Dr.AMBEDKAR INSTITUTE OF TECHNOLOGY

DEPARTMENT OF INFORMATION SCIENCE AND ENGINEERING

The Enclosed documents are verified and approved

HOD,ISE

Dr. Ambedkar Institute of Technology

Bangalore

Department of Information Science and Engineering

Course Outcome

III SEMESTER

18MA31CS/IS DISCRETE MATHEMATICS & NUMERICAL METHODS	
CO1	Demonstrate understanding of how to read and annotate an outline of a proof and able to write a logical poof of a statement.
CO2	Create rigorous mathematical arguments to logical gates and develop an algorithm.
CO3	Apply algebraic structures in codes in cryptography.
CO4	Compare the viability of different approaches to the numerical solution of problems arising in finding roots of equations, interpolation and approximation, numerical differentiation and integration, and solution of ODE's.
CO5	Develop a variety of numerical algorithms using appropriate technology/programming languages.

18IS31 COMPUTER ORGANIZATION AND ARCHITECTURE	
CO1	Analyze functional units of a computer, its operational concepts, addressing modes, internal organization of a system through practicing with an assembly language
CO2	Analyze and design I/O devices, interrupts and I/O interfaces.
CO3	Analyze and design of memory unit including SRAM, DRAM, cache mapping techniques and basics of virtual memory.
CO4	Design basic processing unit and implement execution of complete instruction.
CO5	Implement basic and intermediate concepts of pipelining.

18IS32 DATA STRUCTURES WITH C

CO1	Implement pointers in memory allocation , data structure functions.
CO2	Classify common data structures and implement them.
CO3	Apply appropriate algorithm for problem solving after identifying the appropriate linear data structure.
CO4	Design efficient programs by choosing the most apt non linear data structure.

18IS33 UNIX AND SHELL PROGRAMMING	
CO1	Develop simple command level codes for file, process, redirection, piping, protection and security
CO2	Demonstrate the usage of shell using shell positional parameters and command substitution.
CO3	Demonstrate different types of SED addressing and AWK filtering.
CO4	Develop PERL programs for string usage, file concept and arrays handling.

18IS34 DIGITAL PRINCIPLES AND LOGIC DESIGN	
CO1	Comprehend the fundamental concepts and principles of digital design.
CO2	Design and analyze cost effective combinational circuits and apply concept of Minimization of Boolean functions using different methods. Implement HDL programming.
CO3	Design, analyze and implement various data processing circuits and describe behavior of various digital circuits.
CO4	Design and analyze synchronous and asynchronous counters.
CO5	Design and analyze sequential logic circuits using different models.

18IS35 SOFTWARE ENGINEERING	
CO1	Assess professional and ethical responsibility of a software engineer.

CO2	Design and develop software system, component, or process to meet desired needs within realistic constraints
CO3	Identify and develop system models to design the software system.
CO4	Recognize and apply the techniques, modern engineering tools necessary for engineering practice
CO5	Demonstrate the knowledge of verification and validation to ensure good quality software

18ISL36 DATA STRUCTURES WITH C LAB	
CO1	Design and develop stack, an application providing solution to convert infix to postfix expression using stack and also design a solution to evaluate postfix expression.
CO2	Implement queues like linear queue, circular queue .
CO3	Design and develop solution to implement the following : singly linked list, stacks using linked list, queues using linked list, doubly linked list and circular linked list.
CO4	Design the solution to traverse a Non linear data structure like a Binary Search Tree.

18ISL37 DIGITAL PRINCIPLES AND LOGIC DESIGN LAB	
CO1	Simplify Boolean expressions and implement optimal Logic circuits.
CO2	Design and realize combinational circuits.
CO3	Design and realize sequential circuits used for variety of applications.
CO4	Apply minimization techniques to design and implement optimized digital circuits.
CO5	Develop HDL programs for combinational and sequential circuits.

18HS31 CONSTITUTION OF INDIA & PROFESSIONAL ETHICS	
CO1	Students come to know that who are all take part in the framing of Indian Constitution and how it was framed, what it contained. The Rights they can enjoy

	as a citizen of India. Case law gives detailed knowledge to the students about their fundamental rights. Procedure of enforcement of fundamental rights.
CO2	Student gets the knowledge about procedure of conducting of election by the election commission, its duties and powers along with powers and functions of judiciary.
CO3	Student comes to know regarding system of parliamentary form of government .and how the representative of Central and State Government are elected their powers and functions
CO4	Student comes to know the correct meaning of ethics and their ethical duties and responsibilities and using of honesty in their profession, and the decision making ability.
CO5	Student gets the knowledge of using the intellectual propert rights and its protection and its application in their profession.

18HS33 SOFT SKILLS	
CO1	After the completion of this unit students will know about their self assessments and personality that how to handle various situations in a positive way.
CO2	At the end of this unit student will be able to see how important it is to consider things carefully and from different angles, something one sees, hears, experiences or reads in order to understand it fully. The student will also have understood the importance of soft skills and thinking creatively.
CO3	After the completion of this unit students will have learnt about attitude and adaptability and also how to deal with problems and stress in the present world.
CO4	At the end of this unit students will have learnt some simple ways of planning to achieve his dream and also feel enthusiastic about doing something individually and as well in team.
CO5	After the completion of this unit students writing skills will have improved.

IV SEMESTER

18MA41CS/IS PROBABILITY, STATISTICS & QUEUEING THEORY	
CO1	Understand of basic rules of random variables and moments of random variables.
CO2	Create probability functions of transformation of random variables and use these techniques to generate data from various distributions.
CO3	Develop probabilities in joint probability distributions and derive the marginal and conditional distributions of bivariate random variables.
CO4	Apply the concepts of probability theory to discrete time Markov chain and establish the Markovian queuing models.
CO5	Implement a variety of statistical techniques to solve problems of industry standard statistical software.

18IS41 MICROCONTROLLER AND EMBEDDED SYSTEMS	
CO1	Apply the knowledge gained for Programming ARM for different applications.
CO2	Interface external devices and I/O with ARM microcontroller.
CO3	Interpret the basic hardware components and their selection method based on the characteristics and attributes of an embedded system.
CO4	Develop the hardware /software co-design and firmware design approaches.
CO5	Demonstrate the need of real time operating system for embedded system applications

18IS42 DESIGN AND ANALYSIS OF ALGORITHMS	
CO1	Determine time efficiency of recursive and non- recursive algorithms.
CO2	Apply, analyze algorithms and solve problems using various algorithm design techniques.
CO3	Design and analyze algorithms to solve the optimization problems.
CO4	Design and analyze algorithms associated with space–time tradeoffs

18IS43   OBJECT ORIENTED CONCEPTS

CO1	Develop JAVA programs using OOPs principles.
CO2	Develop computer programs to solve real world problems in Java.
CO3	Develop simple GUI interfaces for a computer program to interact with users, and to comprehend the event-based GUI handling principles using Applets and swings.
CO4	Develop the procedure to store and retrieve data using AWT
CO5	Build the simple swings module using Jlist, Jcombobox as GUI

18IS44   PYTHON PROGRAMMING

CO1	Demonstrate the understanding and usage of core python scripting elements python constructs, data types.
CO2	Demonstrate the understanding and usage of functions ,lists, tuples and dictionaries.
CO3	Demonstrate the understanding and usage of modules, packages and regular expressions.
CO4	Demonstrate usage of object oriented features such as Inheritance, Polymorphism, operator overloading.
CO5	Apply the knowledge of python and use the language scripting elements and constructs to develop threaded and networking applications

18IS45   COMPUTER NETWORKS

CO1	Analyze and formulate components of computer networks.
CO2	Design and develop protocols for transmission at lower layers.
CO3	Identify and develop routing algorithms for network layer.
CO4	Recognize and apply technology for transport layer services.
CO5	Demonstrate the knowledge of Computer networks for different applications.

18ISL46 OBJECT ORIENTED CONCEPTS LAB	
CO1	Design programs using classes and objects using JAVA/C++
CO2	Develop programs for automatic initialization of objects and destroy objects that are no longer required.
CO3	Develop applications to provide flexible options for the creation of new definitions for some of the operators.
CO4	Specify mechanism of deriving a new class from older classes through inheritance .
CO5	Design a program using Templates & Exception Handling.

18ISL47 DESIGN AND ANALYSIS OF ALGORITHMS LAB	
CO1	Design algorithms using different design techniques.
CO2	Implement the algorithms using C/C++.
CO3	Analyze the time complexity of algorithms.
CO4	Design key algorithmic paradigms to solve optimization problems.
CO5	Design a program using Templates & Exception Handling.

V SEMESTER

18HS51 INTELLECTUAL PROPERTY RIGHTS	
CO1	The students learn the property rights under IPR, kinds of IPR, their protection of creative & innovative Rights.
CO2	Students also learn the inventions patentable, their registration , protection & punishment for Infringement& knowledge of creative works, Authors right under Copy Right & its term & Infringement of Copy Right.
CO3	Students will have the knowledge of Registrable Trade Mark, Rights of Proprietor, Protection & prevention of fraudulent use of Trade Mark & learn aesthetic aspects that can be protected , Registered under Designs
CO4	Students will be aware of Geographical Indication of a product , its origin ,

	protection of GI s, Important GIs in India.
CO5	Students will get knowledge of plagiarism in their innovations which can be questioned legally, knowledge on Digital Signature ,Cyber crime & punishment under Information Technology .

18IS51 OPERATING SYSTEMS	
CO1	Analyze the fundamental principles and concepts of operating systems.
CO2	Identify, analyze various synchronization technique, deadlocks.
CO3	Identify, analyze, apply the various algorithms for memory management.
CO4	Analyze issues related to file system, disk management, protection and security.

18IS52 WEB TECHNOLOGIES	
CO1	Design simple web pages using different tags of XHTML and XML document and use the style sheet to display
CO2	Validate and provide user functionality using JavaScript
CO3	Use Angular JS, Node JS in your website development
CO4	Design and develop PHP programs to perform database access & session tracking.
CO5	Develop web application projects

18IS53 :ARTIFICIAL INTELLIGENCE	
CO1	Describe the modern view of AI as the study of agents that receive percepts and perform actions.
CO2	Apply AI search Models and Generic search strategies.
CO3	Write Logic for representing Knowledge and Reasoning of AI systems.
CO4	Design different learning algorithms for improving the performance of AI

	systems.
CO5	Implement projects using different AI learning techniques

18IS54 DATABASE MANAGEMENT SYSTEMS

CO1	Analyze the database concepts, data models and design the ER model for real world applications.
CO2	Design a database schema for database application.
CO3	Develop complex queries using SQL to retrieve the information required from the database.
CO4	Apply normalization techniques to database.
CO5	Analyze the concepts of transaction processing, NoSQL and MongoDB

18IS551   INTERNET OF THINGS

CO1	Interpret the impact and challenges posed by IoT networks
CO2	Appraise the role of IoT protocols for efficient network communication
CO3	Deployment of different sensor technologies and Layers to connect the network.
CO4	To Deploy the role of IoT design in various domains of Industry
CO5	Elaborate the need for Data Analytics .

18IS552   UNIX SYSTEMS PROGRAMMING

CO1	Understand the fundamentals of UNIX operating system such as the POSIX standards, UNIX processes, UNIX file system and Signals.
CO2	Analyze UNIX kernel level support for UNIX processes, UNIX filesystem and Signals.
CO3	Demonstrate advanced UNIX features such as signals, Job Control, daemon processes and inter Process communication.

CO4	Develop UNIX commands, utilities and applications utilizing UNIX System calls.
CO5	Analyze process control, Deamon characteristics, coding rules and error logging and IPC facilities

18IS553 INFORMATION SYSTEMS	
CO1	Describe the role of information technology and information systems in business
CO2	Apply planning and maintenance strategies to the information systems
CO3	Interpret how to use information technologies such as ERP, E-Business and E-Commerce, m-Commerce, wireless networks, mobile computing etc. to solve business problems
CO4	Understand concepts of a Decision Support System (DSS) and its affect on management
CO5	Identify the threats to information security and protect information resources & to identify and propose Business/IT Solutions to the addressed problems.

18IS554 OBJECT-ORIENTED MODELING AND DESIGN	
CO1	Identify objects, attributes and operations performed on the objects in real world situations
CO2	Design class and state models for a given problem.
CO3	Analyze and build interaction models for the system to be developed.
CO4	Design System using class and application domain.
CO5	Implement system with OO approach.

18ISL56 COMPUTER NETWORKS LAB	
CO1	Simulate a sample network on a virtual screen.
CO2	Design and analyze the network behavior against various parameters through simulation

CO3	Demonstrate error detection, routing protocol techniques
CO4	Implement an optimal routing table and apply security algorithms for a given network.
CO5	Demonstrate congestion control techniques.

18ISL57 DATABASE APPLICATIONS LAB	
CO1	Apply the underlying concepts of database technologies.
CO2	Design and implement a relational database schema for a given problem-domain using SQL/MongoDb.
CO3	Develop sophisticated queries to extract information from large datasets.

VI SEMESTER

18HS 61 Management and Entrepreneurship	
CO1	The students will gain knowledge on management concepts & its evolution.
CO2	The students will learn the application of managerial skills & attributes.
CO3	The students will get an in depth knowledge of entrepreneurial process & contribute to the betterment of the society.
CO4	Students will be able to compile information about setting up an MSME & explore the sources of funding agencies.
CO5	Students will be able to identify business opportunities & design a project report.

18IS61 AUTOMATA THEORY and COMPILER DESIGN	
CO1	Analyze concepts in automata theory and classify machines by their power to recognize languages.
CO2	Impart the knowledge of models of computation.
CO3	Design grammar and recognizers for different formal languages.

CO4	Design and solve problems related to Pushdown Automata & Turing Machine.
CO5	Demonstrate the syntax analysis and error correction strategies in Compiler Design.

18IS62 MACHINE LEARNING	
CO1	Identify problems of machine learning and it's methods
CO2	Apply apt machine learning strategy for any given problem
CO3	Design systems that uses appropriate models of machine learning
CO4	Solve problems related to various learning techniques

18IS63 CLOUD COMPUTING	
CO1	Analyze core concepts and fundamentals of the Cloud Computing.
CO2	Identify mechanisms to support Cloud Infrastructure.
CO3	Analyze the reference models for Cloud Computing.
CO4	To manage the Cloud Environment & Cloud Security.
CO5	Develop applications and host on Cloud Environment.

18IS641 ADVANCED JAVA AND J2EE	
CO1	Interpret the need for advanced Java concepts like enumerations and collections in developing modular and efficient programs
CO2	Build client-server applications and TCP/IP socket programs
CO3	Illustrate database access and details for managing information using the JDBC API
CO4	Describe how servlets fit into Java-based web application architecture
CO5	Develop reusable software components using Java Beans

18IS642 DIGITAL IMAGE PROCESSING

CO1	Understand image processing concepts.
CO2	Analyze image enhancement techniques.
CO3	Choose image restoration applications.
CO4	Identify color fundamentals and its transformations.
CO5	Analyze morphological image concepts

18IS643   NETWORK AND CYBER SECURITY

CO1	Apply the knowledge of symmetric and asymmetric technique for securing data.
CO2	Analyze Email Security aspects and application protocols
CO3	Analyze security aspects and protocols of IP layer .
CO4	Secure data in transit across network by using appropriate protocol.
CO5	Acquire Knowledge on the cyber security, cybercrime.

18IS644   MOBILE APPLICATION DEVELOPMENT

CO1	Analyze the fundamentals to build Mobile apps by assessing the basic framework by usage of Android SDK.
CO2	Design Android applications using various resources and built-in classes.
CO3	Apply creative skills in designing and deploying the sophisticated mobile applications.
CO4	Design and deploy Android applications with compelling User Interfaces and databases.
CO5	Develop and publish the Android Application in the global marketplace for download.

18ISL65 MACHINE LEARNING LAB	
CO1	Identify problems of machine learning and it's methods
CO2	Apply apt machine learning strategy for any given problem
CO3	Design systems that uses appropriate models of machine learning
CO4	Solve problems related to various learning techniques

18ISL66 CLOUD COMPUTING LAB	
CO1	Analyze the requirements to setup: Cloud Environment using IaaS Environment
CO2	Develop the ability to solve real-world problems through software development on Cloud Environment.
CO3	Implement, compile, test and run Java/Php/Python programs comprising on PaaS to address a particular software problem.
CO4	Design and develop useful Cloud applications with elegant user interfaces using SaaS.

VII SEMESTER

18IS71 BIG DATA ANALYTICS	
CO1	Describe Big data and use cases from selected industry domains.
CO2	Discuss about NoSQL Big data management.
CO3	Install, configure, and run Hadoop.
CO4	Perform Mapreduce analytics using Hadoop.
CO5	Use Hadoop related tools such as HBase, MongoDB, Pig ,Spark, Hive for Big Data Analytics.

18IS72 SOFTWARE TESTING	
CO1	Derive test cases for any given problem
CO2	Compare the different testing techniques
CO3	Classify the problem into suitable testing model
CO4	Apply the appropriate technique for the design of flow graph.
CO5	Create appropriate document for the software artefact.

18IS731 ARTIFICIAL NEURAL NETWORKS	
CO1	Understand the role of neural networks in engineering, artificial intelligence, and cognitive modeling.
CO2	Understand the concepts and techniques of neural networks through the study of important neural network models.
CO3	Evaluate whether neural networks are appropriate to a particular application..
CO4	Apply neural networks to particular application.
CO5	Analyze the steps needed to improve performance of the selected neural network.

18IS732 C# PROGRAMMING AND .NET	
CO1	Analyze the nature of .Net application development
CO2	Apply OOAD concepts to build C# applications
CO3	Design and develop console based applications using C#
CO4	Develop Windows Application using Winforms, File I/O, XML in .NET.Web Services and deployment.
CO5	Analyze .NET framework 3.0 features like WPF, WCF and WF.

18IS733   SOFTWARE ARCHITECTURE

CO1	Argue the importance and role of software architecture in large scale software systems
CO2	Design and motivate software architecture for large scale software systems
CO3	Recognize major software architectural styles, design patterns, and frameworks
CO4	Describe a software architecture using various documentation approaches and architectural description languages
CO5	Evaluate the coming attractions in software architecture research and practice

18IS734   BLOCK CHAIN TECHNOLOGY

CO1	Comprehend the fundamentals of Blockchain Technology.
CO2	Apply the methods of Decentralization.
CO3	Analyse Bitcoin and alternative coins
CO4	Analyze the importance of Smart Contracts and Ethereum
CO5	Apply blockchain technology in various fields like Government, Health finance etc.,

18IS741   STORAGE AREA NETWORKS

CO1	Identify the need for storage networks and its advantages.
CO2	Recognize various RAID levels.
CO3	Apply the concept of storage virtualization and recognize steps for Business continuity planning in an Enterprise.
CO4	Analyze SAN architecture along with the use of cables technologies.
CO5	Realize the concept of management of storage network.

18IS742 ETHICAL HACKING	
CO1	Explain aspects of security, importance of data gathering, foot printing and system hacking
CO2	Explain aspects of security, importance of data gathering, foot printing and system hacking.
CO3	Demonstrate how intruders escalate privileges.
CO4	Demonstrate how intruders escalate privileges
CO5	Demonstrate how intruders escalate privileges.

18IS743 SOFT AND EVOLUTIONARY COMPUTING	
CO1	Apprehend soft computing techniques
CO2	Apply the learned techniques to solve realistic problems
CO3	Differentiate soft computing with hard computing techniques
CO4	Design a Fuzzy expert system and apply GA for various applications

18IS744 DEEP LEARNING	
CO1	Comprehend the fundamentals of deep learning algorithms.
CO2	Apply specific deep learning algorithms to obtain solutions for appropriate problems.
CO3	Identify and analyse deep learning techniques suitable for training the models using tensorflow and keras.
CO4	Conduct various experiments to demonstrate techniques using Deep neural networks, Convolutional neural networks,Recurrent neural networks so on.
CO5	Usage of modern tools for implementing deep learning algorithms using Python.

18ISL75 BIG DATA AND ANALYTICS LAB	
CO1	Elucidate installation of various Big data tools under Haoop.
CO2	Implement HiveQL statements.
CO3	Differentiate between SQL and NoSQL commands.

18ISL76 SOFTWARE TESTING LAB.	
CO1	Analyze the requirements for the given problem statement
CO2	Design and implement various solutions for the given problem
CO3	Employ various design strategies for problem solving.
CO4	Construct control flow graphs for the solution that is implemented
CO5	Create appropriate document for the software artifact