SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (AUTONOMOUS)

(Approved by AICTE, New Delhi, Affiliated to JNTUK, Kakinada)

Accredited by NAAC with 'A+' Grade.

Recognised as Scientific and Industrial Research Organisation

SRKR MARG, CHINA AMIRAM, BHIMAVARAM – 534204 W.G.Dt., A.P., INDIA

Regulation: R23	**III / IV - B.Tech. I - Semester**

INFORMATION TECHNOLOGY

COURSE STRUCTURE

(With effect from 2023-24 admitted Batch onwards)

Course Code	Course Name	Category	L	T	P	Cr	C.I.E.	S.E.E.	Total Marks
B23IT3101	Advanced Java	PC	3	0	0	3	30	70	100
B23IT3102	Computer Networks	PC	3	0	0	3	30	70	100
B23IT3103	Automata Theory & Compiler Design	PC	3	0	0	3	30	70	100
#PE-I	Professional Elective – I	PE	3	0	0	3	30	70	100
#OE-I	Open Elective – I	OE	3	0	0	3	30	70	100
B23IT3110	Advanced Java Lab	PC	0	0	3	1.5	30	70	100
B23IT3111	Computer Networks Lab	PC	0	0	3	1.5	30	70	100
B23IT3112	Full Stack Development – I	SEC	0	1	2	2	30	70	100
B23IT3113	User Interface Design Using Flutter (**TinkeringLab**)	ES	0	0	2	1	30	70	100
B23IT3114	Evaluation of Community Service Internship	PR	0	0	0	2	--	50	50
B23MC3101	Employability Skills	MC	2	0	0	--	30	--	--
		TOTAL	**17**	**1**	**10**	**23**	**300**	**680**	**950**

	Course Code	Course
#PE-I	B23IT3104	Object Oriented Analysis and Design
	B23IT3105	Cyber Security
	B23IT3106	Artificial Intelligence
	B23IT3107	Microprocessors & Microcontrollers
	B23IT3108	Data Warehousing & Data Mining
	B23IT3109	MOOCS-I
#OE-I	Student has to study one Open Elective offered by CE or ECE or EEE or ME or S&H from the list enclosed.	

Course Code	Category	L	T	P	C	C.I.E.	S.E.E.	Exam
B23IT3101	PC	3	--	--	3	30	70	3 Hrs.

ADVANCED JAVA

(For IT)

Course Objectives: This course is designed to:

1.	To understand the fundamentals of JDBC programming and its applications in database management.
2.	Understand how to solve complex problems. To design and develop web applications using J2EE architecture, Servlet API, and Java Server Pages (JSP).
3.	Analyze and design solutions to problems using object-oriented approach to learn the concepts and principles of Spring MVC and Spring Boot frameworks for building robust web applications.
4	To develop skills in creating RESTful APIs and handling HTTP requests and responses using Spring MVC.
5	To apply knowledge of database transaction management, session tracking, and exception handling in web application development.

Course Outcomes Upon the completion of the course students will be able to:

S.No	Outcome	Knowledge Level
1.	Develop Database operation using JDBC by implementing CRUD operations and managing transactions	K3
2.	Outline J2EE architecture, Containers, and HTTP request processing in the context of Web application Development	K3
3.	Implement servlets to process Client request, Managing sessions and control response in web applications	K3
4.	Create dynamic web pages using JSP elements, Tags and libraries with sessions and error handling	K3
5.	Applies spring MVC features like dependency Injection, beans and DAO to design database-driven enterprise applications	K3

SYLLABUS

UNIT-I (10Hrs)	JDBC Programming: JDBC Architecture, Types of JDBC Drivers, Introduction to major JDBC Classes and Interface, creating simple JDBC Application, Types of Statement (Statement Interface, Prepared Statement, Callable Statement), Exploring Result Set Operations, Batch Updates in JDBC, Creating CRUD Application, Using Row sets Objects, Managing Database Transaction.
UNIT-II (10 Hrs)	J2EE and Web Development: J2EE Architecture Types, J2EE Containers, Types of Servers in J2EE Application, HTTP Protocols and API, Request Processing in Web Application, Web Application Structure, Web Containers and Web Architecture Models

UNIT-III (10 Hrs)	Servlet API and Overview: Servlet Introduction, Servlet Life Cycle(SLC), Types of Servlets, Servlet Configuration with Deployment Descriptor, Working with Servlet Context and Servlet Config Object, Attributes in Servlet, Response and Redirection using Request Dispatcher and using send Redirect Method, Filter API, Manipulating Responses using Filter API, Session Tracking: using Cookies, HTTP Session, Hidden Form Fields and URL Rewriting, Types of Servlet Event: Context Level and Session Level.
UNIT-IV (10 Hrs)	Java Server Pages (JSP): Introduction to JSP, Comparison with Servlet, JSP Architecture, JSP: Life Cycle, Scripting Elements, Directives, Action Tags, Implicit Objects, Expression Language (EL), JSP Standard Tag Libraries (JSTL), Custom Tag, Session Management, Exception Handling, CRUD Application.
UNIT-V (10 Hrs)	Java Web Frameworks: Spring MVC Spring: Introduction, Architecture, Spring MVC Module, Life Cycle of Bean Factory, explore: Constructor Injection, Dependency Injection, Inner Beans, Aliases in Bean, Bean Scopes, Spring Annotations, Spring AOP Module, Spring DAO, Database Transaction Management, CRUD Operation using DAO and Spring API.
Textbooks:	
1.	Black Book “Java server programming” J2EE, 1st ed., Dream Tech Publishers, 2008.
2.	Complete Reference J2EE, James Keogh, McGraw Hill publication.
Reference Books:	
1.	Core Java, Volume II: Advanced Features, Cay Horstmann, Gary Cornell Pearson Publication.
2.	JDBC™ API Tutorial and Reference, Third Edition, Maydene Fisher, Jon Ellis, Jonathan Bruce, Addison Wesley.
3.	Beginning JSP, JSF and Tomcat, Giulio Zambon, A press.
4.	Spring Boot Microservices" by Rajesh RV.
e-Resources	
1.	Spring.io: Spring MVC Tutorial: A comprehensive tutorial on Spring MVC, covering topics like architecture, controllers, and views. [https://spring.io/guides/gs/serving-web-content/]
2.	Spring.io: Spring Boot Tutorial: A comprehensive tutorial on Spring Boot, covering topics like architecture, auto-configuration, and RESTful APIs. [https://spring.io/guides/gs/spring-boot/]

Course Code	Category	L	T	P	C	C.I.E.	S.E.E.	Exam
B23IT3102	PC	3	--	--	3	30	70	3 Hrs.

COMPUTER NETWORKS

(For IT)

Course Objectives:

1.	To understand the different types of networks.
2.	To discuss the software and hardware components of a network.
3.	To develop an understanding of the principles of computer networks.
4.	To calculate IPv4 subnet addresses proficiently and explain network layer protocols such as IP, ICMPv4, and routing algorithms.
5.	To explain the functionalities of transport layer protocols (TCP and UDP), application layer protocols like HTTP, Telnet, and DNS and their respective roles in networking applications.

Course Outcomes

S.No	Outcome	Knowledge Level
1.	Explain protocol layering, digital, analog signals, data rates, and performance issues in the physical layer.	K3
2.	Explain transmission media, switching, link layer addressing, and error handling.	K2
3.	Explain various data link layer protocols.	K2
4.	Calculate IPv4 subnet addresses, explain network layer protocols.	K3
5.	Explain transport layer and application layer protocols	K2

SYLLABUS

UNIT-I (10Hrs)	Introduction: Data communications, Networks, Network Types, Standards, and administration; Protocol Layering, TCP/IP Protocol suite, OSI Model (introduction); Introduction to Physical layer: Data and Signals, Periodic analog signals, Digital signals, Transmission impairments, data rate limits, performance.
UNIT-II (10 Hrs)	Transmission Media: Introduction, Guided media, Un-guided media. Switching: Introduction, Circuit-Switched networks, Packet switching, Structure of a switch. Data Link Layer: Introduction, Link-layer addressing. Error Detection and Correction: Types of errors, Block Coding, Cyclic Redundancy Check, Checksum. Hamming code
UNIT-III (10 Hrs)	Data Link Control: DLC Services, Framing, Finite State Machine (FSM), Stop-and-Wait protocol, HDLC, PPP. Media Access Control (MAC): Random Access, ALOHA, CSMA, CSMA/CD, CSMA/CA, Controlled access: reservation, polling, token passing. Channelization: FDMA, TDMA, CDMA. Introduction to Ethernet and types of Ethernets.

UNIT-IV (10 Hrs)	Network Layer: network layer services, packet switching, network layer performance, IPv4 addressing, DHCP, NAT, Forwarding of IP Packets. Network Layer Protocols: Internet Protocol (IP), Datagram Format, ICMPv4, Distance vector and Link state routing. Hierarchical routing, Introduction to IPv6.
UNIT-V (10 Hrs)	Transport Layer: Services, flow control, error control, congestion control, connectionless and connection-oriented protocols, Stop-and-wait, Go-back-N. UDP and TCP segment formats. TCP services, connection establishment, TCP three-way handshake, TCP States, and state transition diagram. Application Layer protocols: HTTP, Telnet, DNS.
Textbooks:	
1.	Behrouz A. Forouzan, Data Communications and Networking, 5th Edition, McGraw Hill Publication, 2017.
2.	Andrew Tanenbaum, Feamster Wetherall, Computer Networks, 6th Edition, Global Edition
Reference Books:	
1.	James F. Kurose, Keith W. Ross, "Computer Networking: A Top-Down Approach", 6th edition, Pearson, 2019.
2.	Youlu Zheng, ShakilAkthar, "Networks for Computer Scientists and Engineers", Oxford Publishers, 2016.
3.	Computer Networks and Internets, Douglas E Corner, fourth Edition, Pearson Education.
e-Resources	
1.	Cisco Networking Academy, CCNAv7 Introduction to Networks
2.	https://www.geeksforgeeks.org/computer-networks-for-gate/
3.	https://www.netacad.com/courses/ccna-introduction-networks?courseLang=en-US
4.	https://www.cisco.com/c/en/us/solutions/enterprise-networks/what-is-computer-networking.html
5.	https://www.cisco.com/site/in/en/products/networking/index.html

Course Code	Category	L	T	P	C	C.I.E.	S.E.E.	Exam
B23IT3103	PC	3	--	--	3	30	70	3 Hrs.

AUTOMATA THEORY AND COMPILER DESIGN

(For IT)

Course Objectives: This course is designed to:

1.	To learn the fundamentals of Finite Automata and Context-Free Grammars and Languages, establishing a foundation for understanding computational models.
2.	To understand the relationship between Regular Expressions and Finite Automata and identify Regularity of Languages using the Pumping Lemma.
3.	To learn the concepts of Pushdown Automata and their equivalence to Context-Free Grammars, and to gain knowledge on Turing Machines and their variations.
4.	To introduce the fundamental phases of a Compiler, with a focus on understanding the processes of Lexical Analysis and Syntax Analysis.
5.	To explore the concepts involved in the later stages of Compiler Design, including Semantic Analysis, Intermediate Code Generation, and introductory techniques for Code Optimization.

Course Outcomes: At the end of this course, the students will be able to

S.No	Outcome	Knowledge Level
1.	Apply DFA and NFA concepts to design models for simple applications like text search, RL acceptance	K3
2.	Build finite automata from the regular expressions and parse trees from the context free grammars	K3
3.	Construct Context-Free Grammars for language syntax and analyze derivations, parse trees, and ambiguity in relation to PDAs.	K3
4.	Apply the principles of lexical analysis for token recognition and syntax analysis for basic parsing in compiler construction.	K3
5.	Apply semantic rules, intermediate code forms (like three-address code), and basic optimization techniques in compiler design.	K3

SYLLABUS

UNIT-I (10Hrs)	Introduction to Finite Automata: Structural Representations, Automata and Complexity, Chomsky Hierarchy, The Central Concepts of Automata Theory – Alphabets, Strings, Languages, Problems. Nondeterministic Finite Automata: Formal Definition, an Application-Text Search, Finite Automata with Epsilon-Transitions. Deterministic Finite Automata: Definition of DFA, How A DFA Process Strings, The language of DFA, Conversion of NFA with €-transitions to NFA without €-transitions. Conversion of NFA to DFA
UNIT-II (10 Hrs)	Regular Expressions: Finite Automata and Regular Expressions, Applications of Regular Expressions, Algebraic Laws for Regular Expressions, Conversion of Finite Automata to Regular Expressions. Pumping Lemma for Regular Languages- Statement of the pumping

	lemma, Applications of the Pumping Lemma. Context-Free Grammars: Definition of Context-Free Grammars, Derivations Using a Grammar, Leftmost and Rightmost Derivations, the Language of a Grammar, Parse Trees, Ambiguity in Grammars and Languages.
UNIT-III (10 Hrs)	Push Down Automata: Definition of the Pushdown Automaton, the Languages of a PDA, Equivalence of PDA's and CFG's, Acceptance by final state and empty stack. Turing Machines: Introduction to Turing Machine, Formal Description, Instantaneous description, The language of a Turing machine, Types of Turing Machine-Multi-Tape Turing Machine, Non-Deterministic Turing Machine.
UNIT-IV (10 Hrs)	Introduction to Compiler Design: The structure of a compiler, Lexical Analysis: The Role of the Lexical Analyzer, Input Buffering, Recognition of Tokens, The Lexical- Analyzer Generator Lex, Syntax Analysis: Introduction, Context-Free Grammars, writing a Grammar, Top-Down Parsing, Bottom- Up Parsing, Introduction to LR Parsing: Simple LR, More Powerful LR Parsers.
UNIT-V (10 Hrs)	Semantic Analysis: Syntax-Directed Definitions, Evaluation Orders for SDD's, Syntax Directed Translation Schemes, Implementing L-Attributed SDD's. Intermediate-Code Generation: Variants of Syntax Trees, Three-Address code. Code Optimization and Generation: Principal sources of Optimization, Basic Blocks and Flow Graphs, Optimization of Basic Blocks, Issues in the design of a code Generator, The Target Language, A simple code Generator, Peephole Optimization.
Textbooks:	
1.	Introduction to Automata Theory, Languages, and Computation, 3nd Edition, John E. Hopcroft, Rajeev Motwani, Jeffrey D. Ullman, Pearson Education.
2.	Compilers: Principles, Techniques and Tools, Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffry D. Ullman, 2nd Edition, Pearson.
Reference Books:	
1.	Introduction to Languages and The Theory of Computation, John C. Martin, McGraw Hill.
2.	Theory of Computer Science-Automata, Languages and Computation, K.L.P.Mishra, and N.Chandrasekaran, 3rd Edition, PHI, 2007
3.	Compiler Construction‖, K.V.N. Sunitha, Pearson, 2013
4.	Compiler Design, Sandeep Saxena, Rajkumar Singh Rathore, S.Chand publication
e-Resources	
1.	https://onlinecourses.nptel.ac.in/noc21_cs07/preview

Course Code	Category	L	T	P	C	C.I.E.	S.E.E.	Exam
B23IT3104	PE	3	--	--	3	30	70	3 Hrs.

OBJECT ORIENTED ANALYSIS AND DESIGN

(For IT)

Course Objectives: This course is designed to

1.	Become familiar with all phases of OOAD
2.	Understand how to solve complex problems.
3.	Analyze and design solutions to problems using object-oriented approach
4.	Study the notations of Unified Modeling Language
5.	Learn the Object design Principles and understand how to apply them towards Implementation

Course Outcomes: Upon the completion of the course students will be able to:

S.No	Outcome	Knowledge Level
1.	Ability to find solutions to the complex problems using object oriented	K2
2.	Represent classes, responsibilities and states using UML notation	K3
3.	Identify classes and responsibilities of the problem domain	K3
4.	Develop robust object-based models for Systems	K3
5.	Inculcate necessary skills to handle complexity in software design	K3

SYLLABUS

UNIT-I (10Hrs)	Introduction: The Structure of Complex systems, The Inherent Complexity of Software, Attributes of Complex System, Organized and Disorganized Complexity, Bringing Order to Chaos, Designing Complex Systems. Case Study: System Architecture: Satellite-Based Navigation.
UNIT-II (10 Hrs)	Introduction to UML: Importance of modeling, principles of modeling, object-oriented modeling, conceptual model of the UML, Architecture, and Software Development Life Cycle. Basic Structural Modeling: Classes, Relationships, common Mechanisms, and diagrams. Case Study: Control System: Traffic Management.
UNIT-III (10 Hrs)	Class & Object Diagrams: Terms, concepts, modeling techniques for Class & Object Diagrams. Advanced Structural Modeling: Advanced classes, advanced relationships, Interfaces, Types and Roles, Packages. Case Study: AI: Cryptanalysis.
UNIT-IV (10 Hrs)	Basic Behavioral Modeling-I: Interactions, Interaction diagrams Use cases, Use case Diagrams, Activity Diagrams. Case Study: Web Application: Vacation Tracking System.

UNIT-V (10 Hrs)	Advanced Behavioral Modeling: Events and signals, state machines, processes and Threads, time and space, state chart diagrams. Architectural Modeling: Component, Deployment, Component diagrams and Deployment diagrams. Case Study: Weather Forecasting.
Textbooks:	
1.	Grady BOOCH, Robert A. Maksimchuk, Michael W. ENGLE, Bobbi J. Young, Jim Conallen, Kellia Houston, "Object- Oriented Analysis and Design with Applications", 3rd edition, 2013, PEARSON.
2.	Grady Booch, James Rumbaugh, Ivar Jacobson: The Unified Modeling Language User Guide, Pearson Education.
Reference Books:	
1.	Pascal Roques: Modeling Software Systems Using UML2, WILEY- Dreamtech India Pvt. Ltd.
2.	Meilir Page-Jones: Fundamentals of Object-Oriented Design in UML, Pearson Education.
3.	AtulKahate: Object Oriented Analysis & Design, The McGraw-Hill Companies.
4.	Appling UML and Patterns: An introduction to Object – Oriented Analysis and Design and Unified Process, Craig Larman, Pearson Education
e-Resources	
1.	https://onlinecourses.nptel.ac.in/noc19_cs48/preview

Course Code	Category	L	T	P	C	C.I.E.	S.E.E.	Exam
B23IT3105	**PE**	**3**	**--**	**--**	**3**	**30**	**70**	**3 Hrs.**

CYBER SECURITY

(For IT)

Course Objectives:

1.	To assess the vulnerability of and apply basic protections for the network, operating systems, and endpoints. To maintain the integrity, confidentiality, and availability of your network and your data.
2.	To learn about different ways to monitor your network and how to evaluate alerts that you receive.
3.	Delve into tools and techniques used to protect your network, including access control, firewalls, cloud security.
4.	To create policy documents that cover governance and compliance, complying with standards of ethics and legal and regulatory frameworks.

Course Outcomes: By the end of the course, the student should have the ability to:

S.No	Outcome	Knowledge Level
1.	Explain various threats, mitigate common attacks, apply security services.	K2
2.	Use a layered defense-in-depth cyber security strategy.	K3
3.	Summarize wireless, mobile, IoT security issues, along with usage and operation of AAA services.	K3
4.	Determine cloud and data security technologies, evaluate alerts, create policy documents that cover governance and compliance. Test and assess network security.	K3
5.	Explain network and systems vulnerabilities, risk management plan, forensic investigation, disaster recovery methods.	K3

SYLLABUS

UNIT-I (10Hrs)	Cyber Treats and Attacks Types of cyber threats, Deception (Social Engineering) and defending against deception, Types of Cyber Attacks, Wireless and Mobile device attacks, Types of application attacks; Securing Networks: Current state and who is attacking (Threat actors and Cyber criminals), IP Vulnerabilities, ICMP attacks, TCP and UDP Vulnerabilities and attacks; ARP attacks, DNS attacks, DHCP attacks; Common HTTP Exploits, SQL Injection, Cross Site Scripting; Mitigating common network attacks; Fundamentals of Wireless LAN, Types of Wireless LAN Threats; Securing Wireless LAN; Network Security Infrastructure Devices; Security services
UNIT-II (10 Hrs)	Defense-in-depth Common Windows Operating System Vulnerabilities, Windows Architecture; Windows configuration and monitoring, Windows Security; Operating Systems Security: Patch

	Management, End point Security, Host Encryption, Boot Integrity; Apple security features, Physical protection for devices. End point Threats, End point security. Host based Malware protection; Network based Malware protection.; Host based firewalls; Host based Intrusion Detection, Application Security; The Cyber Security cube, CIA Triad, Measure to ensure availability, States of data.; Hardware based and software based Cyber security countermeasures. Policies, standards, guidelines, and procedures.; Defense-in-depth: Asset, Vulnerabilities, and Threats. Cyber Security Operations Management. Business Policy, Security Policy, BYOD policy.; Physical security methods, Application Security.; Network Hardening: Services and protocols, Network Hardening: Segmentation
UNIT-III (10 Hrs)	AAA Wireless device security, Mobile device security, Various measures for Cyber security resilience.; Threats on Embedded and IoT systems, Access Control types, Definitions: Identity management, Authentication, Authorization; Zero Trust Security, Access Control Methods, Network Access Control (NAC) Systems, Account Management; AAA Usage and Operation; Introduction to Access Control Lists, Wild card masking, Configure ACLs.; Implementing ACLs; Mitigating Attacks with ACLs, IPv6 ACLs; Secure Networks with Firewalls, Firewalls in Network Design; Zone-Based Policy Firewalls (ZPF) Overview, ZPF Operation; ZPF Configuration.
UNIT-IV (10 Hrs)	Cloud, IT Security and Governance Virtualization and Cloud Computing, Domains of Cloud Security, Cloud Infrastructure Security, Cloud Application Security; Cloud Data Security, Protecting Virtual Machines; Security Monitoring Protocols, Security Technologies; Security Data: Types of security data, End Device Logs, Network Logs; Evaluating Alerts: Sources of alerts, Alert Evaluation; Governance: Definition, Key roles, Cyber Security policies, Types of Security Policies.; Ethics: Ethics of Cyber Security Specialist, Ten Commandments of Computer Ethics, Types of Cybercrime, Various types of cyber laws.; IT Security Management Framework: Twelve Domains of Cybersecurity, Introduction to ISO 27000, National Cybersecurity Workforce Framework, CIS Critical Security Controls and CCM.; Network Security Assessment, Network Security Testing Techniques, Network Security Testing Tools.; Introduction to Penetration Testing;
UNIT-V (10 Hrs)	CVSS, Risk, Incident Response Threat Intelligence Sources and Services, Network and Server Profiling, Network Anomaly Detection, Network Vulnerability Testing.; Common Vulnerability Scoring System (CVSS); Secure Device Management; Risk Management and Risk Assessment; Security Controls; Evidence Handling and Attack Attribution; The Cyber Kill Chain; The Diamond Model of Intrusion Analysis; Incident Response; Disaster Recovery.
Reference Books:	
1.	Cyber Security Essentials, Cisco Networking Academy.

Course Code	Category	L	T	P	C	C.I.E.	S.E.E.	Exam
B23IT3106	PE	3	--	--	3	30	70	3 Hrs.

ARTIFICIAL INTELLIGENCE

(For IT)

Course Objectives: This course is designed to:

1.	The student should be made to study the concepts of Artificial Intelligence.
2.	The student should be made to learn the methods of solving problems using Artificial Intelligence.
3.	The student should be made to learn the methods of solving problems using Artificial Intelligence.

Course Outcomes: Upon the completion of the course students will be able to:

S.No	Outcome	Knowledge Level
1.	Describe the basic foundations and applications of AI	K2
2.	Apply the problem-solving strategies to generate best AI solutions using state space search for real time problems	K3
3.	Use propositional, predicate & Fuzzy logic concepts to process knowledge Base	K3
4.	Illustrate Knowledge representation and uncertainty techniques to represent real time knowledge base problems	K3
5.	Classify various planning mechanisms, expert systems and its applications	K3

SYLLABUS

UNIT-I (10Hrs)	Introduction, history, intelligent systems, foundations of AI, intelligent agents: Agents and Environments, the concept of rationality, the nature of environments, structure of agents, problem solving agents, problem formulation, applications, tic-tac-toe game playing.
UNIT-II (10 Hrs)	Problem solving: state-space search and control strategies: Introduction, general problem solving, characteristics of problem, exhaustive searches, heuristic search techniques, iterative deepening A*, constraint satisfaction. Problem reduction and game playing: Introduction, problem reduction, game playing, alpha beta pruning, two-player perfect information games
UNIT-III (10 Hrs)	Logic concepts: Introduction, propositional calculus, propositional logic, natural deduction system, axiomatic system, semantic tableau system in propositional logic, resolution refutation in propositional logic, predicate logic. Uncertainty, Fuzzy Logic, Membership Functions, Fuzzy set operations.
UNIT-IV (10 Hrs)	Knowledge representation: Introduction, approaches to knowledge representation, knowledge representation using semantic network, extended semantic networks for KR, knowledge representation using frames Advanced knowledge representation techniques: Introduction, conceptual dependency theory, script structure.

	Reasoning under uncertainty, review of probability, Bayes' probabilistic interferences and dempster Shafer theory.
UNIT-V (10 Hrs)	Planning, components of Planning system, Goal Stack Planning, Non-Linear planning with constraint posting, Hierarchical planning, Reactive systems. Expert system and applications: Introduction phases in building expert systems, expert system versus traditional systems, Architecture of expert systems, Roles of expert systems – Knowledge Acquisition Meta knowledge Heuristics. Typical expert systems – MYCIN, DART, XCON: Expert systems shells,

Textbooks:	
1.	Artificial Intelligence- Saroj Kaushik, CENGAGE Learning.
2.	Artificial intelligence, A modern Approach, 2nded, Stuart Russel, Peter Norvig, PEA.
Reference Books:	
1.	Artificial Intelligence- Deepak Khemani, TMH, 2013.
2.	Introduction to Artificial Intelligence, Patterson, PHI.
3.	Artificial intelligence, structures, and Strategies for Complex problem solving, George F Lugar, 5th ed, PEA.

Course Code	Category	L	T	P	C	C.I.E.	S.E.E.	Exam
B23IT3107	PE	3	--	--	3	30	70	3 Hrs.

MICROPROCESSORS & MICROCONTROLLERS

(For IT)

Course Objectives: This course is designed to:

1.	To discuss about 8085 architecture, signal description and instruction set.
2.	To study different programming techniques to implement in assembly language
3.	To study different peripheral devices and learn to interface with 8085.
4.	To discuss about 8086 architecture, signal description and instruction set

Course Outcomes: Upon the completion of the course students will be able to:

S.No	Outcome	Knowledge Level
1.	Apply the knowledge of 8085 architecture and instruction set.	K3
2.	Use the knowledge of microprocessor for counter designing and interrupts signaling.	K3
3.	Design interfacing circuits between 8085 with different peripheral and memory components.	K4
4.	Apply the knowledge of 8086 architecture and instruction set.	K3
5.	Illustrate the basic concepts of 8051 Microcontroller.	K3

SYLLABUS

UNIT-I (10Hrs)	Introduction to 8085 microprocessors Internal Architecture functional/signal description of 8085 microprocessor, Instruction set, Addressing modes and programming in 8085.
UNIT-II (10 Hrs)	Programming techniques Timing diagram, counters and delays, stacks and subroutines and Interrupts in 8085
UNIT-III (10 Hrs)	Interfacing with 8085 Memory structure & its requirements, Basic concepts of memory interfacing, Address decoding, Interfacing Circuits (2732 EPROM, R/W Memory) Interfacing peripherals to INTEL 8085: Parallel IO interface-8255-Block diagram and its control word, Timer Interface-8253-Block diagram and programming of 8253/54. Interfacing peripherals to INTEL 8085: Block diagram of programmable Interrupt controller Interface-8259A Its functions and interrupt operation
UNIT-IV (10 Hrs)	Introduction to 8086 microprocessor and programming The 8086 Microprocessor architecture, Internal Architecture & functional /signal description of 8086, segmented memory, Maximum & Minimum mode of 8086. Introduction set, Addressing modes.

UNIT-V (10 Hrs)	Introduction to microcontrollers – Comparison between microprocessors and microcontrollers ,8051 Hardware: Block diagram, oscillator clock,8051 Programming model: program counter & data pointer, CPU registers, Flags & program status word, Internal RAM, Internal ROM, Special function Registers, stack, and stack pointer.
Textbooks:	
1.	Microprocessor Architecture and Applications with the 8085, Ramesh S. gaonkar, 4th Edition, Penram International, 1999
2.	Advanced Microprocessors and Peripherals, A K RAY & K M Bhurchandi, 2nd Edition, The Mcgraw-Hill companies.
Reference Books:	
1.	The 80X86 Family, Design, Programming and Interfacing, John E. Uffenbeck, 3rd Edition, Pearson Education Inc., 2002.
2.	Microprocessors and Interfacing. Programming and hardware, 2ne Edition, Douglass V. Hall. MH Edition, 1999

Course Code	Category	L	T	P	C	C.I.E.	S.E.E.	Exam
B23IT3108	PE	3	--	--	3	30	70	3 Hrs.

DATA WAREHOUSING & DATA MINING

(For IT)

Course Objectives: Students are expected to

1.	Understand and implement classical models and algorithms in data warehousing and data mining.
2.	Analyze the data, identify the problems, and choose the relevant models and algorithms to apply.
3.	Apply various methods to perform various data mining tasks.

Course Outcomes: By the end of the course, the student will be able to:

S.No	Outcome	Knowledge Level
1.	Summarize the architectures and operations of a data warehouse.	K2
2.	Apply different data preprocessing techniques and proximity measures on given raw data.	K3
3.	Apply suitable classification technique on a given data set.	K3
4.	Apply various techniques for generation of strong association rules.	K3
5.	Apply suitable techniques to form clusters from a given data set.	K3

SYLLABUS

UNIT-I (10Hrs)	Data Warehousing and Online Analytical Processing: Basic concepts, Data Warehouse Modeling: Data Cube and OLAP, OLTP Vs OLAP, Extract, Transform, and Load (ETL) operations of DWH preparation, Data Warehouse Design and Usage, Operations on a Data cube Roll-Up, Drill-Down, Slice, Dice, and Pivot, Data Warehouse Implementation, Introduction to Data Mining, Kinds of Patterns That Can Be Mined, Technologies Used, Applications Targeted, Major Issues to Consider in Data Mining. (Text Book- 1)
UNIT-II (10 Hrs)	Data Pre-processing: An Overview, Data Cleaning, Data Integration, Data Reduction, Data Transformation and Data Discretization, Data Objects & Attribute Types, Basic Statistical Descriptions of Data, Measuring Data Similarity and Dissimilarity. (Text Book- 1)
UNIT-III (10 Hrs)	Classification: Basic Concepts, General Approach to Solving a Classification Problem, Decision Tree Induction, Evaluating the Performance of a Classifier, Rule-Based Classifier, Bayesian Classifiers: Bayes Theorem, Using the Bayes Theorem for Classification, Naïve Bayes Classifier. (Text Book- 2)
UNIT-IV (10 Hrs)	Classification: Basic Concepts, General Approach to Solving a Classification Problem, Decision Tree Induction, Evaluating the Performance of a Classifier, Rule-Based Classifier, Bayesian Classifiers: Bayes Theorem, Using the Bayes Theorem for Classification, Naïve Bayes Classifier. (Text Book- 2)
UNIT-V	Cluster Analysis: Overview, Clustering Techniques, Different Types of Clusters, K-

(10 Hrs)	means: The Basic K-means Algorithm, K-means Additional Issues, Bisecting K-means, Agglomerative Hierarchical Clustering: Basic Agglomerative Hierarchical Clustering Algorithm, Specific Techniques, Key Issues in Hierarchical Clustering, BIRCH, Density-Based Approach: DBSCAN Algorithm, Strengths and Weaknesses, OPTICS. (Text Books- 1&2)
Textbooks:	
1.	Data Mining concepts and Techniques, 3rd edition, Jiawei Han, Michel Kamber, Elsevier, 2011.
2.	Introduction to Data Mining: Pang-Ning Tan & Michael Steinbach, Vipin Kumar,Pearson, 2012.
Reference Books:	
1.	Data Mining: VikramPudi and P. Radha Krishna, Oxford Publisher
2.	Data Mining Techniques, Arun K Pujari, 3rd edition, Universities Press,2013.
3.	Data Mining: Introductory and Advanced topics: Dunham, First Edition, Pearson, 2020
e-Resources	
1.	(NPTEL course by Prof.PabitraMitra) http://onlinecourses.nptel.ac.in/noc17_mg24/preview
2.	http://www.saedsayad.com/data_mining_map.html

Course Code	Category	L	T	P	C	C.I.E.	S.E.E.	Exam
B23IT3110	**PC**	**--**	**0**	**3**	**1.5**	**30**	**70**	**3 Hrs.**

ADVANCED JAVA LAB

(For IT)

Course Objectives:

1	Design and develop database-driven web applications using JDBC.
2	Understand the architecture and components of J2EE.
3	Apply the concepts of Servlet and JSP to design and develop a web application.
4	Understand the architecture and components of Spring Framework.
5	Apply the concepts of Spring Framework to design and develop a web application.

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

S.No	Outcome	Knowledge Level
1	Analyze JDBC operations to perform CRUD and transaction Management efficiently	**K2**
2	Examine servlet request handling and session management Techniques to understand their role in web applications	**K2**
3	Differentiate JSP elements and JSTL tags to design dynamic web pages with Database connectivity.	**K3**
4	Integrate Spring MVC features with JDBC Template and transactions Management to Build Scalable applications	K4

SYLLABUS

1	**JDBC Programming** 1. Write a JDBC application which will interact with Database and perform the following task. a. Create Student Table with RollNo, Name, and Address field and insert few records. b. Using Statement Object display the content of Record. c. Using Statement Object Insert Two Record. d. Using Statement Object Update One Record. e. Using Statement Object Delete One Record. f. Using Statement Object display the content of Record. 2. Write a JDBC application which will interact with Database and perform the following task. a. Create Student Table with RollNo, Name, and Address field and insert few records. b. Using PreparedStatement Object display the content of Record. c. Using PreparedStatement Object Insert Two Record. d. Using PreparedStatement Object Update One Record. e. Using PreparedStatement Object Delete One Record. Using PreparedStatement Object display the content of Record.

	3. Write a JDBC application which will interact with Database and perform the following task. a. Create a store procedure which will insert one record into employee table. b. Create a store procedure which will retrieve salary for given employee id. Write a java application which will call the above procedure and display appropriate information on screen.
2	4. Design a JDBC application which will demonstrate Scrollable ResultSet functionality. 5. Design a JDBC application which will demonstrate Updatable ResultSet functionality.
3	**J2EE and Web Development** 6. Write down the Program for testing the Servlet and study deployment descriptor. 7. Write down the program for testing the include action for servlet collaboration. 8. Create login form and perform state management using Cookies, HttpSession and URL Rewriting.
4	**Java Server Pages (JSP)** 9. Write down the Program which displays the simple JSP file. 10. Write down the program in which input the two numbers in an html file and then display the addition in JSP file. 11. Perform Database Access through JSP. 12. Write down a program which demonstrates the core tag of JSTL. 13. Write down a program which demonstrates the Format tag of JSTL. 14. Write down a program which demonstrates the Function tag of JSTL. 15. Write down a program which demonstrates the SQL tag of JSTL.
5	**Java Web Frameworks (Spring)** 16. Study and Implement MVC using Spring Framework. 17. Using Spring Template manage Database and Transaction. 18. Implement Spring AOP (Aspect-Oriented Programming) to log method execution time. 19. Implement Spring Security to authenticate and authorize users.
Textbooks:	
1	“Head First Servlets and JSP" by Kathy Sierra and Bert Bates.
2	“Java: A Beginner's Guide" by Herbert Schildt.
e-Resources:	
1	Oracle's JDBC Tutorial:https://docs.oracle.com/javase/tutorial/jdbc/
2	The Java Tutorials by Oracle:https://docs.oracle.com/javase/tutorial/
3	Spring Framework Documentation:https://spring.io/docs

Course Code	Category	L	T	P	C	C.I.E.	S.E.E.	Exam
B23IT3111	PC	--	0	3	1.5	30	70	3 Hrs.

COMPUTER NETWORKS LAB

(For IT)

Course Objectives:

1	Learn basic concepts of computer networking and acquire practical notions of protocols with the emphasis on TCP/IP
2	To provides a practical approach to Ethernet/Internet networking
3	How Networks are assembled and experiments are made to understand the layered architecture and how do some important protocols work

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

S.No	Outcome	Knowledge Level
1	Analyze data link layer services. Functions like error detection	K3
2	Understand sliding window protocol mechanisms	K3
3	Analyse Shortest distance algorithms for given topology	K3
4	Understand Work on various network simulators	K3

SYLLABUS

1	Write a Program to implement error detection using a) Check Sum b) CRC
2	Write a Program to implement Sliding window protocol for a) Go back N ARQ b) Selective repeat ARQ
3	Write a Program to implement Distance vector routing algorithm by obtaining routing table at each node (Take an example subnet graph with weights indicating delay between nodes).
4	Basic Switch Configurations on Packet Trace Simulator
5	Basic Router Configurations on Packet Trace simulator
6	Implementing Static Routing for the given topology
7	Implementing Dynamic routing RIPV1 & RIPV2 for the given topology
8	Implementing OSPF routing for the given topology
9	Implementing VLAN on Packet tracer
10	Implementing Internal VLAN routing on Packet Tracer
11	Write a program for congestion control using leaky bucket algorithm
12	Wireshark i. Packet Capture Using Wire shark ii. Starting Wire shark iii. Viewing Captured Traffic iv. Analysis and Statistics & Filters.
13	Operating System Detection using Nmap & How to run Nmap scan

14	Do the following use NS2 Simulator? i. NS2 Simulator-Introduction ii. Simulate to Find the Number of Packets Dropped iii. Simulate to Find the Number of Packets Dropped by TCP/UDP iv. Simulate to Find the Number of Packets Dropped due to Congestion v. Simulate to Compare Data Rate& Throughput.
Textbooks:	
1	Computer Networks — Andrew S Tanenbaum, Fifth Edition. Pearson Education/PHI
2	Data Communications and Networks – Behrouz A. Forouzan, Fifth Edition TMH.
Reference Books:	
1	Data Communications and Networks- Achut S Godbole, AtulKahate
2	Computer Networks, Mayank Dave, CENGAGE

Course Code	Category	L	T	P	C	C.I.E.	S.E.E.	Exam
B23IT3112	SEC	--	1	2	2	30	70	3 Hrs.

FULL STACK DEVELOPMENT-1

(For IT)

Course Objectives:

1	Make use of HTML elements and their attributes for designing static web pages
2	Build a web page by applying appropriate CSS styles to HTML elements
3	Experiment with JavaScript to develop dynamic web pages and validate forms

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

S.No	Outcome	Knowledge Level
1	Apply HTML and CSS concepts to construct static web pages	K3
2	Apply JavaScript to implement form validation on a dynamic web page	K3
3	Apply Node.js concepts to build and run a basic web server	K3
4	Apply JavaScript functions and event handling techniques to create interactive web pages	K3

SYLLABUS

1	Lists, Links, and Images a. Write a HTML program, to explain the working of lists. Note: It should have an ordered list, unordered list, nested lists and ordered list in an unordered list and definition lists. b. Write a HTML program, to explain the working of hyperlinks using tag and href, target Attributes. c. Create a HTML document that has your image and your friend's image with a specific height and width. Also, when clicked on the images it should navigate to their respective profiles. d. Write a HTML program, in such a way that, rather than placing large images on a page, the preferred technique is to use thumbnails by setting the height and width parameters to something like to 100*100 pixels. Each thumbnail image is also a link to a full-sized version of the image. Create an image gallery using this technique

2	HTML Tables, Forms and Frames a. Write a HTML program, to explain the working of tables. (Use tags:<table>, <tr>, <th>, <td> and attributes: border, rowspan, colspan. b. Write a HTML program, to explain the working of tables by preparing a timetable. (Note: Use <caption> tag to set the caption to the table & also use cell spacing, cell padding, border, rowspan, colspan etc.). c. Write a HTML program, to explain the working of forms by designing Registration form. (Note: Include text field, password field, number field,date of birth field, checkboxes, radio buttons, list boxes using <select>&<option> tags, <text area> and two buttons ie: submit and reset. Use tables to provide a better view). d. Write a HTML program, to explain the working of frames, such that page is to be divided into 3 parts on either direction. (Note: first frame image, second frame paragraph, third frame hyperlink. And make sure of using "no frame" attribute such that frames to be fixed).
3	HTML 5 and Cascading Style Sheets, Types of CSS a. Write a HTML program, that makes use of <article>, <aside>, <figure>, <fig caption>, <footer>, <header>, <main>, <nav>, <section>, , tags. b. Write a HTML program, to embed audio and video into HTML web page. c. Write a program to apply different types (or levels of styles or style specification formats) - inline, internal, external styles to HTML elements. (identify selector, property, and value).
4	Selector forms a. Write a program to apply different types of selector forms i. Simple selector (element, id, class, group, universal) ii. Combinator selector (descendant, child, adjacent sibling, general sibling) iii. Pseudo-class selector iv. Pseudo-element selector v. Attribute selector
5	CSS with Color, Background, Font, Text, and CSS Box Model a. Write a program to demonstrate the various ways you can reference a color in CSS. b. Write a CSS rule that places a background image halfway down the page, tilting it horizontally. The image should remain in place when the user scrolls up or down. c. Write a program using the following terms related to CSS font and text: i. font-size ii. font-weight iii. font-style iv. text-decoration v. text-transformation vi. text-alignment d. Write a program, to explain the importance of CSS Box model using i. Content ii. Border iii. Margin iv. padding
6	Applying JavaScript - internal and external, I/O, Type Conversion a. Write a program to embed internal and external JavaScript in a web page. b. Write a program to explain the different ways for displaying output. c. Write a program to explain the different ways for taking input. d. Create a webpage which uses prompt dialogue box to ask a voter for his name and age. Display the information in table format along with either the voter can vote or not

7	JavaScript Predefined and User-defined Objects a. Write a program using document object properties and methods. b. Write a program using window object properties and methods. c. Write a program using array object properties and methods. d. Write a program using math object properties and methods. e. Write a program using string object properties and methods. f. Write a program using regex object properties and methods. g. Write a program using date object properties and methods. h.Write a program to explain user-defined object by using properties, methods, accessors, constructors, and display.
8	JavaScript Conditional Statements and Loops Write a program which asks the user to enter three integers, obtains the numbers from the user and outputs HTML text that displays the larger number followed by the words "LARGER NUMBER" in an information message dialog. If the numbers are equal, output HTML text as "EQUAL NUMBERS." Write a program to display week days using switch case. c. Write a program to print 1 to 10 numbers using for, while and do-while loops. d. Write a program to print data in object using for-in, for-each and for-of loops e. Develop a program to determine whether a given number is an 'ARMSTRONG NUMBER' or not. [Eg: 153 is an Armstrong number, since sum of the cube of the digits is equal to the number i.e.,13 + 53+ 33 = 153] f. Write a program to display the denomination of the amount deposited in the bank in terms of 100's, 50's, 20's, 10's, 5's, 2's & 1's. (E.g.: If deposited amount is Rs.163, the output should be 1-100's, 1-50's, 1- 10's, 1-2's & 1 -1's)
9	JavaScript Functions and Events a. Design an appropriate function should be called to display i. Factorial of that number ii. Fibonacci series up to that number iii. Prime numbers up to that number iv. Is it palindrome or not b. Design a HTML having a text box and four buttons named Factorial, Fibonacci, Prime, and Palindrome. When a button is pressed an appropriate function should be called to display i. Factorial of that number ii. Fibonacci series up to that number iii. Prime numbers up to that number iv. Is it palindrome or not c. Write a program to validate the following fields in a registration page i. Name (start with alphabet and followed by alphanumeric and the length should not be less than 6 characters) ii. Mobile (only numbers and length 10 digits) iii. E-mail (should contain format like xxxxxxx@xxxxxx.xxx)
Textbooks:	
1	Web Design with HTML, CSS, JavaScript and JQuery Set Book by Jon Duckett Professional JavaScript for Web Developers Book by Nicholas C. Zakas.

2	Learning PHP, MySQL, JavaScript, CSS & HTML5: A Step-by-Step Guide to Creating DynamicWebsites by Robin Nixon.
Reference Books:	
1	Programming the World Wide Web, 7th Edition, Robet W Sebesta, Pearson, 2013.
2	Web Programming with HTML5, CSS and JavaScript, John Dean, Jones & Bartlett Learning,2019 (Chapters 1-11)
3	Pro MERN Stack: Full Stack Web App Development with Mongo, Express, React, and Node,Vasan Subramanian, 2nd edition, APress, O'Reilly.

Course Code	Category	L	T	P	C	C.I.E.	S.E.E.	Exam
B23IT3113	**ES**	**--**	**--**	**2**	**1**	**30**	**70**	**3 Hrs.**

USER INTERFACE DESIGN USING FLUTTER (TINKERING LAB)

(For IT)

Course Objectives:

1.	Learns to Implement Flutter Widgets and Layouts
2.	Understands Responsive UI Design and with Navigation in Flutter
3.	Knowledge on Widgets and customize widgets for specific UI elements, Themes
4.	Understand to include animation apart from fetching data

Course Outcomes: At the end of the course students will be able to

S.No	Outcome	Knowledge Level
1.	**Develop** mobile user interfaces using Flutter widgets like Text, Image, Container, Row, and Column.	K3
2.	**Implement** responsive layouts using Flutter's layout widgets and media queries to support multiple screen sizes.	K3
3.	**Use** Flutter's navigation system to create multi-screen applications with both direct and named route navigation.	K3
4.	**Apply** appropriate widget types (stateless or stateful) in Flutter applications to manage UI updates based on user interactions.	K3
5.	**Apply** navigation techniques and basic state management using set State and named routes in Flutter applications.	K3

SYLLABUS

1.	a) Install Flutter and Dart SDK. b) Write a simple Dart program to understand the language basics.
2.	a) Explore various Flutter widgets (Text, Image, Container, etc.). b) Implement different layout structures using Row, Column, and Stack widgets.
3.	a) Design a responsive UI that adapts to different screen sizes. b) Implement media queries and breakpoints for responsiveness.
4.	a) Set up navigation between different screens using Navigator. b) Implement navigation with named routes.
5.	a) Learn about stateful and stateless widgets. b) Implement state management using set State and Provider.
6.	a) Create custom widgets for specific UI elements. b) Apply styling using themes and custom styles.
7.	a) Design a form with various input fields. b) Implement form validation and error handling.
8.	a) Add animations to UI elements using Flutter's animation framework. Experiment with different types of animations (fade, slide, etc.).
9.	a) Fetch data from a REST API. Display the fetched data in a meaningful way in the UI.
10.	a) Write unit tests for UI components. b) Use Flutter's debugging tools to identify and fix issues.

Reference Books:

1.	Marco L. Napoli, Beginning Flutter: A Hands-on Guide to App Development.
2.	Rap Payne, Beginning App Development with Flutter: Create Cross-Platform Mobile Apps 1st Edition, Apres
3.	Richard Rose, Flutter & Dart Cookbook, Developing Full stack Applications for the Cloud, Oreilly.
E-Resources:	
1.	https://swayam-plus.swayam2.ac.in/courses/course-details?id=P_SMARTBRIDGE_06
2.	https://onlinecourses.nptel.ac.in/noc21_ar05/preview

Course Code	Category	L	T	P	C	C.I.E.	S.E.E.	Exam
B23MC3101	MC	2	--	--		30		

EMPLOYABILITY SKILLS

(For AIML, CSBS, CSE, IT and MECH)

Course Objectives:

1.	To introduce concepts required in framing grammatically correct sentences and identifying errors while using standard English.
2.	To acquaint the learner of making a coherent and cohesive sentences and paragraphs for composing a written discourse.
3.	To inculcate logical thinking in order to frame and use data as per the requirement.

Course Outcomes

S.No	Outcome	Knowledge Level
1.	Match various vocabulary items that appear in competitive examinations with their contextual meanings accurately.	K1
2.	Identify grammatical and ungrammatical usage of English language in all the grammar related questions asked in various competitive examinations like CAT, GRE, IBPS.	K3
3.	Infer meaning from complex texts that are set as questions in different competitive examinations held for higher education or employment	K2
4.	Find solutions to complex arithmetic problems set as questions in the competitive examinations held for employment or higher education	K1
5.	Apply logical thinking abilities in solving the problems of reasoning that appear in the examinations like CAT, GRE, GATE, IBPS.	K3

SYLLABUS

UNIT-I (10Hrs)	Synonyms, Antonyms, Frequently Confused Words, Foreign Phrases, Idioms and Phrasal Verbs, Collocations. Spotting Errors, Sentence Improvement
UNIT-II (10 Hrs)	Time and work, Pipes and Cisterns. Time and Distance Problems, Problems on boats and streams. Percentages, Profit and loss, Simple interest and Compound interest. Discount Problems.
UNIT-III (10 Hrs)	Analogies, Odd One Out. (Verbal ability) Number Series, Letter Series, Analogy, Alpha Numeric Series, Order and Ranking, Directions, Data sufficiency, Syllogisms.
UNIT-IV (10 Hrs)	Sentence Completion, Sentence Equivalence, Close Test Reading Comprehension , Para Jumbles

UNIT-V (10 Hrs)	Number System: Divisibility tests, finding remainders in various cases, Problems related to numbers, Methods to find LCM, Methods to find HCF.
Textbooks:	
1.	*How to Prepare for Verbal Ability and Reading Comprehension for CAT* (10th edition) by Arun Sharma and Meenakshi Upadhyay, McGraw Hill Education, 2022.
2.	*How to Prepare for Quantitative Aptitude for CAT (10th edition) by* by Arun Sharma , McGraw Hill Education, 2022.
Reference Books:	
1.	*English Collocation in Use*- Intermediate (2nd edition) by Michael McCarthy& Felicity O'Dell, CUP, 2017.
2.	*Magical Book On Quicker Maths* (5th Edition) By M.Tyra, BSC Publishing Co Pvt. Ltd, 2018.
e-Resources	
1.	www.Indiabix.com
2.	www.800score.com

Regulation: R23	**III / IV - B.Tech. II - Semester**

INFORMATION TECHNOLOGY

COURSE STRUCTURE
(With effect from 2023-24 admitted Batch onwards)

Course Code	Course Name	Category	L	T	P	Cr	C.I.E.	S.E.E.	Total Marks
B23IT3201	Cloud Computing	PC	3	0	0	3	30	70	100
B23IT3202	Cryptography & Network Security	PC	3	0	0	3	30	70	100
B23IT3203	Machine Learning	PC	3	0	0	3	30	70	100
#PE-II	Professional Elective – II	PE	3	0	0	3	30	70	100
#PE-III	Professional Elective – III	PE	3	0	0	3	30	70	100
#OE-II	Open Elective – II	OE	3	0	0	3	30	70	100
B23IT3214	Cloud Computing Lab	PC	0	0	3	1.5	30	70	100
B23IT3215	Machine Learning Lab	PC	0	0	3	1.5	30	70	100
B23BS3201	Soft Skills	SEC	0	1	2	2	30	70	100
B23AC3201	Technical Paper Writing & IPR	AC	2	--	--	--	30	--	30
		TOTAL	**20**	**1**	**08**	**23**	**300**	**630**	**930**

	Course Code	Course
#PE-II	B23IT3204	Software Testing Methodologies
	B23IT3205	Augmented Reality & Virtual Reality
	B23IT3206	DevOps
	B23IT3207	Generative AI
	B23IT3208	MOOCS-II
#PE-III	B23IT3209	Software Project Management
	B23IT3210	Mobile Adhoc Networks
	B23IT3211	Natural Language Processing
	B23IT3212	Distributed Operating System
	B23IT3213	MOOCS-III
#OE-II	Student has to study one Open Elective offered by CE or ECE or EEE or ME or S&H from the list enclosed.	
*Mandatory Industry Internship /Mini Project of 08 weeks duration during summer vacation		

Course Code	Category	L	T	P	C	C.I.E.	S.E.E.	Exam
B23IT3201	PC	3	--	--	3	30	70	3 Hrs.

CLOUD COMPUTING

(For IT)

Course Objectives: Students are expected to learn

1.	To explain the evolving utility computing model called cloud computing
2.	To introduce the various levels of services offered by cloud.
3.	To discuss the fundamentals of cloud enabling technologies such as distributed computing, service-oriented architecture and virtualization.
4.	To emphasize the security and other challenges in cloud computing.
5.	To introduce the advanced concepts such as containers, serverless computing and cloud-centric Internet of Things.

Course Outcomes: At the end of the course students will be able to

S.No	Outcome	Knowledge Level
1.	Interpret the fundamental concepts and challenges associated with cloud computing.	K3
2.	Analyze the economic, financial, and technological factors influencing the adoption of cloud solutions in organizations.	K3
3.	Assess virtualization techniques and resource management strategies for deploying cloud-based applications.	K3
4.	Evaluate organizational requirements related to scalability, capacity planning, and security in cloud environments.	K3
5.	Develop real-time cloud applications using leading platforms such as AWS, Google Cloud, and Microsoft Azure.	K3

SYLLABUS

UNIT-I (8Hrs)	Introduction to Cloud Computing Fundamentals: Cloud computing briefly, defining a cloud, cloud computing reference model, types of services (IaaS, PaaS, SaaS), cloud deployment models (public, private, hybrid), utility computing, cloud computing characteristics and benefits, cloud service providers (Amazon Web Services, Microsoft Azure, Google AppEngine.
UNIT-II (8 Hrs)	Cloud Enabling Technologies Ubiquitous Internet, parallel and distributed computing, elements of parallel computing, hardware architectures for parallel computing (SISD, SIMD, MISD, MIMD), elements of distributed computing, Inter-process communication, technologies for distributed computing, remote procedure calls (RPC), service-oriented architecture (SOA), Web services.

UNIT-III (8 Hrs)	Virtualization and Containers Characteristics of virtualized environments, taxonomy of virtualization techniques, virtualization and cloud Computing, pros and cons of virtualization, technology examples (XEN, VMware), building blocks of containers, container platforms (LXC, Docker), container orchestration, Docker Swarm and Kubernetes, public cloud VM (e.g. Amazon EC2) and container (e.g. Amazon Elastic Container Service) offerings.
UNIT-IV (8 Hrs)	Cloud computing challenges Economics of the cloud, cloud interoperability and standards, scalability and fault tolerance, energy efficiency in clouds, federated clouds, cloud computing security, fundamentals of computer security, cloud security architecture, cloud shared responsibility model, security in cloud deployment models.
UNIT-V (8 Hrs)	Advanced concepts in cloud computing Serverless computing, Function-as-a-Service, serverless computing architecture, public cloud (e.g. AWS Lambda) and open-source (e.g. OpenFaaS) serverless platforms, cloud-centric IoT - IoT architecture and cloud layers, edge, and fog computing – Edge vs Fog vs Cloud, Introduction to DevOps – CI/CD, infrastructure-as-code, Quantum-as-a-Service (QaaS).
Textbooks:	
1.	Mastering Cloud Computing, 2nd edition, RajkumarBuyya, Christian Vecchiola, ThamaraiSelvi, ShivanandaPoojara, Satish N. Srirama, Mc Graw Hill, 2024
2.	Distributed and Cloud Computing, Kai Hwang, Geoffery C. Fox, Jack J. Dongarra, Elsevier, 2012
Reference Books:	
1.	Cloud Computing, Theory and Practice, Dan C Marinescu, 2nd edition, MK Elsevier, 2018
2.	Essential of Cloud Computing, 1st Edition, K Chandrasekharan, CRC Press, 2014.
3.	Online documentation and tutorials from cloud service providers (e.g., AWS, Azure, GCP)

Course Code	Category	L	T	P	C	C.I.E.	S.E.E.	Exam
B23IT3202	PC	3	--	--	3	30	70	3 Hrs.

CRYPTOGRAPHY & NETWORK SECURITY

(For IT)

Course Objectives: Students are expected to learn

1.	Solve problems using algorithm design methods such as the RSA, DES, AES
2.	Analyze the performance of algorithms.
3.	Demonstrate a familiarity with major algorithms and internet security protocols.

Course Outcomes: At the end of the course students will be able to

S.No	Outcome	Knowledge Level
1.	Apply the mathematical background required for cryptography.	K3
2.	Analyze the algorithms on security problems	K4
3.	Analyze symmetric and asymmetric approaches for cryptography.	K4
4.	Understand authentication mechanisms for internet security.	K2
5.	Understand the principles of Internet security protocols for Internet applications.	K2

SYLLABUS

UNIT-I (8Hrs)	INTRODUCTION TO NUMBER THEORY: Prime Numbers, Fermat's and Eulers Theorems, Testing for Primality, The Chinese Remainder Theorem, Euclidean theorem. INTRODUCTION TO SECURITY: The need for security-Security approaches, principals of security, plain text, and cipher Text- Types of attacks
UNIT-II (8 Hrs)	CRYPTOGRAPHY CONCEPTS AND TECHNIQUES: Substitution and Transportation Techniques –Encryption Techniques –Encryption and Decryption- Symmetric and Asymmetric Cryptography – Stenography SYMMETRIC KEY CRYPTOGRAPHIC ALGORITHMS: Feistel Cipher Structure, Data encryption standard, Triple DES, Stream Ciphers and RC4.
UNIT-III (8 Hrs)	ASYMMETRIC KEY CRYPTOGRAPHIC ALGORITHMS: Overview of asymmetric key cryptography, Diffie Hellman Key exchange, RSA algorithm-symmetric and asymmetric key cryptography together-Message Digest- MAC- HMAC- digital signatures.
UNIT-IV (8 Hrs)	PUBLIC KEY INFRASTRUCTURE: Introduction- Digital Certificates- Private Key the PKIX model. USER AUTHENTICATION MECHANISMS: Introduction-Authentication basics-passwords authentication tokens-certificate based authentication-biometrics authentication-KDC, Kerberos

UNIT-V (8 Hrs)	INTERNET SECURITY PROTOCOLS: Basic concepts -SSL-SHTTP-TSP-SET- SSL versus SET-Email security- Simple SMTP, Privacy Enhanced Mail (PEM), Pretty Good Privacy (PGP) S/MIME, Introduction to firewalls-IP security-Virtual Private Networks
Textbooks:	
1.	Cryptography and Network security, AtulKahate ,Tata McGraw-Hill Pub company Ltd., New Delhi
2.	Cryptography and network security, principles and Practices by William Stallings, 3rd edition, Pearson Pub
Reference Books:	
1.	Network Security Private Communication in a public world, Charlie Kaufman, Radia Perlman & Mike Speciner, Prentice Hall of India Private Ltd., New Delhi.
2.	Network Security: The Complete Reference by Roberta Bragg, Mark Phodes- Ousley, Keith Strassberg Tata Mcgraw-Hill.

Course Code	Category	L	T	P	C	C.I.E.	S.E.E.	Exam
B23IT3203	PC	3	0	0	3	30	70	3 Hrs.

MACHINE LEARNING

(For IT)

Course Objectives:

1.	**To introduce** the fundamental concepts, types, applications, and challenges of Machine Learning
2.	**To develop** the ability to implement regression, classification, and clustering algorithms for data-driven decision-making
3.	**To apply** various Machine Learning models and use performance metrics and optimization techniques to assess their effectiveness.
4	**To describe** the principles of advanced Machine Learning models, including ensemble methods, neural networks, and reinforcement learning, and explain their applications.

Course Outcomes: At the end of the course students will be able to

S.No	Outcome	Knowledge Level
1.	**Explain** core Machine Learning concepts, types, challenges, and key principles.	K2
2.	**Apply** appropriate regression techniques, including linear, non-linear, and regularized models like Ridge and Lasso, to solve real-world prediction problems.	K3
3.	**Apply** classification algorithms such as Decision Trees, Naive Bayes, and K-Nearest Neighbors to solve binary, multi-class, and imbalanced classification problems using appropriate evaluation metrics.	K3
4.	**Apply** Support Vector Machines, ensemble learning techniques, and clustering algorithms such as K-Means and K-Medoids to solve classification and clustering problems using appropriate similarity measures.	K3
5.	**Apply** the concepts of Random Forest, Reinforcement Learning, and Artificial Neural Networks to solve real-world classification and decision-making problems.	K3

SYLLABUS

UNIT-I (10Hrs)	**Introduction to Machine Learning:** Definition, Relation between AI, ML, DL, Need of Machine Learning, Types of Machine Learning, Applications, Challenges of Machine Learning, Data Acquisition. Features selections and features extraction, Overfitting Vs Underfitting, Bais and variance.
UNIT-II (10 Hrs)	**Linear Regression, Non-Linear Regression:** Introduction, Key differences between Linear Regression and Non-Linear Regression. **Regularization:** Introduction, Types of Regularization, Ridge Regression vs Lasso Regression. **Logistic Regression:** Binary Classification.

UNIT-III (10 Hrs)	**Classification:** Introduction, Types of learners, Binary classifier, Multi-class classification, Multi label classification, Imbalanced classification. **Decision Tree:** Representation, Decision Tree Learning Algorithm (ID3), Metrics for Evaluating Classifier Performance. **Navie Bayes:** Theorem, Bayesian Classification algorithm. K-Nearest Neighbors: Distance Metrics, (KNN) Algorithm, Limitations.
UNIT-IV (10 Hrs)	**Support Vectors:** Linear SVM, Non-Linear SVM, SVR. **Ensembled Learning:** Bagging, Boosting, Stacking, Random Forest. **Cluster Analysis:** Introduction, Basic Clustering Methods, Measures of Similarity and Dissimilarity. **Partitioning Methods:** K-Means and K-Medoids algorithms.
UNIT-V (10 Hrs)	**Introduction:** Random Forest, Reinforcement Learning. **Dimensionality Reduction:** Principal Component Analysis (PCA). **Artificial Neural Networks (ANN):** Introduction, Biological Neurons, Artificial Neurons, Perceptron, Multi-layer Perceptron, performing logical operations, Feedforward Network, Back propagation Algorithm.
Textbooks:	
1.	Machine Learning, Tom M. Mitchell, First Edition, 2017, McGraw Hill Education.
2.	Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems, AurelienGeron, Third Edition, 2022, O'Reilly
Reference Books:	
1.	Machine Learning: A Probabilistic Perspective, Kevin P. Murphy, 2012, MIT Press
2.	"Machine Learning for Absolute Beginners" – Oliver Theobald
e-Resources	
1.	Introduction to Machine Learning :https://nptel.ac.in/courses/106105152
2.	Introduction to Machine Learning :https://nptel.ac.in/courses/106106139
3.	Machine Learning :https://nptel.ac.in/courses/106106202

Code	Category	L	T	P	C	C.I.E.	S.E.E.	Exam
B23IT3204	**PE**	**3**	**--**	**--**	**3**	**30**	**70**	**3 Hrs.**

SOFTWARE TESTING METHODOLOGIES

(For IT)

Course Objectives:

1.	To study the fundamental concepts of software testing which includes objectives, process, criteria, strategies, and methods.
2.	To discuss various software testing types and levels of testing like black and white box testing along with levels unit test, integration, regression, and system testing.
3.	To learn the types of bugs, testing levels with which the student can very well identify a bug and correct as when it happens.
4	It provides knowledge on transaction flow testing and data flow testing techniques so that the flow of the program is tested as well.
5.	To learn the domain testing, path testing and logic-based testing to explore the testing process easier.

Course Outcomes: At the end of the course students will be able to

S.No	Outcome	Knowledge Level
1.	Identify various bugs and correcting them after knowing the consequences of the bug.	K2
2.	Illustrate the functional testing using Transaction flow and domain testing	K3
3.	Use of program's control flow as a paths and logic-based testing.	K2
4.	Understand the State Graphs and Transition testing.	K2
5	Analyze the needs of software test automation and management using the latest tools.	K3

SYLLABUS

UNIT-I (10Hrs)	Introduction: Purpose of testing, Dichotomies, model for testing, consequences of bugs, taxonomy of bugs Flow graphs and Path testing: Basics concepts of path testing, predicates, path predicates and achievable paths, path sensitizing, path instrumentation, application of path testing.
UNIT-II (10 Hrs)	Transaction Flow Testing: transaction flows, transaction flow testing techniques. Data Flow testing: Basics of data flow testing, strategies in data flow testing, application of data flow testing. Domain Testing: domains and paths, Nice & ugly domains, domain testing, domains and interfaces testing, domain and interface testing, domains, and testability

UNIT-III (10 Hrs)	Paths, Path products and Regular expressions: path products & path expression, reduction procedure, applications, regular expressions & flow anomaly detection. Logic Based Testing: overview, decision tables, path expressions, kv charts, specifications.
UNIT-IV (10 Hrs)	State, State Graphs and Transition testing: state graphs, finate state machine, State tables, good state graphs and bad state graphs, state testing, principles of state testing, limitations and Extensions, Testability tips.
UNIT-V (10 Hrs)	Graph Matrices and Application: Motivational overview, matrix of graph, relations, power of a matrix, node reduction algorithm, building tools. (Student should be given an exposure to a tool like Jmeter/selenium/soapUI/Catalon).

Textbooks:	
1.	Software Testing techniques - BarisBeizer, Dreamtech, second edition.
2.	Software Testing Tools – Dr. K. V. K. K. Prasad, Dreamtech.
Reference Books:	
1.	The craft of software testing - Brian Marick, Pearson Education.
2.	Software Testing Techniques – SPD(Oreille).
3.	Software Testing in the Real World – Edward Kit, Pearson
4.	Art of Software Testing – Meyers, John Wiley.
5.	Effective methods of Software Testing, Perry, John Wiley
e-Resources	
1.	https://nptel.ac.in/courses/106105150
2.	https://www.tutorialspoint.com/software_testing_dictionary/test_tools.htm

Code	Category	L	T	P	C	C.I.E.	S.E.E.	Exam
B23IT3205	**PE**	**3**	**--**	**--**	**3**	**30**	**70**	**3 Hrs.**

AUGMENTED REALITY & VIRTUAL REALITY

(For IT)

Course Objectives: The objective of this course is to make the student learn about

1.	To Provide a foundation to the fast-growing field of AR and make the students aware of the various AR concepts.
2.	To understand historical and modern overviews and perspectives on virtual reality. Describes the fundamentals of sensation, perception, technical and engineering aspects of virtual reality systems

Course Outcomes: At the end of the course students will be able to

S.No	Outcome	Knowledge Level
1.	Describe how AR systems work and list the applications of AR.	K2
2.	Understand the software architectures of AR	K2
3.	Understand the Visual perception and rendering in VR	K2
4.	Understand the interaction, auditory perception and rendering in VR	K2

SYLLABUS

UNIT-I (10Hrs)	Introduction to Augmented Reality: Augmented Reality - Defining augmented reality, history of augmented reality, Examples, Related fields Displays: Multimodal Displays, Visual Perception, Requirements and Characteristics, Spatial Display Model, Visual Displays Tracking: Tracking, Calibration, and Registration, Coordinate Systems, Characteristics of Tracking Technology, Stationary Tracking Systems, Mobile Sensors
UNIT-II (10 Hrs)	Computer Vision for Augmented Reality: Marker Tracking, Multiple-Camera Infrared Tracking, Natural Feature Tracking by Detection, Outdoor Tracking. Interaction: Output Modalities, Input Modalities, Tangible Interfaces, Virtual User Interfaces on Real Surfaces, Augmented Paper, Multi-view Interfaces, Haptic Interaction Software Architectures: AR Application Requirements, Software Engineering Requirements, Distributed Object Systems, Dataflow, Scene Graphs
UNIT-III (10 Hrs)	Introduction to Virtual Reality: Defining Virtual Reality, History of VR, Human Physiology and Perception The Geometry of Virtual Worlds: Geometric Models, Axis-Angle Representations of Rotation, Viewing Transformations Light and Optics: Basic Behavior of Light, Lenses, Optical Aberrations, The Human Eye, Cameras, Displays

UNIT-IV (10 Hrs)	The Physiology of Human Vision: From the Cornea to Photoreceptors, From Photoreceptors to the Visual Cortex, Eye Movements, Implications for VR Visual Perception: Visual Perception - Perception of Depth, Perception of Motion, Perception of Color Visual Rendering: Visual Rendering -Ray Tracing and Shading Models, Rasterization, Correcting Optical Distortions, Improving Latency and Frame Rates, Immersive Photos and Videos
UNIT-V (10 Hrs)	Motion in Real and Virtual Worlds: Velocities and Accelerations, The Vestibular System, Physics in the Virtual World, Mismatched Motion and Vection Interaction: Motor Programs and Remapping, Locomotion, Social Interaction Audio: The Physics of Sound, The Physiology of Human Hearing, Auditory Perception, Auditory Rendering
Textbooks:	
1.	Augmented Reality: Principles & Practice by Schmalstieg / Hollerer, Pearson Education India; First edition (12 October 2016),ISBN-10: 9332578494.
2.	Virtual Reality, Steven M. LaValle, Cambridge University Press, 2016
Reference Books:	
1.	Allan Fowler-AR Game Development‖, 1st Edition, A press Publications, 2018, ISBN 978-1484236178
2.	Understanding Virtual Reality: Interface, Application and Design, William R Sherman and Alan B Craig, (The Morgan Kaufmann Series in Computer Graphics)". Morgan Kaufmann Publishers, San Francisco, CA, 2002
3	Developing Virtual Reality Applications: Foundations of Effective Design, Alan B Craig, William R Sherman and Jeffrey D Will, Morgan Kaufmann, 2009
4	Designing for Mixed Reality, Kharis O'Connell Published by O'Reilly Media, Inc., 2016, ISBN:9781491962381
5	Sanni Siltanen- Theory and applications of marker-based augmented reality. Julkaisija – Utgivare Publisher. 2012. ISBN 978-951-38-7449-0
6	Gerard Jounghyun Kim, "Designing Virtual Systems: The Structured Approach", 2005

Code	Category	L	T	P	C	C.I.E.	S.E.E.	Exam
B23IT3206	**PE**	**3**	**--**	**--**	**3**	**30**	**70**	**3 Hrs.**

DEVOPS

(For IT)

Course Objectives:

1.	To describe the agile relationship between development and IT operations
2.	To understand the skill sets and high-functioning teams involved in DevOps and related methods to reach a continuous delivery capability
3	To implement automated system update and DevOps lifecycle

Course Outcomes: At the end of the course students will be able to

S.No	Outcome	Knowledge Level
1.	Identify components of Devops environment	K2
2.	Describe Software development models and architectures of DevOps	K2
3.	Apply different project management, integration, testing and code deployment tool.	K3
4.	Investigate different DevOps Software development models.	K3
5.	Assess, Collaborate and adopt various Devops in real-time projects	K3

SYLLABUS

UNIT-I (10Hrs)	Introduction to DevOps: Introduction to SDLC, Agile Model. Introduction to Devops. DevOps Features, DevOps Architecture, DevOps Lifecycle, Understanding Workflow and principles, Introduction to DevOps tools, Build Automation, Delivery Automation, Understanding Code Quality, Automation of CI/ CD. Release management, Scrum, Kanban, delivery pipeline, bottlenecks, examples
UNIT-II (10 Hrs)	Source Code Management (GIT): The need for source code control, The history of source code management, Roles and code, source code management system and migrations. What is Version Control and GIT, GIT Installation, GIT features, GIT workflow, working with remote repository, GIT commands, GIT branching, GIT staging and collaboration. UNIT TESTING - CODE COVERAGE: Junit, nUnit& Code Coverage with Sonar Qube, SonarQube - Code Quality Analysis.
UNIT-III (10 Hrs)	Build Automation - Continuous Integration (CI): Build Automation, what is CI Why Cl is Required, CI tools, Introduction to Jenkins (With Architecture), jenkins workflow, jenkins master slave architecture, Jenkins Pipelines, PIPELINE BASICS - Jenkins Master, Node, Agent, and Executor Freestyle Projects & Pipelines, Jenkins for Continuous Integration, Create and Manage Builds, User Management in Jenkins Schedule Builds, Launch Builds on Slave Nodes.

UNIT-IV (10 Hrs)	Continuous Delivery (CD): Importance of Continuous Delivery, CONTINUOUS DEPLOYMENT CD Flow, Containerization with Docker: Introduction to Docker, Docker installation, Docker commands, Images & Containers, DockerFile, running containers, working with containers and publish to Docker Hub. Testing Tools: Introduction to Selenium and its features, JavaScript testing
UNIT-V (10 Hrs)	Configuration Management - ANSIBLE: Introduction to Ansible, Ansible tasks, Roles, Jinjatemplating, Vaults, Deployments using Ansible. CONTAINERIZATION USING KUBERNETES(OPENSHIFT): Introduction to Kubernetes Namespace & Resources, CI/CD - On OCP, BC, DC &ConfigMaps, Deploying Apps on Openshift Container Pods. Introduction to Puppet master and Chef.
Textbooks:	
1.	Joyner, Joseph., Devops for Beginners: Devops Software Development Method Guide for Software Developers and It Professionals, 1st Edition MihailsKonoplows, 2015.
2	Alisson Machado de Menezes., Hands-on DevOps with Linux,1st Edition, BPB Publications, India, 2021.
Reference Books:	
1.	Len Bass, Ingo Weber, Liming Zhu. DevOps: A Software Architect's Perspective. Addison Wesley; ISBN-10
2.	Gene Kim Je Humble, Patrick Debois, John Willis. The DevOps Handbook, 1st Edition, IT Revolution Press, 2016.
3	Verona, Joakim Practical DevOps, 1st Edition, Packt Publishing, 2016.
4	Joakim Verona. Practical Devops, Ingram short title; 2nd edition (2018). ISBN10: 1788392574
5	Deepak Gaikwad, Viral Thakkar. DevOps Tools from Practitioner's Viewpoint. Wiley publications. ISBN: 9788126579952

Course Code	Category	L	T	P	C	C.I.E.	S.E.E.	Exam
B23IT3207	PE	3	--	--	3	30	70	3 Hrs.

GENERATIVE AI

(For IT)

Course Objectives:

1.	Understand the basics of Generative AI.
2.	Know the basics of Text Generation.
3	Understand the process of generating videos.
4	Know about GAN and its variants.

Course Outcomes: At the end of the course students will be able to

S.No	Outcome	Knowledge Level
1.	Explain the basic concepts of generative models in AI and use cases	K2
2.	Illustrate the various Generative Models for Text and prompt designing.	K3
3.	Use of Generative Models For images	K3
4.	Discuss various generative models for Painting, Music, and Play	K3
5.	Apply various Open-Source Models and Programming Frameworks	K3

SYLLABUS

UNIT-I (10Hrs)	Introduction To Gen Ai: Historical Overview of Generative modelling, Difference between Gen AI and Discriminative Modeling, Importance of generative models in AI and Machine Learning, Types of Generative models, GANs, VAEs, autoregressive models and Vector quantized Diffusion models, understanding if probabilistic modeling and generative process, Challenges of Generative Modeling, Future of Gen AI, Ethical Aspects of AI, Responsible AI, Use Cases.
UNIT-II (10 Hrs)	Generative Models for Text: Language Models Basics, building blocks of Language models, Transformer Architecture, Encoder and Decoder, Attention mechanisms, Generation of Text, Models like BERT and GPT models, Generation of Text, Autoencoding, Regression Models, Exploring ChatGPT, Prompt Engineering: Designing Prompts, Revising Prompts using Reinforcement Learning from Human Feedback (RLHF), Retrieval Augmented Generation, Multimodal LLM, Issues of LLM like hallucination.
UNIT-III (10 Hrs)	Generation of Images: Introduction to Generative Adversarial Networks, Adversarial Training Process, Nash Equilibrium, VariationalAutoencoders, Encoder-Decoder Architectures, Stable Diffusion Models, Introduction to Transformer-based Image Generation, CLIP, Visual Transformers ViT- Dall-E2 and Dall-E3, GPT-4V, Issues of Image Generation models like Mode Collapse and Stability.

UNIT-IV (10 Hrs)	Generation of Painting, Music, and Play: Variants of GAN, Types of GAN, Cyclic GAN, Using Cyclic GAN to Generate Paintings, Neural Style Transfer, Style Transfer, Music Generating RNN, Muse GAN, Autonomous agents, Deep Q Algorithm, Actor-critic Network.
UNIT-V (10 Hrs)	Open-Source Models and Programming Frameworks: Training and Fine tuning of Generative models, GPT 4 All, Transfer learning and Pretrained models, Training vision models, Google Copilot, Programming LLM, Lang Chain, Open-Source Models, Llama, Programming for Times former, Deployment, Hugging Face.
Textbooks:	
1.	Denis Rothman, "Transformers for Natural Language Processing and Computer Vision", Third Edition , Packt Books, 2024
Reference Books:	
1.	David Foster," Generative Deep Learning", O'Reily Books, 2024.
2	Altaf Rehmani, "Generative AI for Everyone", BlueRose One, 2024.

Code	Category	L	T	P	C	C.I.E.	S.E.E.	Exam
B23IT3209	**PE**	**3**	**--**	**--**	**3**	**30**	**70**	**3 Hrs.**

SOFTWARE PROJECT MANAGEMENT

(For IT)

Course Objectives: At the end of the course, the student shall be able to**:**

1.	Describe and determine the purpose and importance of project management from the perspectives of planning, tracking and completion of project
2.	Compare and differentiate organization structures and project structures
3.	Implement a project to manage project schedule, expenses and resources with the application of suitable project management tools

Course Outcomes: Upon the completion of the course students will be able to:

S.No	Outcome	Knowledge Level
1.	Apply the process to be followed in the software development life-cycle models	K3
2.	Apply the concepts of project management & planning	K3
3.	Implement the project plans through managing people, communications and change	K3
4.	Conduct activities necessary to successfully complete and close the Software projects .	K3
5.	Implement communication, modeling, and construction & deployment practices in software development .	K3

SYLLABUS

UNIT-I (10 Hrs)	Conventional Software Management: The waterfall model, conventional software Management performance. Evolution of Software Economics: Software Economics, pragmatic software cost estimation. Improving Software Economics: Reducing Software product size, improving software processes, improving team effectiveness, improving automation, Achieving required quality, peer inspections. The old way and the new: The principles of conventional software Engineering, principles of modern software management, transitioning to an iterative process
UNIT-II (10 Hrs)	Life cycle phases: Engineering and production stages, inception, Elaboration, construction, transition phases. Artifacts of the process: The artifact sets, Management artifacts, Engineering artifacts, programmatic artifacts.
UNIT-III (10 Hrs)	Model based software architectures: A Management perspective and technical perspective.

	Work Flows of the process: Software process workflows, Iteration workflows. Checkpoints of the process: Major milestones, Minor Milestones, Periodic status assessments. Iterative Process Planning: Work breakdown structures, planning guidelines, cost and schedule estimating, Iteration planning process, Pragmatic planning.
UNIT-IV (10 Hrs)	Project Organizations and Responsibilities: Line-of-Business Organizations, Project, Organizations, evolution of Organizations. Process Automation: Automation Building blocks, The Project Environment. Project Control and Process instrumentation: The seven core Metrics, Management indicators, quality indicators, life cycle expectations, pragmatic Software Metrics, Metrics automation.
UNIT-V (10 Hrs)	Agile Methodology, ADAPTing to Scrum, Patterns for Adopting Scrum, Iterating towards Agility. Fundamentals of DevOps: Architecture, Deployments, Orchestration, Need, Instance of applications, DevOps delivery pipeline, DevOps eco system. DevOps adoption in projects: Technology aspects, Agiling capabilities, Tool stack implementation, People aspect, processes
Textbooks:	
1.	Software Project Management, Walker Royce, PEA, 2005
2.	Succeeding with Agile: Software development using Scrum, Mike Cohn, Addison Wesley
Reference Books:	
1.	Software Project Management, Bob Hughes,3/e, Mike Cotterell, TMH
2.	Software Project Management, Joel Henry, PEA
3.	Software Project Management in practice, PankajJalote, PEA, 2005
4.	Project Management in IT, Kathy Schwalbe, Cengage
e-Resources	
1.	https://onlinecourses.nptel.ac.in/noc19_cs70/preview
2.	https://www.javatpoint.com/software-project-management

Code	Category	L	T	P	C	C.I.E.	S.E.E.	Exam
B23IT3210	**PE**	**3**	**--**	**--**	**3**	**30**	**70**	**3 Hrs.**

MOBILE ADHOC NETWORKS

(For IT)

Course Objectives:

1.	Architect sensor networks for various application setups.
2.	Devise appropriate data dissemination protocols and model links cost.
3.	Understanding of the fundamental concepts of wireless sensor networks and has a basic knowledge of the various protocols at various layers
4.	Evaluate the performance of sensor networks and identify bottlenecks.

Course Outcomes: At the end of the course students will be able to

S.No	Outcome	Knowledge Level
1.	Discuss the characteristics, applications, and challenges of MANETs and design of MAC protocols.	K2
2.	Demonstrate the application of different routing protocols in various ad-hoc network topologies and scenarios.	K3
3.	Explain the different secure routing protocols used to protect against attacks in ad hoc networks.	K2
4.	Demonstrate the effects of different factors on the sensing and communication range by applying them to real-world scenarios.	K3
5.	Describe the key management techniques used in WSNs and their role in securing communication in the network.	K2

SYLLABUS

UNIT-I (10 Hrs)	Introduction to Ad Hoc Wireless Networks- Cellular and Ad Hoc Wireless Networks, Characteristics of MANETs, Applications of MANETs, Issues and Challenges of MANETs, Ad Hoc Wireless Internet, MAC protocols for Ad hoc Wireless Networks- Issues, Design Goals and Classifications of the MAC Protocols.
UNIT-II (10 Hrs)	Routing Protocols for Ad Hoc Wireless Networks- Issues in Designing a Routing Protocol, Classifications of Routing Protocols, Topology-based versus Position-based Approaches, Issues and design goals of a Transport layer protocol, Classification of Transport layer solutions, TCP over Ad hoc Wireless Networks, Solutions for TCP over Ad Hoc Wireless Networks, Other Transport layer protocols.
UNIT-III (10 Hrs)	Security protocols for Ad hoc Wireless Networks- Security in Ad hoc Wireless Networks, Network Security Requirements, Issues and Challenges in Security Provisioning, Network Security Attacks, Key Management, Secure Routing in Ad hoc Wireless Networks, Cooperation in MANETs, Intrusion Detection Systems.

UNIT-IV (10 Hrs)	Basics of Wireless Sensors and Applications- The Mica Mote, Sensing and Communication Range, Design Issues, Energy Consumption, Clustering of Sensors, Applications, Data Retrieval in Sensor Networks-Classification of WSNs, MAC layer, Routing layer, Transport layer, High-level application layer support, Adapting to the inherent dynamic nature of WSNs.
UNIT-V (10 Hrs)	Security in WSNs- Security in WSNs, Key Management in WSNs, Secure Data Aggregation in WSNs, Sensor Network Hardware-Components of Sensor Mote. Sensor Network Operating Systems–TinyOS, LA-TinyOS, SOS, RETOS, Imperative Language-nesC. Dataflow Style Language-TinyGALS, Node-Level Simulators, NS-2 and its sensor network extension, TOSSIM.
Textbooks:	
1.	C. Siva Ram Murthy andB.S. Manoj, Ad Hoc Wireless Networks: Architectures and Protocols,Pearson Education.
2.	Ad Hoc and Sensor Networks – Theory and Applications, 2nd editionCarlos Corderio Dharma P.Aggarwal,World Scientific Publications / Cambridge University Press, March
Reference Books:	
1.	Wireless Sensor Networks: An Information Processing Approach, 1st edition,Feng Zhao,Leonidas Guibas, Elsevier Science imprint, Morgan Kauffman Publishers, 2005, rp2009
2.	Wireless Ad hoc Mobile Wireless Networks – Principles, Protocols and Applications, 1st edition, Subir Kumar Sarkar, et al., Auerbach Publications, Taylor & Francis Group, 2008
3	Ad hoc Networking, 1stedition,*CharlesE.Perkins*, Pearson Education, 2001
4	Wireless Ad hoc Networking, 1st edition, *Shih-Lin Wu, Yu-Chee Tseng*, Auerbach Publications, Taylor & Francis Group, 2007
5	Wireless Sensor Networks – Principles and Practice, 1st edition, Fei Hu, Xiaojun Cao, An Auerbach book, CRC Press, Taylor & Francis Group, 2010
e-Resources	
1.	https://archive.nptel.ac.in/courses/106/105/106105160/

Course Code	Category	L	T	P	C	C.I.E.	S.E.E.	Exam
B23IT3211	PE	3	--	--	3	30	70	3 Hrs.

NATURAL LANGUAGE PROCESSING

(For IT)

Course Objectives: The objective of this course is to make the student learn about

1.	This course introduces the fundamental concepts and techniques of natural language processing(NLP).
2.	Students will gain an in-depth understanding of the computational properties of natural languages and the commonly used algorithms for processing linguistic information.
3.	The course examines NLP models and algorithms using both the traditional symbolic and the more recent statistical approach
4.	Enable students to be capable to describe the application based on natural language processing and to show the points of syntactic, semantic and pragmatic processing.

Course Outcomes: At the end of the course students will be able to

S.No	Outcome	Knowledge Level
1.	Demonstrate a given text with basic Language features	K2
2.	To execute an innovative application using NLP components	K3
3.	Explain a rule based system to tackle morphology/syntax of a language	K2
4.	To design a tag set to be used for statistical processing for real-time applications	K3
5.	Execute different statistical approaches for different types of NLP applications.	K3

SYLLABUS

UNIT-I (10Hrs)	Introduction: Origins and challenges of NLP, Language Modeling: Grammar-based LM, Statistical LM, Regular Expressions, Finite-State Automata, English Morphology, Transducers for lexicon and rules, Tokenization, Detecting and Correcting Spelling Errors, Minimum Edit Distance.
UNIT-II (10 Hrs)	Word Level Analysis: Unsmoothed N-grams, Evaluating N-grams, Smoothing, Interpolation and Backoff – Word Classes, Part-of-Speech Tagging, Rule-based, Stochastic and Transformation-based tagging, Issues in PoS tagging, Hidden Markov and Maximum Entropy models.
UNIT-III (10 Hrs)	Syntactic Analysis: Context-Free Grammars, Grammar rules for English, Treebanks, Normal Forms for grammar, Dependency Grammar, Syntactic Parsing, Ambiguity, Dynamic Programming parsing, Shallow parsing, Probabilistic CFG, Probabilistic CYK, Probabilistic Lexicalized CFGs, Feature structures, Unification of feature structures

UNIT-IV (10 Hrs)	Semantics And Pragmatics: Requirements for representation, First-Order Logic, Description Logics, Syntax-Driven Semantic analysis, Semantic attachments, Word Senses, Relations between Senses, Thematic Roles, selectional restrictions, Word Sense Disambiguation, WSD using Supervised, Dictionary & Thesaurus, Bootstrapping methods, Word Similarity using Thesaurus and Distributional methods.
UNIT-V (10 Hrs)	Discourse Analysis and Lexical Resources: Discourse segmentation, Coherence, Reference Phenomena, Anaphora Resolution using Hobbs and Centering Algorithm, Coreference Resolution, Resources: Porter Stemmer, Lemmatizer, Penn Treebank, Brill's Tagger, WordNet, PropBank, FrameNet, Brown Corpus, British National Corpus (BNC).
Textbooks:	
1.	Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics and Speech, 2nd Edition, Daniel Jurafsky, James H. Martin - Pearson Publication,2014.
2.	Natural Language Processing with Python, First Edition, Steven Bird, Ewan Klein and Edward Loper, OReilly Media,2009.
Reference Books:	
1.	Language Processing with Java and Ling Pipe Cookbook, 1st Edition, Breck Baldwin, Atlantic Publisher, 2015.
2.	Natural Language Processing with Java, 2nd Edition, Richard M Reese, OReilly Media,2015.
3.	Handbook of Natural Language Processing, Second, NitinIndurkhya and Fred J. Damerau, Chapman and Hall/CRC Press, 2010.Edition
4.	Natural Language Processing and Information Retrieval, 3rd Edition, TanveerSiddiqui, U.S. Tiwary, Oxford University Press,2008.
e-Resources	
1.	https://nptel.ac.in/courses/106105158
2.	https://sites.google.com/view/nlp-cs60075/course-materials
3.	https://intellipaat.com/blog/what-is-natural-language-processing/

Course Code	Category	L	T	P	C	C.I.E.	S.E.E.	Exam
B23IT3212	PE	3	--	--	3	30	70	3 Hrs.

DISTRIBUTED OPERATING SYSTEM

(For IT)

Course Objectives: The objective of this course is to make the student learn about

1.	Fundamentals of distributed systems and communication aspects in distributed environment.
2.	Synchronization of system clocks and synchronization of processes based on system clocks.
3.	File system implementation in distributed systems and shared memory models.

Course Outcomes: At the end of the course students will be able to

S.No	Outcome	Knowledge Level
1.	Understand the ways of communication in a distributed environment.	K2
2.	Illustrate issues related to communication among processors in distributed systems.	K3
3.	Describe working of various shared memory systems.	K2
4.	Illustrate issues and ways related to resource allocation.	K2
5.	Classify file system design and implementation for distributed systems.	K2

SYLLABUS

UNIT-I (10 Hrs)	Introduction to Distributed Systems: Fundamentals: What is Distributed Computing Systems? Evolution of Distributed Computing System; Distributed Computing System Models; What is Distributed Operating System? Issues in Designing a Distributed Operating System; Introduction to Distributed Computing Environment (DCE). Message Passing: Introduction, Desirable features of a Good Message Passing System, Issues in PC by Message Passing, Synchronization, Buffering, Multi-datagram Messages, Encoding and Decoding of Message Data, Process Addressing, Failure Handling, Group Communication, Case Study: 4.3 BSD UNIX IPC Mechanism.
UNIT-II (10 Hrs)	Remote Procedure Calls: Introduction, The RPC Model, Transparency of RPC, Implementing RPC Mechanism, Stub Generation, RPC Messages, Marshaling Arguments and Results, Server Management, Parameter-Passing Semantics, Call Semantics, Communication Protocols for RPCs, Complicated RPCs, Client-Server Binding, Exception Handling, Security, Some Special Types of RPCs, RPC in Heterogeneous Environments, Lightweight RPC, Optimization for Better Performance, Case Studies: Sun RPC.
UNIT-III (12 Hrs)	Distributed Shared Memory: Introduction, General Architecture of DSM systems, Design and Implementation Issues of DSM, Granularity, Structure of Shared Memory Space, Consistency Models, Replacement Strategy, Thrashing, Other approaches to DSM, Heterogeneous DSM, Advantages of DSM. Synchronization: Introduction, Clock Synchronization, Event Ordering, Mutual Exclusion, Dead Lock, Election Algorithms.

UNIT-IV (10 Hrs)	Resource Management: Introduction, Desirable Features of a Good Global Scheduling Algorithm, Task Assignment Approach, Load – Balancing Approach, Load – Sharing Approach Process Management: Introduction, Process Migration, Threads.
UNIT-V (8 Hrs)	Distributed File Systems: Introduction, Desirable Features of a Good Distributed File System, File models, File–Accessing Models, File – Sharing Semantics, File – Caching Schemes, File Replication, Fault Tolerance, Atomic Transactions and Design Principles.
Textbooks:	
1.	Pradeep. K. Sinha: Distributed Operating Systems: Concepts and Design, PHI, 2007.
Reference Books:	
1.	"Distributed Operating Systems: Concepts and Design" by George Coulouris.
2.	Distributed Operating Systems and algorithms by Chow & Randy.
e-Resources	
1.	http://staff.um.edu.mt/csta1//courses/lectures/csm202/os17.html
2.	https://www.tpointtech.com/distributed-operating-system
3.	https://www.shiksha.com/online-courses/articles/distributed-operating-system/

Course Code	Category	L	T	P	C	C.I.E.	S.E.E	Exam
B23IT3214	PC	--	--	3	1.5	30	70	3 Hrs.

CLOUD COMPUTING LAB

(For IT)

Course Objectives:

1	To introduce the various levels of services offered by cloud
2	To give practical knowledge about working with virtualization and containers
3	To introduce the advanced concepts such as serverless computing and cloud simulation

Course Outcomes: At the end of the course students will be able to

S.No	Outcome	Knowledge Level
1	Demonstrate various service types, delivery models and technologies of a cloud computing environment.	K4
2	Distinguish the services based on virtual machines and containers in the cloud offerings.	K4
3	Assess the challenges associated with a cloud-based application.	K4
4	Discuss advanced cloud concepts such as serverless computing and cloud simulation.	K4
5	Examine various programming paradigms suitable to solve real world and scientific problems using cloud services	K4

SYLLABUS

1	Build your VPC and lunch a web server.
2	AWS Lambda and Elastic beanstalk.
3	Exploring AWS Identity and Access Management (IAM).
4	Creating an Amazon RDS Database Creating an Amazon RDS Database.
5	Creating a Virtual Private Cloud Creating a Virtual Private Cloud.
6	Creating a Highly Available Environment.
7	Securing Applications by using Amazon Cognito.
8	Encrypting Data at Rest by Using AWS Encryption Options.
9	Automating Infrastructure with AWS CloudFormation.
10	Building Decoupled Applications by Using Amazon SQS.
11	Implementing a Serverless Architecture on AWS.
12	Configuring Hybrid Storage and Migrating Data with AWS Storage Gateway S3 File Gateway.
13	Creating a Static Website for the Café
14	Migrating a Database to Amazon RDS. Creating a Static Website for the Café.

Text Books:

1	Mastering Cloud Computing, 2nd edition, RajkumarBuyya, Christian Vecchiola, ThamaraiSelvi, ShivanandaPoojara, Satish N. Srirama, McGraw Hill, 2024
2	Distributed and Cloud Computing, Kai Hwang, Geoffery C. Fox, Jack J. Dongarra, Elsevier, 2012

Reference Books:

1	Cloud Computing, Theory and Practice, Dan C Marinescu, 2nd edition, MK Elsevier, 2018
2	Cloud Computing: Principles and Paradigms by RajkumarBuyya, James Broberg and Andrzej M. Goscinski, Wiley, 2011.
3	Online documentation and tutorials from cloud service providers (e.g. AWS, Google App Engine).
4	Docker, Reference documentation,https://docs.docker.com/reference/
5	OpenFaaS, Serverless Functions Made Simple,https://docs.openfaas.com/

Course Code	Category	L	T	P	C	C.I.E.	S.E.E.	Exam
B23IT3215	**PC**	**--**	**--**	**3**	**1.5**	**30**	**70**	**3 Hrs.**

MACHINE LEARNING LAB

(For IT)

Course Objectives:

1	To implement different mechanisms in preprocessing and model evaluation & implementation.
2	To implement different dimensionality reduction techniques.
3	To implement different clustering & classification techniques.
4	To evaluate, save the model.
5	To implement simple linear, logistic regressions and Feed-Forward Network.

Course Outcomes: At the end of the course students will be able to

S.No	Outcome	Knowledge Level
1	Apply preprocessing techniques on custom data sets.	K3
2	Apply dimensional reduction techniques on custom datasets	K3
3	Develop, evaluate and save the different clustering & classification models	K4
4	Develop regression models, and reduce the regression model complexity using Lasso and Ridge Regularization	K3
5	Develop neural networks for structured, and unstructured data classification and regression	K3

SYLLABUS

1	DATA PREPROCESSING – CONTINUOUS / DISCRETE DATA: For a given set of training data examples stored in a .CSV file, demonstrate Data Preprocessing in Machine learning with the following steps a) Getting the dataset. b) Importing libraries. c) Importing datasets. d) Finding Missing Data. e) Finding Outliers f) Splitting dataset into training and test set. g) Feature scaling
2	Data Preprocessing: Write a program to implement Categorical Encoding, One-hot Encoding
3	Analyze an online dataset by identifying the optimal balance between bias and variance to minimize overall prediction error.
4	Develop a program to implement linear and multiple regression models.
5	Write a program to implement logistic regression for binary classification and multiclass classification

6	Apply regularization methods (Lasso and Ridge Regression) on a dataset and evaluate their effectiveness in reducing overfitting and minimizing prediction error.
7	Implement the ID3 algorithm for decision tree construction and apply it to a dataset for classification tasks.
8	Implement the Naive Bayes classification algorithm and apply it on a dataset to predict class labels with probabilistic reasoning.
9	Compare the performance of a simple classifier K-NN using different distance metrics.
10	Implement and visualize basic clustering techniques such as K-Means and Hierarchical Clustering on real-world or synthetic datasets.
11	Implement a program to reduce the dimensionality of a dataset using PCA while retaining the most significant features and to visualize the effect of dimensionality reduction.
12	Implement the K-Means clustering algorithm and analyze the grouping of data into clusters based on similarity.
13	Implement a single-layer and multi-layer perceptron using a framework like scikit-learn or TensorFlow.
Reference Books:	
1	Chris Albon, "Machine Learning with Python Cookbook-practical solutions from preprocessing to Deep learning", O'REILLY Publisher,2018
2	Sebastian Raschka&VahidMirjalili, "Python Machine Learning", Packt Publisher, 2017
3	Ian Good Fellow, Yoshua Bengio, Aaron Courville, "Deep Learning", MIT Press, 2017.
4	Francois Chollet, "Deep Learning with Python", Manning Publications, 2018.
5	Phil Kim, "Matlab Deep Learning: With Machine Learning, Neural Networks and Artificial Intelligence", Apress , 2017.
e-Resources:	
1	https://scikit-learn.org/stable/modules/generated/sklearn.linear_model.Perceptron.html
2	https://medium.com/ml-research-lab/chapter-4-knowledge-from-the-data-and-data-explorationanalysis-99a734792733
3	https://machinelearningmastery.com/implement-backpropagation-algorithm-scratch-python/
4	https://www.analyticsvidhya.com/blog/2016/01/guide-data-exploration/
5	https://www.pyimagesearch.com/2020/02/17/autoencoders-with-keras-tensorflow-and-deeplearning/

Course Code	Category	L	T	P	C	C.I.E.	S.E.E.	Exam
B23BS3201	SEC	--	1	2	2	30	70	3 Hrs.

SOFT SKILLS

(For AIML, CSBS, CSE, IT and MECH)

Course Objectives:

1	To familiarise students with soft skills and how they influence their professional growth.
2	To build/refine the professional qualities/skills necessary for a productive career and to instill confidence through attitude building.

Course Outcomes:

S.No	Outcome	Knowledge Level
1	Interpret the essence of key soft skills such as creativity & problem solving, emotional intelligence, leadership qualities, etc.	K2
2	Outline interview essentials for graduate-job prospects.	K2
3	Apply presentation skills in academic and professional settings.	K3
4	Demonstrate knowledge about domain specific industry and the prospective workplace.	K2

SYLLABUS

1	**INTRODUCTION** Introduction to soft skills, definition and meaning, importance and need in personal and professional settings; soft skills vs. hard skills; personality development.
2	**INTRA-PERSONAL AND INTER-PERSONAL COMMUNICATION** Significance of Inter & Intra-Personal Communication; SWOT Analysis; Goal Setting – Guidelines for Goal Setting; Emotional Intelligence; Creativity & Problem Solving; Stress and Time Management; Leadership & Team Work; Building a positive attitude, Social Consciousness.
3	**WRITTEN COMMUNICATION** Resume Preparation: Common resume blunders, Tips for betterment, Resume Review; Report Writing; Writing an SOP (Statement of purpose).
4	**PRESENTATION SKILLS** Importance of Presentation Skills; JAM; Essential guidelines for Group Discussions; Debates; Role Plays; PPTs etc.
5	**INTERVIEW SKILLS** Employability Skills: Knowing about Selection Process; Interview Skills, types of Interviews, E-Interviews, Do's and Don'ts of Interviews, FAQs, Mock Interviews; Awareness about Industries; Importance of researching the prospective workplace.

Text Books:

1	Sherfield, M. Robert et al, Cornerstone Developing Soft Skills,(4th edition), Pearson Publication, New Delhi, 2014.

2	Alka Wadkar, Life Skills for Success,(1st edition), Sage Publications India Private Limited, 2016.
3	Soft Skills : Know Yourself and Know the World by Dr. K. Alex, S. Chand & Company Ltd., New Delhi, 2009.

Reference Books:

1	Sambaiah.M. Technical English, Wiley Publishers India. New Delhi. 2014.
2	Gangadhar Joshi, From Campus to Corporate, SAGE TEXT, 2015.
3	Alex.K, Soft Skills, 3rd ed. S. Chand Publication, New Delhi, 2014.
4	Meenakshi Raman and Sangeeta Sharma, Technical Communication: Principle and Practice, Oxford University Press, 2009.
5	Emotional Intelligence by Daniel Goleman, Random House Publishing Group, 2012.

Course Code	Category	L	T	P	C	C.I.E.	S.E.E.	Exam
B23AC3201	AC	2	--	--	--	30	--	3 Hrs.

TECHNICAL PAPER WRITING & IPR

(Common to AI&DS, CSE, AIML, CSIT, IT, CSD, CSBS, CIC, CE, ME)

Course Objectives:

1.	To appreciate the difference in English used in Academic, Business, Legal and other contexts.
2.	To know the fundamentals of basic technical report structure and writing.
3.	To understand the filing and processing of patent application.

Course Outcomes

S.No	Outcome	Knowledge Level
1.	Construct grammatically sound and concise technical write-ups.	K3
2.	Prepare the outline and structure of a technical paper with essential sections.	K3
3.	Develop a project proposal and dissertation framework aligned with academic conventions.	K3
4.	Use a word processor effectively for document formatting, citations, and version control.	K3
5.	Identify appropriate IPR mechanisms for protecting various types of intellectual creations.	K3

SYLLABUS

UNIT-I (10Hrs)	**Introduction:** An introduction to writing technical reports, technical sentences formation, using transitions to join sentences, Using tenses for technical writing. **Planning and Structuring:** Planning the report, identifying reader(s), Voice, Formatting and structuring the report, Sections of a technical report, Minutes of meeting writing.
UNIT-II (10 Hrs)	**Drafting report and design issues:** The use of drafts, Illustrations and graphics. **Final edits:** Grammar, spelling, readability and writing in plain English: Writing in plain English, Jargon and final layout issues, Spelling, punctuation and Grammar, Padding, Paragraphs, Ambiguity.
UNIT-III (10 Hrs)	**Proofreading and summaries:** Proofreading, summaries, Activities on summaries. **Presenting final reports:** Printed presentation, Verbal presentation skills, Introduction to proposals and practice.
UNIT-IV (10 Hrs)	**Using word processor:** Adding a Table of Contents, Updating the Table of Contents, Deleting the Table of Contents, Adding an Index, Creating an Outline, Adding Comments, Tracking Changes, Viewing Changes, Additions, and Comments, Accepting and Rejecting Changes, Working with Footnotes and Endnotes, Inserting citations and Bibliography, Comparing Documents, Combining Documents, Mark documents final and make them read only., Password protect Microsoft Word documents., Using Macros

UNIT-V (10 Hrs)	**Nature of Intellectual Property:** Patents, Designs, Trade and Copyright. Process of **Patenting and Development:** technological research, innovation, patenting, development. International Scenario: International cooperation on Intellectual Property
Textbooks:	
1.	Kompal Bansal &Parshit Bansal, "Fundamentals of IPR for Beginner's", 1st Ed., BS Publications, 2016.
2.	William S. Pfeiffer and Kaye A. Adkins, "Technical Communication: A Practical Approach", Pearson.
Reference Books:	
1.	Ramappa,T., "Intellectual Property Rights Under WTO", 2nd Ed., S Chand, 2015.
2.	Adrian Wallwork , English for Writing Research Papers, Springer New York Dordrecht Heidelberg London, 2011.
3.	Day R, How to Write and Publish a Scientific Paper, Cambridge University Press(2006)
e-Resources	
1.	https://www.udemy.com/course/reportwriting/
2.	https://www.udemy.com/course/professional-business-english-and-technical-report-writing/
3.	https://www.udemy.com/course/betterbusinesswriting/