system.

Course Outcomes

After completion of the course, student will be able to -

1. Describe core concepts of database and model a database management system through ER modelling
2. Apply knowledge of relational algebra and structured query language to retrieve and manage data from relational database
3. Demonstrate the use of normalization for database design
4. Demonstrate the concept of transactions and use modern database techniques such as NoSQL

Detailed Syllabus

Unit	**Description**	**Duration**
1	**Introduction** Database System Applications, Purpose of Database Systems, View of Data, Database Languages, Data Models, Database Users and Administrator	03

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2	**Database Design and the E-R Model** Overview of the Design Process, The Entity-Relationship Model, Constraints, Entity Relationship Diagrams, Reduction to Relational Schemas, Schema Diagrams , Entity-Relationship Design Issues, Extended ER features	05
3	**Introduction to the Relational Model** Structure of Relational Databases, Database Schema, Keys, Relational Algebra, Basic operators of Relational Algebra,	03
4	**Structured Query Language** Overview of the SQL Query Language, SQL Data Definition, SQL Constraints, Basic Structure of SQL Queries, Additional Basic Operations, DML operations, Set operations, Aggregate Functions, Nested Sub-queries, Joins, views	06
5	**Relational Database Design** Features of Good Relational Designs, Problems with bad design, Decomposition using concept of functional dependencies, Armstrong's axioms, Closure of functional dependency, Closure of attribute, Introduction to process of Normalization and de-normalization, Normal Forms- 1NF, 2NF, 3NF, BCNF	05
6	**Transactions** What is Transactions? Properties of transaction, Transaction states, Issues with concurrent executions, Schedules, Serializability- Conflict and View	04
7	**Introduction to NoSQL** Overview of NoSQL, characteristics of NoSQL, Storage types of NoSQL, Implementing NoSQL in MongoDB - Managing Databases and Collections from the MongoDB shell, Finding Documents in MongoDB collection from the MongoDB shell.	04
	Total	**30**

Text Books

1. Hennery Korth and Abraham Silberschatz, *Database System Concepts*, 7th Edition, McGraw Hill, 2019
2. Gaurav Vaish, *Getting Started with NoSQL*, 1st edition, Packt Publication, March 2013
3. Brad Daylel, *NoSQL with MongoDB in 24 Hours*, 1st edition, Sams Teach Yourself, January 2015

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Program: B Tech/MBA Tech (Computer Engineering) / B Tech Computer Science	**Semester :** IV
Course - Design and Analysis of Algorithms	**Code-** 702CO0C010

Teaching Scheme				**Evaluation Scheme**	
Lecture (Hours per week)	**Practical (Hours per week)**	**Tutorial (Hours per week)**	**Credit**	**Internal Continuous Assessment (ICA) (Marks-50)**	**Term End Examinations (TEE) (Marks -100)**
2	2	0	3	Marks Scaled to 50	Marks Scaled to 50

Pre-requisite: Programming for Problem Solving, Data Structures, Discrete Mathematics

Course Objective

Objective of this course is to demonstrate a familiarity with major algorithm design paradigm. Analyze the asymptotic performance of algorithms and Devise efficient algorithms in common engineering design situations.

Course Outcomes- After completion of the course, student will be able to -

1. Understand the space-time complexity of an algorithm,
2. Evaluate divide and conquer approach of algorithm design,
3. Apply greedy technique of algorithm design,
4. Analyze dynamic programming and Backtracking algorithm design paradigm.

Detailed Syllabus:

Unit	**Description**	**Duration**
1.	**Introduction:** What is Algorithms, types of Algorithms: greedy, divide & conquer, backtracking, etc. Analysis of Algorithms complexity. Introduction of P, NP, NP Complete and NP hard problems.	04
2.	**Analysing the Algorithms:** Time and Space Complexity of Algorithms, Asymptotic notations, Asymptotic order, Properties of big oh, big omega, and big theta, Classifying functions by their asymptotic growth rates, Best case, average Case and worst	06

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	case analysis. Master's Theorem and Substitution Method, Recursion Tree Method.	
3.	**Divide and Conquer Technique:** The general method, control abstraction for divide and conquer, Finding the maximum and minimum: straightforward and recursive algorithm, Merge sort, Quick sort.	04
4.	**Greedy Technique:** The general method, control abstraction, Optimal storage on tapes, Knapsack problem, Job sequencing with deadlines, Optimal merge patterns, Huffman code.	05
5.	**Dynamic Programming:** The general method, principle of optimality, Multistage graphs, Single source shortest path - Bellman Ford algorithm, 0/1-knapsack, Matrix Chain multiplication, Longest Common Subsequence problem.	08
6.	**Backtracking:** The general method, The n–queens problem, Sum of subsets, Graph coloring.	03
	Total	30

Text Books:

1. Ellis Horowitz, and Sartaj Sahani, Fundamentals of Computer Algorithms, 2nd Edition, University Press, 2008.
2. Thomas H. Cormen, Charles E., Leiserson, Ronald L. Rivest, Introduction to Algorithms, 2nd Edition, PHI Learning, 2010.

Reference Books:

1. Sara Baase and Alan Van Gelder, Computer Algorithms Introduction to Design and Analysis, 3rd Edition, Addison-Wesley, 2000.
2. Aho, Hopcroft and Ullman, Data Structures and Algorithms, Addison-Wesley, 2000.

Laboratory/ Tutorial Work

8 to 10 experiments (and a practicum where applicable) based on the syllabus

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SVKM's Narsee Monjee Institute of Management Studies

Mukesh Patel School of Technology Management & Engineering

Program: B. Tech Computer Science				**Semester:** IV	
Course: Design and Applications of Internet of Things				**Code:** 702CS0C003	
Teaching Scheme				**Evaluation Scheme**	
Lecture (Hours per week)	**Practical (Hours per week)**	**Tutorial (Hours per week)**	**Credit**	**Internal Continuous Assessment (ICA) (Marks - 50)**	**Term End Examinations (TEE) (Marks- 100)**
3	2	0	4	Marks Scaled to 50	Marks Scaled to 50

Prerequisite

Computer Networks, Wi-Fi, Programming skills: C/C++ & Python

Course Objectives

The course educates students on the basic principles of the internet of things, hardware and software for IoT-based systems. It also covers IoT protocols, sensors, actuators and cloud platform for IoT-based systems.

Course Outcomes

After completion of the course, students will be able to -

1. Describe the significance of routing protocols, Power management techniques and the communication protocol
2. Analyze various IoT Platforms, tools, sensors and other required components
3. Identify various architectures, networking protocols, cloud platforms for developing IoT based systems
4. Create cutting-edge IoT-based systems that are suitable for real-world applications

Detailed Syllabus

Unit	**Description**	**Duration**
1	**Introduction to IOT** Internet of Things, Definition, Power & Challenges, Overview of IOT Components and communication technologies, Case Studies Illustrating IoT design e.g. Smart Lighting, home intrusion detection, smart parking, smart irrigation, forest fire detection	**8**
2	**Addressing Power Challenges** RFID, Transponder, transmission & reception, Routing Protocol, Energy Harvesting, Power Management techniques	**8**
3	**Sensors & Actuators** Pressure Sensor, Actuators, Solenoid Valves, Analog and Digital Sensors, Interfacing of Temperature, Humidity, Motion, light and Gas Sensor with Arduino. Pperipheral's and sensors in embedded systems, Peripheral interfacing - SPI and I2C	**12**
4	**IOT Protocols & Architecture** IOT Architecture and protocols, Sensing layer, Data processing layer, Network layer, Application layer, MQTT protocol, Web socket, MAC, Routing and performance considerations	**7**
5	**Cloud Platforms for IOT** Cloud Architecture, Cloud Computing, benefits, Cloud services-SaaS, PaaS, IaaS, Cloud provider, IOT Cloud Platforms, ThingSpeak API, Interfacing ESP	**10**

	8266 with web services, IoT Platform, Overview of IoT supported Hardware platforms: Raspberry pi, Arduino Board	
	Total	**45**

Text Books

1. Sudeep Misra, Anadarup Mukherjee & Arijit Roy, "Introduction to IOT", 1st edition, Cambridge University Press, 2021.
2. Surya Durbha & Jyoti Joglekar, "Internet of Things", 1st edition, Oxford University Press, 2022.

Reference Books

1. Ernest Woodruff, "Raspberry Pi: The Complete User Guide for Beginners and Experts with Tips & Tricks on How to Setup Raspberry Pi and build Innovative Project", 1st edition, independently published, 2021.
2. Massimo Banzi, Michael Shiloh, "Getting started with Arduino: The Open Source Electronic Prototyping Platform", 3rd edition, Make: Community, 2015.

Laboratory Work

8 to 10 experiments (and a practicum where applicable) based on the syllabus.

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Signature
(Approved by Dean)

Program: B Tech All Program (except Data Science, Civil and Mechanical, CSE(DS) 311 (VT)] MBA Tech All Program (except Data Science), B Tech Integrated Computer				**Semester:** III /IV /V / VII	
Course: Discrete Mathematics				**Course Code:** 702BS0C047	
Teaching Scheme				**Evaluation Scheme**	
Lecture (Hours per week)	**Practical (Hours per week)**	**Tutorial (Hours per week)**	**Credit**	**Internal Continuous Assessment (ICA) (Marks - 50)**	**Term End Examinations (TEE) (Marks - 100)**
2	0	1	3	Marks Scaled to 50	Marks Scaled to 50

Pre-requisite: Linear Algebra and Ordinary Differential Equations

Course Objective

The principal objective of the course is to train the students in the construction and understanding of mathematical proofs and common mathematical arguments. It will instil sound knowledge of different topics of discrete mathematics which students will readily apply in the subsequent courses of their programme.

Course Outcomes

After completion of the course, students will be able to -

1. Define and relate basic notions of discrete mathematics
2. Demonstrate the ability to understand mathematical logic, concepts in abstract algebra and mathematical proof techniques
3. Solve problems based on combinatorics, graph theory and abstract algebra
4. Demonstrate understanding of the applications of algebra, combinatorics and graph theory

Detailed Syllabus

Unit	Description	Duration
1.	**Set Theory, Relations and Functions** ***Revision of prerequisite concepts - 'Sets, Venn diagrams, Operations on sets, Laws of set theory'.*** Power set, The principle of Inclusion-Exclusion, Partitions of sets. Relations, Properties and types of binary relations, Equivalence relation. Functions, injective, surjective and bijective functions, Composition, inverse of a function.	06

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2.	**Logic** ***Revision of prerequisite concepts – 'Propositions, Truth table, Laws of logic, Equivalence'.*** Satisfiability, tautology, validity, disjunctive and conjunctive normal forms, Predicates and Quantifiers, Proof Techniques, Mathematical Induction.	06
3.	**Combinatorics** Pigeonhole principle, Homogeneous and non-homogeneous linear recurrence relations with constant coefficients, Generating functions.	04
4.	**Graphs and Trees** Graphs and their properties, Degree, Connectivity, Path, Cycle, Eulerian graph, Hamiltonian graph, Planar graphs, Graph Coloring. Trees, Rooted trees, Spanning tree and minimum spanning tree, Kruskal's and Prim's algorithms for minimal spanning trees.	08
5.	**Abstract algebra** Definition and examples of groups, subgroups, cyclic groups, group homomorphism, group isomorphisms. Definitions and Examples of Rings and Fields.	06
	Total	**30**

Text Books

1. Kenneth H. Rosen, *Discrete Mathematics and its Applications*, 8th Edition, Tata McGraw Hill, 2018.
2. Kolman, Busby and Ross, *Discrete Mathematical Structures*, 6th Edition, Prentice Hall India, 2015.

Reference Books

1. C. L. Liu, *Elements of Discrete Mathematics*, 4th Edition, McGraw Hill, New Delhi, 2017.
2. Seymour Lipschutz and Mark Lipson, *Discrete Mathematics*, 3rd Edition, McGraw Hill education, Schaum's Outline Series, 2017.
3. I. N. Herstein , "*Topics in Algebra*", , 2nd Edition, John Wiley and Sons, 1975.
4. Narsingh Deo, *Graph theory with Applications to Engineering and computer science*, 1st Edition, Prentice Hall India, 2016.

Laboratory/ Tutorial Work

8 to 10 tutorials based on the syllabus.

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(Prepared by Corned Faculty/HOD)

Program: B Tech/ MBA Tech (Computer Engineering) /B Tech Computer Science				**Semester:** IV	
Course: Object Oriented Programming through JAVA				**Code:** 702CO0C038	
Teaching Scheme				**Evaluation Scheme**	
Lecture Hours per week	**Practical Hours per week**	**Tutorial Hours per week**	**Credit**	**Internal Continuous Assessment (ICA) (Marks - 50)**	**Term End Examinations (Marks- 50)**
0	2	0	1	Marks Scaled to 50	Marks Scaled to 50
*Practical exam will be conducted at school level (Non-University Examination)					
Pre-requisite: Programming for Problem Solving					

Course Objective

To develop the abilities for object-oriented programming using Java, to gain knowledge of the basic data structures supported by Java, concepts of object-oriented programming, exception handling, graphical user interface and collection framework in Java.

Course Outcomes: After successful completion of this course, student will be able to -

1. Understand java programming fundamentals
2. Write program using object-oriented programming concepts
3. Use exception handling and collection framework in Java
4. Design graphical user interface

Detailed Syllabus:

Unit	Description	Duration
1.	**Introduction to object-oriented programming** Features of object-oriented programming, datatypes, variables, literals, operators, constants, identifiers.	02
2.	**Control Statements** selection statements, Iterations, Jump statements.	02
3.	**OOP's concept** Class, methods, objects, constructor, polymorphism-method overloading, encapsulation, access modifiers, packages, introduction to string & string buffer.	07
4.	**Inheritance in Object Oriented design**	07

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	Types of inheritance, method overriding, abstraction- abstract class, abstract method, Introduction to interfaces, implementing interface, keywords-super, final. JS3 pages.	
5.	**Exception handling** What is exception handling, Difference between exception and error, try, catch, finally, throw, throws, finally.	02
6.	**Spring** MVC Architecture using spring, Containers- JFrame, JApplet, JWindow, JDialog, JPanel, Controlling Layout, Event Handling.	06
7.	**Collection Framework Overview** The Collection Interfaces-List interface, set interfaces, The Collection Class- The Array List, The Linked List, accessing a collection- using an Iterator and For-each loop.	04
	Total	**30**

Text Books:

1. R. Nageswara Rao, *Core Java: An Integrated Approach, New: Includes All Versions upto Java 8*, Dreamtech Press ,1st January 2016.

Reference books

1. E Balaguruswamy, *Programming with Java*, 6th edition, Tata McGraw Hill,2019.
3. Herbert Schildt, *Java The Complete Reference - Eleventh Edition*, McGraw Hill, 11th edition.

Laboratory / Tutorial work

8 to 10 experiments (and a practicum where applicable) based on the syllabus.

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Program: B Tech/ MBA Tech (Computer Engineering) / B Tech Computer Science	**Semester:** IV
Course: Theoretical Computer Science	**Code-** 702CO0C011

Teaching Scheme				**Evaluation Scheme**	
Lecture Hours per week	**Practical Hours per week**	**Tutorial Hours per week**	**Credit**	**Internal Continuous Assessment (ICA) (Marks - 50)**	**Term End Examinations (TEE) (Marks- 100)**
2	0	1	3	Marks Scaled to 50	Marks Scaled to 50

Pre-requisite: Data Structures

Course Objective

To introduce fundamental principle of automata theory and formal languages. To understand various types of automata and their relationships.

Course Outcomes- After successful completion of the course, student will be able to-

1. Understand the concepts of Automata theory and formal language,
2. Identify different formal language classes and their relationships,
3. Design grammars and recognizers for different formal languages.

Detailed Syllabus

Unit	**Description**	**Duration**
1.	**Introduction to Automata theory**: Basic concepts of String, Formal languages, Chomsky hierarchy, Grammar and its type – Type 0, 1, 2 and 3, Derivation Tree, Application of the subject in complier construction	03
2.	**Finite State Machine & Regular Set**: Concept of DFA, NFA, Epsilon NFA, Converting NFA to Minimized DFA, Regular Expressions, DFA to R. E Conversion, Regular language, Closure properties & Pumping Lemma for regular sets	08
3.	**Moore and Mealy machine:** Designing of Mealy machine and Moore machine, Conversion from Mealy to Moore and Moore to Mealy	03

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4.	**Context Free Grammar:** Basic concept of Context Free Grammar and Language, Ambiguous CFG, Simplification of CFG, Chomsky's Normal Form, Griebach Normal Form.	05
5.	**Push Down Automata:** Tuples and elements in PDM, Design of PDA for CFL, Power of PDA over FSM, Closure Properties of CFL	05
6.	**Turing Machine:** Turing Machine Definition, Examples of TM designing, Recursive and recursively enumerable, Universal Turing machine, Church Turing Hypothesis, Halting problem, Power of TM over PDA	06
	Total	**30**

Text Books:

1. Peter Linz, Narosa, "Introduction to Formal Languages and Automata", 6th Edition, 2016.
2. Vivek Kulkarni, "Theory of Computation", Oxford, 1st Edition, 2013.

Reference Books:

1. J.E. Hopcrof t, J.D. Ullman, Motwani, "Introduction to Automata theory, Languages and Computation", 3rd Edition, Pearson Education, 2008.
2. Michael Sipser, Introduction to the Theory of Computation, 3rd edition, Cengage Learning, 2013.

Laboratory/ Tutorial Work

8 to 10 tutorials based on the syllabus.

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Program: B Tech (Artificial Intelligence, Computer Engineering, Information Technology, CSE (Cyber), AI and ML, AI and DS, CSE (DS),Computer Science) MBA Tech (Artificial Intelligence, Computer Engineering, Information Technology) B Tech Integrated (Computer Engineering)	**Semester:** III/IV/V/VIII
Course: Web Programming	**Code:** 702AI0E005

Teaching Scheme				**Evaluation Scheme**	
Lecture (Hours per week)	**Practical (Hours per week)**	**Tutorial (Hours per week)**	**Credit**	**Internal Continuous Assessment (ICA) (Marks - 50)**	**Term End Examinations (TEE) (Marks - 100)**
2	2	0	3	Marks Scaled to 50	Marks Scaled to 50

Prerequisite: Computer Programming

Course Objective

The objective of this course is to develop modern web application by leveraging latest technologies. It helps them to learn new technologies by applying foundation paradigms, building strong expertise to develop end to end application - web frontend and backend development.

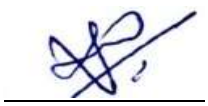
Course Outcomes

After completion of the course, students will be able to -

1. Explain the fundamentals of web programming
2. Design front end of a web application
3. Establish database connectivity between front-end and back-end

Detailed Syllabus

Unit	Description	Duration
1.	**Introduction** Concept of website, its need and purpose, Types of websites: Static and dynamic website, Introduction to HTML, XML, JSON, Web Browsers, − Web Servers, Uniform Resource Locator, Tools and Web Programming Languages, HTTP, Web Standards, Tiered Architecture: Client Server Model, Three Tier Model	**02**
2.	**Hyper Text MarkUp Language** Languages used for website development, HTML5: basic tags, formatting tags, Adding images, Lists, Embedding multimedia in Web pages, Inserting tables, Internal and External Linking, Frames, Forms	**05**



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3.	**Cascading Style Sheets (CSS3)** Basics of Cascading Style sheets, Advantages of CSS, External Style sheet, Internal style sheet, Inline style sheet, CSS Syntax, color, background, Font, images	**05**
4.	**Java Script** Features of JavaScript, extension of JavaScript, Syntax of JavaScript: data types, operators, variables, tag, Document Object Model (DOM) with JavaScript, Selection Statement using if and Switch, Iterative statement: for, for/in, while, do while, break and continue, Form Validation using JavaScript.	**04**
5.	**Angular JS** Introduction to Angular JS, Single Page Application, Angular features, Expressions, Modules, Directives, Model, controllers, Data bindings, Scopes, Tables, Angular JS Forms and validation, Services, HTTP, Dependency Injection, Events.	**08**
6.	**Node JS** Introduction, Modules, HTTP module, URL module, File system, NPM, Events and Event Emitter, Exception handling. **MYSQL database with Node.js** Introduction, Express.js, create database, create table, insert, update select, delete, where, order by, drop table.	**06**
	Total	**30**

Text Books

1. DT Editorial Services, *HTML 5 Black Book*, Dreamtech Press, 2nd Edition, 2016
2. Ken Williamson, *Learning AugularJS – A Guide to AngularJS-Development*, Oreilly Media, 1st Edition, 2015
3. Basart Ali Syed, *Beginnig Node .js*, 1st edition, Apress, 2014

Reference Books

1. Laurence Svekis, *Modern Web Design with HTML5, CSS3, and JavaScript*, 3rd Edition, Packt Publishing, 2020
2. Achyut Godbole, *Web Technologies*, Tata McGraw-Hill, 3rd Edition, 2013.
3. Azat Mardan, "*Full Stack JavaScript: Learn Backbone.js, Node.js and MongoDB*, 2nd Edition, Apress, 2015

Laboratory/ Tutorial Work

8 to 10 experiments (and a practicum where applicable) based on the syllabus

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