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**

COMPUTER SCIENCE AND DESIGN

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
B23CD3101	Visual Design and Communication	PC	3	0	0	3	30	70	100
B23CD3102	Computer Networks	PC	3	0	0	3	30	70	100
B23CD3103	Data Mining and Data Warehousing	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
B23CD3109	Full Stack Development-2 Lab	PC	0	0	3	1.5	30	70	100
B23CD3110	Data Mining and Data Warehousing Lab	PC	0	0	3	1.5	30	70	100
B23BS3101	Soft Skills	SEC	0	1	2	2	30	70	100
B23CD3111	Tinkering Lab	ES	0	0	2	1	30	70	100
B23CD3112	Evaluation Of Community Service Internship	PR	--	--	--	2	--	50	50
		TOTAL	**15**	**1**	**10**	**23**	**270**	**680**	**950**

	Course Code	Course
# PE - I	B23CD3104	Software Engineering
	B23CD3105	Cyber Security
	B23CD3106	Internet of Things
	B23CD3107	Artificial Intelligence
	B23CD3108	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
B23CD3101	PC	3	--	--	3	30	70	3 Hrs.

VISUAL DESIGN AND COMMUNICATION

(For CSD & CSIT)

Course Objectives:

1.	To understand the principles of the visual language and their semantic use. A multi- disciplinary domain, design consists of, aesthetics, architecture, products, communication, processes, systems, technology, business/commerce, ramification on environment and society and demands.
2.	To communicate more concisely and in a visually appropriate manner, it is necessary to use commonly understood principles, perspective and design layout standards.
3.	To understand the fundamentals of Typography and Photography.

Course Outcomes

S.No	Outcome	Knowledge Level
1.	**Apply** the basic elements of visual language—dots, lines, forms, space, pattern, texture, and colour—in creating visually coherent compositions.	K3
2.	**Use** concepts of proximity, gradation, dominance, and subordination to develop coherent and expressive visual narratives.	K3
3.	**Demonstrate** an understanding of vernacular and Indian letter forms by incorporating them in culturally relevant typographic compositions.	K3
4.	**Apply** basic digital post-production techniques in software like Photoshop, including resizing, resolution adjustment, and file format optimization.	K4
5.	**Analyze** the components of visual storytelling by breaking down storyboards into narrative, framing, and camera movement elements.	K4

SYLLABUS

UNIT-I (10Hrs)	**Introduction to Visual Design:** Importance of understanding visual language-its relation in context to nature and environment-Exploring and understanding Dots, Lines, Forms, Space, Pattern, Texture and Colour as an element of visual language
UNIT-II (10 Hrs)	**Introduction to the Principles of Visual Language:** Visual explorations and experiments with Form, Colour, and Space, Texture, in relation to the context and environments – Concepts of harmony, balance, contrast, proportion, order, symmetry, asymmetry, rhythm, tension, juxtaposition, proximity, size, scale, proportion, orientation, alignment, variety, gradation, dominance, subordination, transition etc.
UNIT-III (10 Hrs)	**Introduction to Fundamentals of Typography:** Introduction to Type and its History-Type as a form and means of communication in our environment-Introduction to Indian

	type: Vernacular letter-forms-Classification of types: Typefaces, type families and type designers-Anatomy of the type: x-height, ascenders, descenders, counter, cap-height, baseline, etc-Typographic variables: Kerning, tracking, leading, spacing etc.-Semantics of type: Legibility & readability issues in type and meaning attributed to type. 4h. Expressive Typography-Introduction to printing techniques
UNIT-IV (10 Hrs)	**Introduction to Photography:** Introduction and Orientation: Art and Science of Photography. Drawing out parallels / differences between the EYE and the CAMERA-Camera: Understanding the various controls on a Digital SLR Camera Features and Details. Shooting Modes. Aperture and Depth of Field. Shutter Speed. Critical Shutter Speeds and Effects- Exposure: Exposure as function of Quantity of Light and Time. Getting used to shoot in Manual Mode and learning to measure light using the camera's built-in exposure meter-Film Speed/Sensor Sensitivity: Understanding the role of sensitivity in Exposure. ISO/ASA and Digital Noise-Lenses: Different Types of Lenses. Classification of Lenses by Focal Lengths. Angle of View. Fixed Focal Length and Zoom Lenses. Close up and Macro Lenses-Light and Color Temperature- Digital Post-Production: Introduction to File-Formats. RAW vs.JPG. Understanding resolution, resizing and basic image post processing using Photoshop. Exploring the software to visualize and create digital mosaics.
UNIT-V (10 Hrs)	**Introduction to Videography**: Concept development Storyboarding-Video Shooting - Framing, Camera movement etc. Video Editing- Defining communication-Sender, Channel and Receiver-Semiotics - Study of sign process (semiosis), meaning making and meaningful communication. Sign, Signifier, Signified-Denotation and Connotation.Story, narrative and see different perspectives-Identifying problems, opportunities and improvements. Differentiating problem, need and conflict-Persona study-Scenario study .
Textbooks:	
1.	Wallschlaeger, Charles, & Busic-Synder, Cynthia, Basic Visual Concepts and Principles for Artists, Architects and Designers, McGraw-Hill, (1992).
Reference Books:	
1.	Buxton, Bill, Sketching User Experience: Getting the Design Right and the Right Design (Interactive Technologies), Morgan Kaufmann, (2007).
2.	Caplin, Steve; Banks, Adam,The Complete Guide to Digital Illustration, Publisher: Watson - Guptill Publications, (2003).
e-Resources	
1.	S. Kolay, "Visual Communication Design for Digital Media – Jan–Feb 2019 (SEM1)," NPTEL, IIT Roorkee, : https://archive.nptel.ac.in/noc/courses/noc20/SEM2/noc20-ar15.
2.	B. K. Chakravarthy, "Visual Communication – Engineering Design," NPTEL, IIT Bombay, : https://archive.nptel.ac.in/courses/107/101/107101001.
3.	M. Ghosh, "Visual Semiotics for Visual Communication," NPTEL, IIT Kharagpur, : https://onlinecourses.nptel.ac.in/noc20_ar15/preview.

Course Code	Category	L	T	P	C	C.I.E.	S.E.E.	Exam
B23CD3102	**PC**	**3**	**--**	**--**	**3**	**30**	**70**	**3 Hrs.**

COMPUTER NETWORKS

(For CSD & CSIT)

Course Objectives: Students are expected

1.	To understand the different types of networks
2.	To develop an understanding of the principles of computer networks.
3.	To familiarize with Reference model OSI and TCP/IP
4.	To understand various layers of Reference models functions
5.	To explore network protocols

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

S.No	Outcome	Knowledge Level
1.	**Explain** the concepts of reference models and network protocols used in communication between networked systems.	K2
2.	**Apply** knowledge of data transmission media and the data link layer to design basic communication setups.	K3
3.	**Apply** network layer design principles and protocols to implement efficient routing mechanisms.	K3
4.	**Analyze** transport layer services and their protocols	K4
5.	**Analyze** application layer protocols to real-world networking scenarios and service configurations.	K4

SYLLABUS

UNIT-I (10Hrs)	**Introduction:** Types of Computer Networks, Reference Models- The OSI Reference Model, The TCP/IP Reference Model, A Critique of the OSI Model and Protocols, A Critique of the TCP/IP Reference Model. History of Internet.
UNIT-II (10 Hrs)	**The Data Link Layer:** Transmission Media, Guided and Un-guided media, Data Link Layer Design Issues, Services Provided to the Network Layer, Error detecting and Error Correcting codes, Elementary Data Link Protocols, Sliding Window Protocols, HDLC, PPP. Multiple Access Protocols Wired Lans: Ethernet, Fast Ethernet, Gigabit Ethernet.
UNIT-III (10 Hrs)	**The Network Layer**: Network Layer Design Issues, Routing Algorithms, Congestion, Congestion control algorithms. The Network Layer on the Internet, The IP Version 4 Protocol, IP Addresses- Classful, CIDR, NAT, IP Version 6 Protocol, Transition from IPV4 to IPV6

UNIT-IV (10 Hrs)	**The Transport Layer:** The Transport Layer Services, Transport Layer Protocols: UDP, TCP and SCTP.
UNIT-V (10 Hrs)	**The Application Layer:** The World Wide Web, HTTP, Domain Name Space, Remote Loging, Electronic Mail and File Transfer.
Textbooks:	
1.	"Computer Networks", Andrew S Tanenbaum, David J Wetherall, 5th Edition, Pearson.
2.	"Data Communications and Networking", Behrouz A Forouzan, 4th Edition, Tata McGraw Hill Education.
Reference Books:	
1.	"Data and Computer Communication", William Stallings, Pearson
2.	"TCP/IP Protocol Suite", Behrouz Forouzan, McGraw Hill.
e-Resources:	
1.	D. P. Agrawal, *Computer Networks and Internet Protocol*, NPTEL Course, IIT Kharagpur. : https://archive.nptel.ac.in/courses/106/105/106105183
2.	P. K. Das, *Data Communication*, NPTEL Course, IIT Kharagpur. : https://archive.nptel.ac.in/courses/117/105/117105143
3.	S. Misra, *Computer Networks*, NPTEL Course, IIT Kharagpur. : https://archive.nptel.ac.in/courses/106/105/106105081
4.	S. Kar, *Communication Networks*, NPTEL Course, IIT Kharagpur. : https://onlinecourses.nptel.ac.in/noc22_ee61
5.	A. Mahanti and R. K. Ghosh, *Advanced Computer Networks*, NPTEL Course, IIT Indore & IIT Gandhinagar. : https://onlinecourses.nptel.ac.in/noc25_cs02/preview

Course Code	Category	L	T	P	C	C.I.E.	S.E.E.	Exam
B23CD3103	**PC**	**3**	**--**	**--**	**3**	**30**	**70**	**3 Hrs.**

DATA MINING AND DATA WAREHOUSING

(For CSD & CSIT)

Course Objectives: The main objective of the course is to

1.	Introduce basic concepts and techniques of data warehousing and data mining
2.	Examine the types of the data to be mined and apply pre-processing methods on raw data
3.	Discover interesting patterns, analyze supervised and unsupervised models and estimate the accuracy of the algorithms.

Course Outcomes

S.No	Outcome	Knowledge Level
1.	**Explain** the concepts of data warehousing & OLAP technology.	K2
2.	**Apply** data pre processing techniques.	K3
3.	**Formulate** and apply classification algorithms and their performance evaluation metrics on sample datasets.	K4
4.	**Analyze** Apriori and FP-Growth algorithms to generate frequent itemsets and strong rules using pruning and compact representations.	K4
5.	**Categorize** and compare partitioning, hierarchical, density based and grid based clustering algorithms.	K4

SYLLABUS

UNIT-I (10Hrs)	**Data Warehousing and Online Analytical Processing**: Basic concepts, Data Warehouse Modeling: Data Cube and OLAP, Data Warehouse Design and Usage, Data Warehouse Implementation, Cloud Data Warehouse, Data Mining and Patten Mining, Technologies, Applications, Major issues, Data Objects & Attribute Types, Basic Statistical Descriptions of Data, Data Visualization, Measuring Data Similarity and Dissimilarity. (Text Book- 1).
UNIT-II (10 Hrs)	**Data Preprocessing:** An Overview, Data Cleaning, Data Integration, Data Reduction, Data Transformation and Data Discretization. (Text Book- 1).
UNIT-III (10 Hrs)	**Classification:** Basic Concepts, General Approach to solving a classification problem, Decision Tree Induction: Attribute Selection Measures, Tree Pruning, Scalability and Decision Tree Induction, Visual Mining for Decision Tree Induction, Bayesian Classification Methods: Bayes Theorem, Naïve Bayes Classification, Rule-Based Classification, Model Evaluation and Selection.

UNIT-IV (10 Hrs)	**Association Analysis:** Problem Definition, Frequent Itemset Generation, Rule Generation: Confident Based Pruning, Rule Generation in Apriori Algorithm, Compact Representation of frequent item sets, FP-Growth Algorithm.
UNIT-V (10 Hrs)	**Cluster Analysis:** Overview, Basics and Importance of Cluster Analysis, Clustering techniques, Different Types of Clusters; K-means: The Basic K-means Algorithm, K-means Additional Issues, Bi-secting K Means, Agglomerative Hierarchical Clustering: Basic Agglomerative Hierarchical Clustering Algorithm DBSCAN: Traditional Density Center-Based Approach, DBSCAN Algorithm, Strengths and Weaknesses.
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.
e-Resources	
1.	Mitra, *"Data Warehouse and OLAP Technology,"* NPTEL, : https://nptel.ac.in/courses/106105174.
2.	Ghosh, *"Big Data Computing,"* SWAYAM/NPTEL, : https://swayam.gov.in/nd1_noc20_cs48.
3.	Chakraborti, *"Introduction to Data Analytics,"* SWAYAM, : https://swayam.gov.in/nd1_noc19_mg53.

Course Code	Category	L	T	P	C	C.I.E.	S.E.E.	Exam
B23CD3104	**PE**	**3**	**--**	**--**	**3**	**30**	**70**	**3 Hrs.**

SOFTWARE ENGINEERING

(For CSD)

Course Objectives: Students are expected

1.	Software life cycle models, Software requirements and SRS document.
2.	Project Planning, quality control and ensuring good quality software.
3.	Software Testing strategies, use of CASE tools, Implementation issues, validation &verification procedures.

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

S.No	Outcome	Knowledge Level
1.	**Explain** the evolution of software engineering, life cycle models, and development practices, and distinguish between traditional and agile methodologies.	K2
2.	**Interpret** Estimate effort, time, and cost using COCOMO and Halstead models, and analyze requirements using formal methods to create a complete SRS."	K3
3.	**Implement** Design software systems using structured and function-oriented methodologies, and demonstrate understanding of good design principles, modularity, cohesion, and coupling	K3
4.	**Demonstrate** to Build and test software, fix errors, and check quality using ISO 9000 and Six Sigma.	K3
5.	**Use** CASE tools, maintenance methods, and reuse techniques to improve productivity and manage the software lifecycle.	K3

SYLLABUS

UNIT-I (10Hrs)	**Introduction:** Evolution, Software development projects, Exploratory style of software developments, Emergence of software engineering, Notable changes in software development practices, Computer system engineering. **Software Life Cycle Models:** Basic concepts, Waterfall model and its extensions, Rapid application development, Agile development model, Spiral model.
UNIT-II (10 Hrs)	**Software Project Management:** Software project management complexities, Responsibilities of a software project manager, Metrics for project size estimation, Project estimation techniques, Empirical Estimation techniques, COCOMO, Halstead's software science, risk management. **Requirements Analysis and Specification:**

	Requirements gathering and analysis, Software Requirements Specification (SRS), Formal system specification, Axiomatic specification, Algebraic specification, Executable specification and 4GL.
UNIT-III (10 Hrs)	**Software Design:** Overview of the design process, how to characterize a good software design? Layered arrangement of modules, Cohesion and Coupling. Approaches to software design. **Agility:** Agility and the Cost of Change, Agile Process, Extreme Programming (XP), Other Agile Process Models, Tool Set for the Agile Process (Text Book 2) **Function-Oriented Software Design:** Overview of SA/SD methodology, Structured analysis, Developing the DFD model of a system, Structured design, Detailed design, and Design Review. **User Interface Design:** Characteristics of a good user interface, Basic concepts, Types of user interfaces, Fundamentals of component-based GUI development, and user interface design methodology.
UNIT-IV (10 Hrs)	**Coding And Testing:** Coding, Code review, Software documentation, Testing, Black-box testing, White-Box testing, Debugging, Program analysis tools, Integration testing**,** testing object-oriented programs, Smoke testing, and some general issues associated with testing. **Software Reliability and Quality Management:** Software reliability. Statistical testing,Softwarequality,SoftwarequalitymanagementsystemISO9000.SEICapabilitymaturitymodel.Fewother important quality standards, and Six Sigma
UNIT-V (10 Hrs)	**Computer-Aided Software Engineering (Case):** CASE and its scope, CASE environment, CASE support in the software life cycle, other characteristics of CASE tools, Towards second generation CASE Tool, and Architecture of a CASE Environment. **Software Maintenance:** Characteristics of software maintenance, Software reverse engineering, and Software maintenance process models and Estimation of maintenance cost. **Software Reuse:** Reuse-definition, introduction, reason behind no reuse so far, Basic issues in any reuse program, A reuse approach, and Reuse at organization level.
Textbooks:	
1.	Fundamentals of Software Engineering, Rajib Mall, 5th Edition, PHI.
2.	Software Engineering A practitioner's Approach, Roger S. Pressman, 9thEdition, McGraw Hill International Edition.
Reference Books:	
1.	Software Engineering, Ian Sommerville, 10th Edition,Pearson.
2.	Software Engineering, Principles and Practices, Deepak Jain, Oxford University Press.
e-Resources	
1.	R. Mall, *Software Engineering*, National Programme on Technology Enhanced Learning (NPTEL), IIT Kharagpur. : https://nptel.ac.in/courses/106/105/106105182/
2.	Infosys Ltd., *Software Engineering*, Infosys Springboard.

	https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_01260589506387148827_shared/overview.
3.	Infosys Ltd., *Agile Software Development*, Infosys Springboard. : https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_013382690411003904735_shared/overview

Course Code	Category	L	T	P	C	C.I.E.	S.E.E.	Exam
B23CD3105	**PE**	**3**	**--**	**--**	**3**	**30**	**70**	**3 Hrs.**

INTERNET OF THINGS

(For CSD)

Course Objectives: Students are expected

1.	Vision and Introduction to Internet of Things (IoT). Understand IoT Market perspective
2.	Data and Knowledge Management and use of Devices in IoT Technology.
3.	Understand State of the Art – IoT Architecture. Understand Real World IoT Design Constraints, Industrial Automation and Commercial.

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

S.No	Outcome	Knowledge Level
1.	**Compute** the apply knowledge of Internet and Internet of Things architecture to explain their functioning in practical scenarios.	K3
2.	**Apply** understanding of wireless and mobile network constraints and capabilities to analyze their impact on IoT applications.	K3
3.	**Use** basic sensing and measurement and tools to determine the real-time performance of network of devices.	K3
4.	**Interpret** the prototype models for various applications using IoT technology.	K3
5.	**Illustrate** cloud-based data collection, storage, and computing techniques to develop IoT/M2M applications using various service models and platforms such as Xively, Nimbits, and participatory sensing technologies.	K3

SYLLABUS

UNIT-I (10Hrs)	**The Internet of Things:** An Overview of Internet of things, Internet of Things Technology, behind IoTs Sources of the IoTs, M2M Communication, Examples of IoTs, Design Principles for Connected Devices Internet Connectivity Principles, Internet connectivity, Application Layer Protocols: HTTP, HTTPS, FTP, Telnet.
UNIT-II (10 Hrs)	Business Models for Business Processes in the Internet of Things, IoT/M2M systems LAYERS AND designs standardizations, Modified OSI Stack for the IoT/M2M Systems, ETSI M2M domains and High- level capabilities, Communication Technologies, Data Enrichment and Consolidation and Device Management Gateway Ease of designing and affordability
UNIT-III (10 Hrs)	Design Principles for the Web Connectivity for connected-Devices, Web Communication protocols for Connected Devices, Message Communication protocols for Connected Devices, Web Connectivity for connected-Devices.

UNIT-IV (10 Hrs)	Data Acquiring, Organizing and Analytics in IoT/M2M, Applications /Services /Business Processes, IOT/M2M Data Acquiring and Storage, Business Models for Business Processes in the Internet of Things, Organizing Data, Transactions, Business Processes, Integration and Enterprise Systems.
UNIT-V (10 Hrs)	Data Collection, Storage and Computing Using a Cloud Platform for IoT/M2M Applications/Services, Data Collection, Storage and Computing Using cloud platform Everything as a service and Cloud Service Models, IOT cloud-based services using the Xively (Pachube/COSM), Nimbits and other platforms Sensor, Participatory Sensing, Actuator, Radio Frequency Identification, and Wireless, Sensor Network Technology, Sensors Technology, Sensing the World.
Textbooks:	
1.	Internet of Things: Architecture, Design Principles and Applications, Rajkamal, McGraw Hill Higher Education
2.	Internet of Things, A. Bahgya and V. Madisetti, Univesity Press, 201
Reference Books:	
1.	Designing the Internet of Things, Adrian McEwen and Hakim Cassimally, Wiley Getting Started with the Internet of Things, Cuno Pfister, Oreilly
e-Resources	
1.	S. Misra, **"Introduction to Internet of Things,"** NPTEL Online Course, IIT Kharagpur, 2023. Available via SWAYAM/NPTEL NPTEL:http://nptel.ac.in/courses/106105166

Course Code	Category	L	T	P	C	C.I.E.	S.E.E.	Exam
B23CD3106	PE	3	--	--	3	30	70	3 Hrs.

CYBER SECURITY

(For CSD)

Course Objectives: Students are expected

1.	To learn threats and risks within context of the cyber security architecture.
2.	Students should learn and identify security tools and hardening techniques.
3.	To learn types of incidents including categories, responses and timelines for response.

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

S.No	Outcome	Knowledge Level
1.	**Apply** cyber security architecture principles.	K3
2.	**Analyze** the risk management processes and practices.	K3
3.	**Appraise** cyber security incidents to apply appropriate response	K4
4.	**Distinguish** system and application security threats and Vulnerabilities.	K4
5.	**Demonstrate** to Identify security tools and hardening techniques	K4

SYLLABUS

UNIT-I (10Hrs)	Introduction to Cyber Security-Cyber security objectives, roles, differences between information security and cyber security, Cyber security principles- confidentiality, integrity, availability, authentication and non-repudiation
UNIT-II (10 Hrs)	Information Security with in Lifecycle Management-Life cycle management landscape, Security architecture processes, Security architecture tools, Intermediate lifecycle management concepts, Risks& Vulnerabilities-Basics of risk management, Operational threat environments, Classes of attacks.
UNIT-III (10 Hrs)	Incident Response-Incident categories, Incident response, Incident recovery, Operational security protection-Digital and data assets, ports and protocols, Protection technologies, Identity and access Management, configuration management
UNIT-IV (10 Hrs)	Threat Detection and Evaluation Monitoring-Vulnerability management, Security logs and alerts, Monitoring tools and appliances, Analysis-Network traffic analysis, packet capture and analysis
UNIT-V (10 Hrs)	Introduction to backdoor System and security-Introduction to metasploit, backdoor, demilitarized zone (DMZ), Digital signature, Brief study on Harding of operating system.

Textbooks:	
1.	Cyber Security Fundamentals- Cyber Security, Network Security and Data Governance Security, 2nd Edition, ISACA Publishers, 20
2.	Information Security Management Principles, Updated Edition, David Alexander, Amanda Finch, David Sutton, BCS Publishers, June 2013
Reference Books:	
1.	Cyber Security Fundamentals- Cyber Security, Network Security and Data Governance Security, 2nd Edition, ISACA Publishers, 20
e-Resources:	
1.	NPTEL, *"Introduction to Information Security,"* NPTEL, : https://nptel.ac.in/courses/106105031
2.	Coursera, *"Cyber Security Specialization,"* Coursera, : https://www.coursera.org/specializations/cyber-security
3.	Cybrary, *"Cyber Security Career Path,"*Cybrary, : https://www.cybrary.it/catalog/career-path/cyber-security/
4.	edX, *"Cybersecurity Fundamentals,"* edX, : https://www.edx.org/course/cybersecurity-fundamentals

Course Code	Category	L	T	P	C	C.I.E.	S.E.E.	Exam
B23CD3107	**PE**	**3**	**--**	**--**	**3**	**30**	**70**	**3 Hrs.**

ARTIFICIAL INTELLIGENCE

(For CSD & CSIT)

Course Objectives:

1.	Gain a historical perspective of Artificial Intelligence (AI) and its foundations.
2.	Become familiar with basic principles of AI toward problem solving, inference, perception, knowledge representation, and learning.
3.	Investigate applications of AI techniques in intelligent agents, expert systems, artificial neural networks and other machine learning models.
4.	Experience AI development tools such as an 'AI language', expert system shell, and/or data mining tool. Experiment with a machine learning model for simulation and analysis.
5.	Explore the current scope, potential, limitations, and implications of intelligent systems.

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

S.No	Outcome	Knowledge Level
1.	**Demonstrate** knowledge of the building blocks of AI as presented in terms of intelligent agents.	K3
2.	**Interpret** and formalize the problem as a state space, graph, design heuristics and select amongst different search or game-based techniques to solve them.	K4
3.	**Analyze** the intelligent algorithms for constraint satisfaction problems and also design intelligent systems for Game Playing.	K4
4.	**Discernment** the capability to represent various real life problem domains using logic-based techniques and use this to perform inference or planning.	K4
5.	**Examine** the problems with uncertain information using Bayesian approaches.	K4

SYLLABUS

UNIT-I (10Hrs)	**Introduction to artificial intelligence:** Introduction, history, intelligent systems, foundations of AI, applications, tic-tac-tie game playing, development of AI languages, current trends in AI, **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
UNIT-II (10 Hrs)	**Problem reduction and game playing:** Introduction, problem reduction, game playing, alpha-beta pruning, two-player perfect information games, **Logic concepts:** Introduction, propositional calculus, proportional logic, natural deduction system, axiomatic system, semantic tableau system in proportional logic, resolution refutation in proportional logic, predicate logic

UNIT-III (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, cyc theory, case grammars, semantic web
UNIT-IV (10 Hrs)	**Uncertainty measure: probability theory:** Introduction, probability theory, Bayesian belief networks, certainty factor theory, dempster-shafer theory
UNIT-V (10 Hrs)	**Fuzzy sets and fuzzy logic:** Introduction, fuzzy sets, fuzzy set operations, types of membership functions, multi valued logic, fuzzy logic, linguistic variables and hedges, fuzzy propositions, inference rules for fuzzy propositions, fuzzy systems.

Textbooks:	
1.	Artificial intelligence, A modern Approach, 2nded, Stuart Russel, Peter Norvig, Prentice Hall
2.	Artificial Intelligence, Saroj Kaushik, 1st Edition, CENGAGE Learning, 2011.
Reference Books:	
1.	Artificial intelligence, structures and Strategies for Complex problem solving, 5th Edition, George F Lugar, PEA
2.	Introduction to Artificial Intelligence, Ertel, Wolf Gang, Springer, 2017
3.	Artificial Intelligence, A new Synthesis, 1st Edition, Nils J Nilsson, Elsevier, 1998
4.	Artificial Intelligence- 3rd Edition, Rich, Kevin Knight, Shiv Shankar B Nair, TMH
5.	Introduction To Artificial Intelligence and Expert Systems, 1st Edition, Patterson, Pearson India, 2015.
e-Resources	
1.	D. Khemani, *Artificial Intelligence: Search Methods for Problem Solving*, NPTEL, : https://onlinecourses.nptel.ac.in/noc23_cs67/preview
2.	IBM, *Introduction to Artificial Intelligence (AI)*, Coursera, : https://www.coursera.org/learn/introduction-to-ai

Course Code	Category	L	T	P	C	C.I.E.	S.E.E.	Exam
B23CD3109	**PC**	**--**	**--**	**3**	**1.5**	**30**	**70**	**3 Hrs.**

FULL STACK DEVELOPMENT – MODULE – II

(For CSD & CSIT)

Course Objectives: The main objective of the course is to

1	Make use of router, template engine and authentication using sessions to develop application in Express JS.
2	Build a single page application using RESTful APIs in ExpressJS.
3	Apply router and hooks in designing ReactJS application.
4	Make use of MongoDB queries to perform CRUD operations on document database

Course Outcomes:

S.No	Outcome	Knowledge Level
1	**Apply** routing, middleware, and HTTP methods in ExpressJS to handle server-side operations.	K3
2	**Analyze** dynamic web applications using ExpressJS with form handling, sessions, and authentication mechanisms.	K4
3	**Differentiate** MongoDB with ExpressJS to perform database operations and build RESTful APIs.	K4
4	**Examine** interactive user interfaces using ReactJS components, props, state, and event handling.	K4
5	**Outline** single-page applications using ReactJS features like routing, hooks, and form handling to enhance user experience.	K4

SYLLABUS

1.	**ExpressJS – Routing, HTTP Methods, Middleware.** a. Write a program to define a route, Handling Routes, Route Parameters, Query Parameters and URL building. b. Write a program to accept data, retrieve data and delete a specified resource using http methods. **c.** Write a program to show the working of middleware.
2.	**ExpressJS – Templating, Form Data** a. Write a program using templating engine. b. Write a program to work with form data.
3.	**ExpressJS – Cookies, Sessions, Authentication** a. Write a program for session management using cookies and sessions. **b.** Write a program for user authentication.

4.	**ExpressJS – Database, RESTful APIs** a. Write a program to connect MongoDB database using Mangoose and perform CRUD operations. b. Write a program to develop a single page application using RESTful APIs.
5.	**ReactJS – Render HTML, JSX, Components – function & Class** a. Write a program to render HTML to a web page. b. Write a program for writing markup with JSX. c. Write a program for creating and nesting components (function and class).
6.	**ReactJS – Props and States, Styles, Respond to Events** a. Write a program to work with props and states. b. Write a program to add styles (CSS & Sass Styling) and display data. c. Write a program for responding to events.
7.	**ReactJS – Conditional Rendering, Rendering Lists, React Forms** a. Write a program for conditional rendering. b. Write a program for rendering lists. c. Write a program for working with different form fields using react forms.
8.	**ReactJS – React Router, Updating the Screen** a. Write a program for routing to different pages using react router. b. Write a program for updating the screen.
9.	**ReactJS – Hooks, Sharing data between Components** a. Write a program to understand the importance of using hooks. **b.** Write a program for sharing data between components.
10.	**MongoDB – Installation, Configuration, CRUD operations** a. Install MongoDB and configure ATLAS b. Write MongoDB queries to perform CRUD operations on document using insert(), find(), update(), remove()
11.	**MongoDB – Databases, Collections and Records** a. Write MongoDB queries to Create and drop databases and collections. b. Write MongoDB queries to work with records using find(), limit(), sort(), createIndex(), aggregate().
12.	**Augmented Programs: (Any 2 must be completed)** a. Design a to-do list application using NodeJS and ExpressJS. b. Design a Quiz app using ReactJS. c. Complete the MongoDB certification from MongoDB University website.
Text Books:	
1.	Pro MERN Stack: Full Stack Web App Development with Mongo, Express, React, and Node, Vasan Subramanian, 2nd edition, APress, O'Reilly.
2.	Node.Js in Action, Mike Cantelon, Mark Harter, T.J. Holowaychuk, Nathan Rajlich, Manning Publications. (Chapters 1-11)
3.	React Quickly, AzatMardan,Manning Publications(Chapters 1-8,12-14)
e-Resources:	

1.	MDN Contributors, "Express routing," *Mozilla Developer Network*. https://developer.mozilla.org/en-US/docs/Learn/Server-side/Express_Nodejs/routes
2.	GeeksforGeeks, "Express.js Routing," *GeeksforGeeks*. [Online]. https://www.geeksforgeeks.org/express-js-routing/
3.	NPTEL, "Server-side Development using NodeJS, Express and MongoDB," *NPTEL Online Course*. https://onlinecourses.nptel.ac.in/noc23_cs96

Course Code	Category	L	T	P	C	C.I.E.	S.E.E.	Exam
B23CD3110	**PC**	**--**	**--**	**3**	**1.5**	**30**	**70**	**3 Hrs.**

DATA MINING AND DATA WAREHOUSING LAB

(For CSD & CSIT)

Course Objectives: The main objective of the course is to

1	Inculcate Conceptual, Logical, and Physical design of Data Warehouses OLAP applications and OLAP deployment.
2	Design a data warehouse or data mart to present information needed by management in a form that is usable.
3	Emphasize hands-on experience working with all real data sets.
4	Test real data sets using popular data mining tools such as WEKA, Python Libraries.
5	Develop ability to design various algorithms based on data mining tools.

Course Outcomes:

S.No	Outcome	Knowledge Level
1	**Demonstrate** data warehouses and perform OLAP operations using ETL tools and multidimensional schemas.	K3
2	**Analyze** and explore WEKA toolkit features for data preprocessing, visualization, and model evaluation.	K4
3	**Illustrate** association rule mining using Apriori and FP-Growth; analyze rules and effects of discretization.	K4
4	**Examine** classification techniques and compare results using performance metrics like ROC and confusion matrix.	K4
5	**Calculate** and apply clustering techniques in analyze clusters, and visualize results for insights.	K4

SYLLABUS

1.	**Creation of a Data Warehouse**. ➢ Build Data Warehouse/Data Mart (using open-source tools like Pentaho Data Integration Tool, Pentaho Business Analytics; or other data warehouse tools like Microsoft-SSIS, Informatica, Business Objects,etc.,) ➢ Design multi-dimensional data models namely Star, Snowflake and Fact Constellation schemas for any one enterprise (ex. Banking, Insurance, Finance, Healthcare, manufacturing, Automobiles, sales etc.). ➢ Write ETL scripts and implement using data warehouse tools. ➢ Perform Various OLAP operations such slice, dice, roll up, drill up and pivot.

2.	**Explore machine learning tool "WEKA"** ➢ Explore WEKA Data Mining/Machine Learning Toolkit. ➢ Downloading and/or installation of WEKA data mining toolkit. ➢ Understand the features of WEKA toolkit such as Explorer, Knowledge Flow interface, Experimenter, command-line interface. ➢ Navigate the options available in the WEKA (ex. Select attributes panel, Preprocess panel, Classify panel, Cluster panel, Associate panel and Visualize panel) ➢ Study the arff file format Explore the available data sets in WEKA. Load a data set (ex. Weather dataset, Iris dataset, etc.) ➢ Load each dataset and observe the following: 1. List the attribute names and they type 2. Number of records in each dataset 3. Identify the class attribute (if any) 4. Plot Histogram 5. Determine the number of records for each class. 6. Visualize the data in various dimensions
3.	**Perform data preprocessing tasks and demonstrate performing association rule mining on data sets** ➢ Load weather. nominal, Iris, Glass datasets into Weka and run Apriori Algorithm with different support and confidence values. ➢ Study the rules generated. Apply different discretization filters on numerical attributes and run the Apriori association rule algorithm. Study the rules generated. ➢ Derive interesting insights and observe the effect of discretization in the rule generation process. ➢ Explore various options available in Weka for preprocessing data and apply Unsupervised filters like Discretization, Resample filter, etc. on each dataset
4.	**Demonstrate performing classification on data sets Weka/R** ➢ Load each dataset and run 1d3, J48 classification algorithm. Study the classifier output. Compute entropy values, Kappa statistic. 1. Extract if-then rules from the decision tree generated by the classifier, Observe the confusion matrix. 2. Load each dataset into Weka/R and perform Naïve-bayes classification and k-Nearest Neighbour classification. Interpret the results obtained. 3. Plot RoC Curves 4. Compare classification results of ID3, J48, Naïve-Bayes and k-NN classifiers for each dataset, and deduce which classifier is performing best and poor for each dataset and justify.

5.	**Demonstrate performing clustering of data sets** ➢ Load each dataset into Weka/R and run simple k-means clustering algorithm with different values of k (number of desired clusters). ➢ Study the clusters formed. Observe the sum of squared errors and centroids, and derive insights. ➢ Explore other clustering techniques available in Weka/R. ➢ Explore visualization features of Weka/R to visualize the clusters. Derive interesting insights and explain.
6.	**Demonstrate knowledge flow application on data sets into Weka/R** ➢ Develop a knowledge flow layout for finding strong association rules by using Apriori, FP Growth algorithms ➢ Set up the knowledge flow to load an ARFF (batch mode) and perform a cross validation using J48 algorithm ➢ Demonstrate plotting multiple ROC curves in the same plot window by using j48 and Random Forest tree.
7.	Demonstrate ZeroR technique on Iris dataset (by using necessary preprocessing technique(s)) and share your observations.
8.	Write a java program to prepare a simulated data set with unique instances.
9.	Write a Python program to generate frequent item sets / association rules using Apriori algorithm.
10.	Write a program to calculate chi-square value using Python/R. Report your observation.
11.	Write a program of Naive Bayesian classification using Python/R programming language.
12.	Implement a Java/R program to perform Apriori algorithm.
13.	Write a R program to cluster your choice of data using simple k-means algorithm using JDK.
14.	Write a program of cluster analysis using simple k-means algorithm Python/R programming language.
15.	Write a program to compute/display dissimilarity matrix (for your own dataset containing at least four instances with two attributes) using Python.
16.	Visualize the datasets using matplotlib in python/R.(Histogram, Box plot, Bar chart, Pie chart etc
Reference Books:	
1.	Data Warehousing Fundamentals for IT Professionals: Paulraj Ponniah, Wiley.
2.	Machine Learning with WEKA: Ian H. Witten, Eibe Frank, The University of Waikato.
e-resource:	
1.	https://online.stanford.edu/courses/xine257-data-warehousing-and-business-intelligence
2.	https://www.cs.waikato.ac.nz/ml/weka/documentation.html

Course Code	Category	L	T	P	C	C.I.E.	S.E.E.	Exam
B23BS3101	SEC		1	2	2	30	70	3 Hrs.

SOFT SKILLS

(For AIDS, CIC, CSIT, CSD, ECE and EEE)

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
B23CD3111	**ES**	**1**	**--**	**2**	**1**	**30**	**70**	**3 Hrs.**

TINKERING LAB (UI DESIGN USING FLUTTER)

(For CSD & CSIT)

Course Objectives: The main objective of the course is to

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

Course Outcomes:

S.No	Outcome	Knowledge Level
1	**Demonstrate** to Install Flutter and Dart SDK, and write basic Dart programs to demonstrate syntax and language fundamentals.	K3
2	**Outline** the responsive UIs using Flutter widgets, layout structures, and media queries for multiple screen sizes.	K4
3	**Examine** the navigation and state management using Navigator, setState, and Provider.	K4
4	**Design** forms with validation, apply themes, and create custom widgets for reusable UI components.	K5
5	**Develop** REST APIs, display dynamic data, and debug Flutter apps using unit testing and developer tools.	K5

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. b) Experiment with different types of animations (fade, slide, etc.).
9.	a) Fetch data from a REST API. b) 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.

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

COMPUTER SCIENCE AND DESIGN

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
B23CD3201	Automata Theory and Compiler Design	PC	3	0	0	3	30	70	100
B23CD3202	Machine Learning	PC	3	0	0	3	30	70	100
B23CD3203	Design of Interactive Systems	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
B23CD3213	Multimedia Applications &Development Lab	PC	0	0	3	1.5	30	70	100
B23CD3214	Machine Learning using Python Lab.	PC	0	0	3	1.5	30	70	100
B23CD3215	Internet of Things Lab	SEC	0	1	2	2	30	70	100
B23AC3201	Audit Course: Technical Paper Writing & IPR	AC	2	--	--	--	30	--	30
B23MC3201	Employability Skills	MC	2	--	--	--	30	--	30
		TOTAL	**22**	**1**	**8**	**23**	**330**	630	960

	Course Code	Course
#PE-II	B23CD3204	Software Testing Methodologies
	B23CD3205	Cryptography & Network Security
	B23CD3206	Cloud Computing
	B23CD3207	Principles of Video Editing and 3D Animation
	B23CD3208	MOOCS-II
#PE – III	B23CD3209	Object Oriented Analysis and Design
	B23CD3210	Mobile Adhoc Networks
	B23CD3211	Augmented Reality and Virtual Reality
	B23CD3212	Computer Graphics & Animation
	B23CD3213	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
B23CD3201	**PC**	**3**	**--**	**--**	**3**	**30**	**70**	**3 Hrs.**

AUTOMATA THEORY AND COMPILER DESIGN

(For CSD & CSIT)

Course Objectives: The main objective of the course is to

1.	To develop an understanding of regular expressions and their relation to finite automata, along with algebraic properties and the use of the pumping lemma for language classification.
2.	To explain the working of context-free grammars and pushdown automata, and to introduce Turing machines as a model of computation including decidability and undesirability issues.
3.	To impart knowledge on the structure of compilers, focusing on the roles of lexical analysis, syntax analysis, and various parsing techniques (top-down, bottom-up, LR parsers).
4.	To provide a conceptual and practical understanding of syntax-directed translation, intermediate code generation, and run-time environment organization, including memory allocation strategies.

Course Outcomes

S.No	Outcome	Knowledge Level
1.	**Explain** the fundamental concepts of finite automata, DFA, NFA, and epsilon transitions.	K2
2.	**Apply** regular expressions and algebraic laws to model languages and use the pumping lemma for language analysis.	K3
3.	**Analyze** context-free grammars, parse trees, ambiguity, PDA, and Turing machines.	K4
4.	**Examine** the structure and components of compilers including lexical and syntax analysis using parsing methods.	K4
5.	**Develop** syntax-directed translation schemes, intermediate code, and understand run-time environment mechanisms.	K5

SYLLABUS

UNIT-I (10Hrs)	Introduction to Finite Automata: Structural Representations, Automata and Complexity, 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	Regular Expressions: Finite Automata and Regular Expressions, Applications of Regular

(10 Hrs)	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 Turing Machines: Introduction to Turing Machine, Formal Description, Instantaneous description, The language of a Turing machine Undecidability: Undecidability, A Language that is Not Recursively Enumerable, An Undecidable Problem That is RE, Undecidable Problems about Turing Machines.
UNIT-IV (10 Hrs)	Introduction: 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)	Syntax-Directed Translation: 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 Run-Time Environments: Stack Allocation of Space, Access to Nonlocal Data on the Stack, Heap Management.

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.
3.	Theory of Computer Science – Automata languages and computation, Mishra and Chandrashekaran, 2nd Edition, PHI.
Reference Books:	
1.	Dr. Sukhendu Das, Associate Professor, Dept. of Computer Science and Engineering, NPTEL, Indian Institute of Technology Madras. https://nptel.ac.in/courses/106106090
2.	Dariush Derakhshani, Théotime Vaillant, Game Design: Art and Concepts Specialization, California Institute of the Arts https://www.coursera.org/learn/game-design

Course Code	Category	L	T	P	C	C.I.E.	S.E.E.	Exam
B23CD3202	PC	3	--	--	3	30	70	3 Hrs.

MACHINE LEARNING

(For CSD & CSIT)

Course Objectives:

1.	Define machine learning and its different types (supervised and unsupervised) and understand their applications.
2.	Apply supervised learning algorithms including decision trees and k-nearest neighbours (k-NN).
3.	Implement unsupervised learning techniques, such as K-means clustering.

Course Outcomes

S.No	Outcome	Knowledge Level
1.	**Apply** the fundamentals of Machine Learning including learning paradigms, stages, and types of data involved in the ML pipeline.	K2
2.	**Apply** proximity-based models like K-Nearest Neighbor for classification and regression, and *evaluate* their performance using appropriate metrics.	K2
3.	**Construct** decision tree and Bayes-based models for classification and regression and *assess* their strengths and limitations in practical scenarios.	K3
4.	**Implement** and analyze Perceptions, SVM, and Logistic Regression for linearly and non-linearly separable data.	K4
5.	**Design** clustering techniques for unsupervised learning, and *evaluate* their performance on complex datasets.	K4

SYLLABUS

UNIT-I (10Hrs)	**Introduction to Machine Learning:** Evolution of Machine Learning, Paradigms for ML, Learning by Rote, Learning by Induction, Reinforcement Learning, Types of Data, Matching, Stages in Machine Learning, Data Acquisition, Feature Engineering, Data Representation, Model Selection, Model Learning, Model Evaluation, Model Prediction, Search and Learning, Data Sets.
UNIT-II (10 Hrs)	**Nearest Neighbor-Based Models:** Introduction to Proximity Measures, Distance Measures, Non-Metric Similarity Functions, Proximity Between Binary Patterns, Different Classification Algorithms Based on the Distance Measures, K-Nearest Neighbor Classifier, Radius Distance Nearest Neighbor Algorithm, KNN Regression, Performance of Classifiers, Performance of Regression Algorithms.
UNIT-III	**Models Based on Decision Trees:** Decision Trees for Classification, Impurity Measures,

(10 Hrs)	Properties, Regression Based on Decision Trees, Bias–Variance Trade-off, Random Forests for Classification and Regression. The Bayes Classifier: Introduction to the Bayes Classifier, Bayes' Rule and Inference, The Bayes Classifier and its Optimality, Multi-Class Classification, Class Conditional Independence and Naive Bayes Classifier (NBC).
UNIT-IV (10 Hrs)	**Linear Discriminants for Machine Learning:** Introduction to Linear Discriminants, Linear Discriminants for Classification, Perceptron Classifier, Perceptron Learning Algorithm, Support Vector Machines, Linearly Nonseparable Case, Nonlinear SVM, Kernel Trick, Logistic Regression, Linear Regression, Multilayer Perceptrons (MLPs), Backpropagation for Training an MLP.
UNIT-V (10 Hrs)	**Clustering :** Introduction to Clustering, Partitioning of Data, Matrix Factorization, Clustering of Patterns, Divisive Clustering, Agglomerative Clustering, Partitional Clustering, K-Means Clustering, Soft Partitioning, Soft Clustering, Fuzzy C-Means Clustering, Rough Clustering, Rough K-Means Clustering Algorithm, Expectation Maximization-Based Clustering, Spectral Clustering.
Text Books:	
1.	"Machine Learning Theory and Practice", M N Murthy, V S Ananthanarayana, Universities Press (India), 2024
Reference Books:	
1.	"Machine Learning", Tom M. Mitchell, McGraw-Hill Publication, 2017.
2.	"Machine Learning in Action", Peter Harrington, Dream Tech
3.	"Introduction to Data Mining", Pang-Ning Tan, Michel Stenbach, Vipin Kumar, 7th Edition, 2019.
e-Resources	
1.	Prof. Balaraman Ravindran Professor in Computer Science at IIT Madras, Introduction to Machine Learning NPTEL:https://onlinecourses.nptel.ac.in/noc21_cs24/preview

Course Code	Category	L	T	P	C	C.I.E.	S.E.E.	Exam
B23CD3203	**PC**	**3**	**--**	**--**	**3**	**30**	**70**	**3 Hrs.**

DESIGN OF INTERACTIVE SYSTEMS

(For CSD)

Course Objectives: Students are expected

1.	To focus on creating interfaces, systems and analyse the devices revolving around user behaviour.
2.	Explore the interaction design process and the tools used for principles of interactive systems.

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

S.No	Outcome	Knowledge Level
1.	**Explain** the guidelines, principles, and theories related to usability.	K2
2.	**Apply** design processes and participatory design methods to support user-centered development.	K3
3.	**Analyze** the use of direct manipulation and natural language interfaces in HCI.	K4
4.	**Analyze** the impact of Quality of Service (QoS) on user satisfaction and productivity.	K4
5.	**Analyze** advanced information search and visualization interfaces.	K4

SYLLABUS

UNIT-I (10Hrs)	**Usability of Interactive Systems:** Introduction, Usability Requirements, Usability Measures, Universal Usability, Goals for our Profession **Guidelines, Principles and Theories:** Introduction, Guidelines, Principles, Theories, Object-Action Interface Model.
UNIT-II (10 Hrs)	**Managing Design Processes:** Introduction, Organizational Design to Support Usability, The Three Pillars of Design, Development Methodologies, Ethnographic Observation, Participatory Design, Scenario Development, Social Impact Statement for Early Design Review, Legal Issues **Evaluating Interface Designs:** Introduction, Expert Reviews, Usability Testing and Laboratories, Survey Instruments, Acceptance Tests, Evaluation During Active Use, Controlled Psychologically Oriented Experiments. **Software Tools:** Introduction, Specification Methods, Interface-Building Tools, Evaluation and Critiquing Tools
UNIT-III (10 Hrs)	**Direct Manipulation and Virtual Environments:** Introduction, Examples of Direct Manipulation, Discussion of Direct Manipulation, 3D interfaces, Tele-operation, Virtual and Augmented Reality **Menu Selection, Form Filling, and Dialog Boxes:**

	Introduction, Task- Related Menu Organization, Single Menus, Combinations of Multiple Menus, Content Organization, Fast Movement Through Menus, Data Entry with Menus, Audio Menus and Menus for Small Displays **Command and Natural Languages:** Introduction, Functionality to Support Users 'Tasks, Command- Organization Strategies, The Benefits of Structure, Naming and Abbreviations, Natural Language in Computing.
UNIT-IV (10 Hrs)	**Interaction Devices:** Introduction, Keyboards and Keypads, Pointing Devices, Speech and Auditory Interfaces, Displays-Small and Large, Printers **Collaboration:** Introduction, Goals of Collaboration, A synchronous Distributed Interfaces, Synchronous Distributed Interfaces, Face-to-Face Interfaces **Quality of Service:** Introduction, Models of Response Time Impacts, Expectations and Attitudes, User Productivity, Variability in Response Time, Frustrating Experiences
UNIT-V (10 Hrs)	**Balancing Function and Fashion:** Introduction, Error Messages, Non-anthropomorphic Design, Display Design, Window Design, Color. **User Manuals, Online Help, and Tutorials:** Introduction, Paper versus Online Manuals, reading rom Paper Versus from Displays, Shaping the Content of the Manuals, Online Manuals and Help, Online Tutorials, Demonstrations, and Guides, Online Communities for User Assistance, The Development Process. **Information Search and Visualization:** Introduction, Search in Textual Documents and Database Querying, Multimedia Document Searches, Advanced Filtering and Search Interfaces, Information Visualization.

Textbooks:	
1.	Ben Shneiderman, "Designing the User Interface", Fourth Edition, Addison-Wesley,2010.
Reference Books:	
1.	Barfield, Lon, "The User Interface: Concepts and Design", Addison–Wesley.
2.	Wilbert O.Galiz, "The Essential guide to User Interface Design", Wiley Dream tech
3.	Jacob Nielsen, "Usability Engineering", Academic Press.
4.	Alan Dixetal,"Human-Computer Interaction", Prentice Hall,2012.
e-Resources:	
1.	S. Kanagaraj, *Interaction Design*, NPTEL Course, IIT Guwahati. https://nptel.ac.in/courses/107103083
2.	S. K. Pal, *User-centric Computing for Human–Computer Interaction*, NPTEL Course. : https://nptel.ac.in/courses/106103220
3.	A. Majumder, *Design and Implementation of Human–Computer Interfaces*, NPTEL Course, IIT Guwahati. : https://nptel.ac.in/courses/106103237

Course Code	Category	L	T	P	C	I.M	E.M	EXAM
B23CD3204	**PE**	**3**	**0**	**0**	**3**	**30**	**70**	**3 Hrs.**

SOFTWARE TESTING METHODOLOGIES

(For CSD)

Course Objectives: Students are expected

1.	To provide knowledge of the concepts in software testing such as testing process, criteria, strategies, and methodologies.
2.	To develop skills in software test automation and management using the latest tools

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

S. No	Outcome	Knowledge Level
1.	**Apply** the purpose and principles of software testing to identify and justify the selection of appropriate testing strategies for given software requirements.	K3
2.	**Apply** transaction flow concepts to construct transaction flow graphs representing different user interactions in software systems.	K3
3.	**Apply** path product and path expression techniques to represent and analyze control flow paths in software modules.	K3
4.	**Apply** state graph modeling techniques to represent the dynamic behavior of software systems.	K3
5.	**Apply** graph theory concepts to model software structures using matrices representing control and data flow.	K3

SYLLABUS

UNIT-I (10 Hrs)	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 (8 Hrs)	State, State Graphs and Transition testing: state graphs, good & bad state graphs, state testing, Testability tips.
UNIT-V (8 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.	Effective methods of Software Testing, Perry, John Wiley.
5.	Art of Software Testing – Meyers, John Wiley.
e-Resources:	
1.	R. Mall, "Software Testing," NPTEL (IIT Kharagpur), course code 106105150. : https://nptel.ac.in/courses/106105150.
2.	IBM Skills Network Team, "Software Testing, Deployment, and Maintenance Strategies," Coursera. : https://www.coursera.org/learn/software-testing-deployment-and-maintenance-strategies.

Course Code	Category	L	T	P	C	C.I.E.	S.E.E.	Exam
B23CD3205	PE	3	--	--	3	30	70	3 Hrs.

CRYPTOGRAPHY & NETWORK SECURITY

(For CSD & CSIT)

Course Objectives:

1.	Student will be able to understand security issues related to computer networks and learn different symmetric key techniques
2.	Students will be able learn mathematic of cryptography for symmetric and Asymmetric algorithms and apply this knowledge to understand the Cryptographic algorithms
3.	Students will be able learn different types of symmetric and Asymmetric algorithms
4.	Students will be able learn different algorithms of Hash functions, message authentication and digital signature and their importance to the security
5.	Discuss the fundamental ideas of Symmetric and Asymmetric cryptographic Algorithms
6.	Students will be able learn different Enhanced security protocols of Application Layer, Transport Layer and Network layer

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

S.No	Outcome	Knowledge Level
1.	**Explain** the objectives of information security.	K2
2.	**Demonstrate** the importance and application of each of confidentiality, integrity, authentication and availability	K3
3.	**Interpret** the basic categories of threats to computers and networks	K3
4.	**Analyze** the Mathematics of Cryptography	K4
5.	**Examine** the Network layer, Transport Layer and Application layer Protocols Enhanced security mechanisms	K4

SYLLABUS

UNIT-I (10Hrs)	**Security Concepts:** Introduction, The need for security, Security approaches, Principles of security, Types of Security attacks, Security services, Security Mechanisms, A model for Network Security Cryptography. Classical Encryption Techniques-symmetric cipher model, Substitution techniques, Transposition techniques, Rotor Machines, Steganography.
UNIT-II (10 Hrs)	**Introduction to Symmetric Cryptography: Algebraic Structures**-Groups, Rings, Fields, GF(2^n) fields, Polynomials. **Mathematics of Asymmetric cryptography:** Primes, Checking For Primness, Eulers phi-functions, Fermat's Little Theorem, Euler's Theorem, Generating Primes, Primality Testing, Factorization, Chinese Remainder Theorem, Quadratic Congruence, Exponentiation And Logarithm.

UNIT-III (10 Hrs)	**Symmetric key Ciphers:** Block Cipher principles, DES, AES, Blowfish, IDEA, Block cipher operation, Stream ciphers: RC4, RC5 **Asymmetric key Ciphers:** Principles of public key cryptosystems, RSA algorithm, Diffie-Hellman Key Exchange, Elgamal Cryptographic system, Elliptic Curve Arithmetic, Elliptic Curve Cryptography.
UNIT-IV (10 Hrs)	**Cryptographic Hash Functions:** Applications of Cryptographic Hash Functions, Two Simple Hash Functions, Requirements and Security, Hash Functions Based on Cipher Block Chaining, Secure Hash Algorithms (SHA) **Message Authentication Codes:** Message Authentication Requirements, Message Authentication Functions, Requirements for Message Authentication Codes, Security of MAC'S, MAC'S Based on Hash Functions: HMAC, MAC'S Based on Block Ciphers: DAA And CMAC **Digital Signatures:** Digital Signatures, Elgamal Digital Signature Scheme, Elliptic Curve Digital Signature Algorithm, RSA-PSS Digital Signature Algorithm.
UNIT-V (10 Hrs)	**Network and Internet Security: Transport-Level Security:** Web Security Considerations, Transport Level Security, HTTPS, SSH. **IP Security:** IP Security Overview, IP Security Policy, Encapsulating Security Payload, Authentication Header Protocol. **Electronic-Mail Security:** Internet-mail Security, Email Format, Email Threats and Comprehensive Email Security, S/MIME, PGP.
Textbooks:	
1.	Cryptography and Network Security - Principles and Practice: William Stallings, Pearson Education, 7th Edition, 2017
2.	Cryptography and Network Security: Behrouz A. Forouzan Debdeep, Mc Graw Hill, 3rd Edition, 2015
Reference Books:	
1.	Cryptography and Network Security: Atul Kahate, Mc Graw Hill, 3rd Edition
2.	Introduction to Cryptography with Coding Theory: Wade Trappe, Lawrence C. Washington, Pearson.
3.	Modern Cryptography: Theory and Practice ByWenbo Mao. Pearson
e-Resources	
1.	Cyber Security Experts, "Cyber Security Course: Learn Network Security," Udemy, https://www.udemy.com/course/cyber-security-course/
2.	Cybrary, "Cryptography Course," :https://www.cybrary.it/course/cryptography/
3.	RITx, "Network Security," edX, : https://www.edx.org/course/network-security
4.	D. Boneh, "Cryptography I," Coursera, Stanford University, : https://www.coursera.org/learn/crypto
5.	D. Mukhopadhyay, "Computer Networks and Internet Protocol," NPTEL, IIT Kharagpur, https://nptel.ac.in/courses/106105031

Course Code	Category	L	T	P	C	C.I.E.	S.E.E.	Exam
B23CD3206	PE	3	0	0	3	30	70	3 Hrs.

CLOUD COMPUTING

(For CSD & CSIT)

Course Objectives: The main objectives of the course is to provide students with:

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.	**Summarize** concepts for state-of-the-art cloud computing	K2
2.	**Explain** how virtualization technology enabling cloud computing.	K2
3.	**Use** algorithms for cloud resource management and scheduling.	K3
4.	**Interpret** the storage system architectures and security fundamentals for cloud applications.	K3
5.	**Discriminate** suitable host provider for cloud applications development.	K4

SYLLABUS

UNIT-I (10Hrs)	**Introduction to Cloud Computing**: Fundamentals Cloud computing at a glance, 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 App Engine).
UNIT-II (10 Hrs)	**Cloud Enabling Technologies**: 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, virtualization.
UNIT-III (10 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, public cloud VM (e.g. Amazon EC2) and container (e.g. Amazon Elastic Container Service) offerings.
UNIT-IV (10 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 (10 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. Open Faas) serverless platforms, Internet of Things (IoT), applications, cloud-centric IoT and layers, edge and fog computing, DevOps, infrastructure-as-code, quantum cloud computing.
Textbooks:	
1.	Mastering Cloud Computing, 2nd edition, Rajkumar Buyya, Christian Vecchiola, Thamarai Selvi, Shivananda Poojara, 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.	Essentials of cloud Computing, K. Chandrasekhran, CRC press, 2014.
3.	Online documentation and tutorials from cloud service providers (e.g., AWS, Azure, GCP)
e-Resources	
1.	NPTEL, "Cloud Computing," : https://onlinecourses.nptel.ac.in/noc25_cs11.

Course Code	Category	L	T	P	C	C.I.E.	S.E.E.	Exam
B23CD3207	**PE**	**3**	**0**	**0**	**3**	**30**	**70**	**3 Hrs.**

PRINCIPLES OF VIDEO EDITING AND 3D ANIMATION

(For CSD)

Course Objectives: Students are expected

1.	This comprehensive course introduces students to the fundamental principles and techniques of video editing and 3D animation
2.	Students will learn industry-standard software tools, storytelling through visual media, and technical aspects of both disciplines.

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

S. No	Outcome	Knowledge Level
1.	**Explain** fundamental of video editing techniques and workflows	K2
2.	**Interpret** and Understand 3D modelling, texturing, and animation principles	K3
3.	**Create** compelling visual narratives through edited content	K5
4.	**Develop** professional-grade animation sequences	K5
5.	**Develop** industry-standard post-production techniques	K5

SYLLABUS

UNIT-I (Hrs)	**Introduction to Video Editing**: History and evolution of video editing, Different types of edits and their psychological impact, File formats and video codecs Basic Editing Techniques: Cutting and trimming, Timeline management, Transitions and effects, Audio editing basics
UNIT-II (Hrs)	**Color correction and grading**, Motion graphics integration, green screen and compositing, multi-camera editing, Narrative Structure in Editing, Storytelling through editing, Pacing and rhythm, Montage theory, Contemporary editing styles **Sound Design:** Audio cleanup and enhancement, music editing, sound effects, mix level and audio workflow.
UNIT-III (10Hrs)	Introduction to 3D Animation, History of animation**,** Principles of animation**,** 3D coordinate systems**,** Interface familiarization**,** 3D Modelling Basics: Primitive modelling**,** Polygon modelling**,** Edge flow and topology**,** UV mapping basics **Materials and Texturing**: Material types and properties, Texture mapping, PBR materials, Shader networks **Lighting and Rendering**: Basic lighting setups, Global illumination, Render settings, Output formats

UNIT-IV (8Hrs)	**Character Animation**: Character rigging, Weight and balance, Walk cycles, Facial animation **Dynamics and Effects**: Particle systems, Cloth simulation, Rigid body dynamics, Fluid simulation Advanced Rendering: Render layers, Pass rendering, Compositing, Post-production effects Motion Graphics: Typography in motion, Logo animation, Kinetic typography, Integration with video
UNIT-V (8Hrs)	**Project Planning**: Pre-production workflows, Asset management, Team collaboration, Version control **Industry Standards**: File organization, Naming conventions, Render farm management, Delivery specifications **Portfolio Development**: Demo reel creation, Project documentation, Online presence, Industry networking

Textbooks:	
1.	The Technique of Film and Video Editing by Ken Dancyger (Focal Press), 6th Edition,2018
2.	In the Blink of an Eye by Walter Murch (Silman-James Press), 2nd Edition, 2001.
3.	3D Animation Essentials by Andy Beane ISBN: 978-1118147481, 2012.
Reference Books:	
1.	The Filmmaker's Eye: Learning (and Breaking) the Rules of Cinematic Composition" by Gustavo Mercado ISBN: 978-0240812
2.	"The Animator's Survival Kit" by Richard Williams ISBN: 978-057123834
3.	Digital Cinematography: Fundamentals, Tools, Techniques, and Workflows by David Stump ISBN: 978-024081791
e-Resources	
1.	A. Kennedy, *Video Editing Fundamentals*, LinkedIn Learning : https://www.linkedin.com/learning/video-editing-fundamentals
2.	A. Agrawal, *3D Animation and Modeling*, NPTEL, : https://onlinecourses.nptel.ac.in/noc23_cg11/preview

Course Code	Category	L	T	P	C	C.I.E.	S.E.E.	Exam
B23CD3209	PE	3	--	--	3	30	70	3 Hrs.

OBJECT ORIENTED ANALYSIS AND DESIGN

(For CSD & CSIT)

Course Objectives:

1.	Become familiar withal phases of OOAD.
2.	Master the main features of the UML.
3.	Master the main concepts of Object Technologies and how to apply them at work and develop the ability to analyze and solve challenging problem in various domains.
4.	Learn the Object design Principles and understand how to apply them towards Implementation

Course Outcomes

S.No	Outcome	Knowledge Level
1.	**Discuss** the inherent complexity in software systems and describe strategies for designing and managing complex systems.	K2
2.	**Apply** the principles and concepts of UML modeling to analyze and design object-oriented systems.	K3
3.	**Construct** class, object, and package diagrams for advanced structural modeling of real-world systems.	K4
4.	**Develop** behavioral models such as use case, activity, and interaction diagrams to represent system functionality and user interactions.	K5
5.	**Design** state machines, component, and deployment diagrams to model advanced behaviors and architecture of complex systems.	K5

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-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 Modelling:** Events and signals, state machines, processes and Threads, time and space, state chart diagrams. **Architectural Modelling:** Component, Deployment, Component diagrams and Deployment diagrams **CaseStudy:** Weather Forecasting.
Textbooks:	
1.	Grady BOOCH, RobertA.Maksimchuk, Michael W.ENGLE, Bobbi J.Young, JimConallen, KelliaHouston, "Object- Oriented Analysis and Design with Applications", 3rd edition,2013,PEARSON.
2.	Grady Booch, James Rumbaugh, IvarJacobson: The Unified Modeling Language User Guide, Pearson Education.
Reference Books:	
1.	Meilir Page- Jones: Fundamentals of Object-Oriented Design in UML, Pearson Education.
2.	Pascal Roques: Modeling Software Systems Using UML2, WILEY- Dream tech India Pvt. Ltd.
3.	Atul Kahate: 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.	TutorialsPoint, "Structure of Complex Systems in Software Engineering," *TutorialsPoint* : https://www.tutorialspoint.com/software_engineering/software_complexity.htm
2.	IBM, "Bringing Order to Chaos: The Object-Oriented Approach," *IBM Developer* : https://developer.ibm.com/articles/order-chaos-oop/

Course Code	Category	L	T	P	C	C.I.E.	S.E.E.	Exam
B23CD3210	PE	3	--	--	3	30	70	3 Hrs.

MOBILE ADHOC NETWORKS

(For CSD)

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

S.No	Outcome	Knowledge Level
1.	**Explain** the issues involved in designing MAC protocols for ad hoc wireless networks.	K2
2.	**Apply** the principles of routing protocol design to identify and address key issues specific to ad hoc wireless networks.	K3
3.	**Apply** fundamental security principles to identify vulnerabilities specific to ad hoc wireless networks.	K3
4.	**Interpret** clustering strategies in WSNs to optimize resource utilization and communication efficiency.	K3
5.	**Analyze** security vulnerabilities in wireless sensor networks and assess potential threats and attack models.	K4

SYLLABUS

UNIT-I (10Hrs)	**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.	Ad Hoc Wireless Networks – Architectures and Protocols, 1st edition, C. Siva Ram Murthy, B. S. Murthy, Pearson Education, 2004
2.	Ad Hoc and Sensor Networks – Theory and Applications, 2nd edition *Carlos Corderio Dharma P.Aggarwal*, World Scientific Publications / Cambridge University Press, March 2006
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, 1st edition,*Charles E.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.	S. Misra, *Ad Hoc Wireless Networks*, NPTEL, : https://onlinecourses.nptel.ac.in/noc21_cs55/preview

Course Code	Category	L	T	P	C	C.I.E.	S.E.E.	Exam
B23CD3211	PE	3	--	--	3	30	70	3 Hrs.

AUGMENTED REALITY & VIRTUAL REALITY

(For CSD)

Course Objectives:

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

Course Outcomes

S.No	Outcome	Knowledge Level
1.	**Explain** the definition and historical development of Augmented Reality (AR) to distinguish it from related fields such as Virtual Reality and Mixed Reality.	K3
2.	**Use** multiple-camera and infrared tracking systems to enhance spatial awareness and user tracking in AR systems.	K3
3.	**Demonstrate** an understanding of human physiology and perception principles to design effective VR experiences.	K3
4.	**Apply** principles of visual perception, including depth, motion, and color perception, to enhance realism in virtual environments.	K3
5.	**Analyze** how motor programs and remapping techniques affect user interaction and performance in virtual reality applications.	K4

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 (10Hrs)	**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 (10Hrs)	**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 Behaviour of Light, Lenses, Optical Aberrations, The Human Eye, Cameras, Displays
UNIT-IV (10Hrs)	**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 ColorVisual Rendering: Visual Rendering -Ray Tracing and Shading Models, Rasterization, Correcting Optical Distortions, Improving Latency and Frame Rates, Immersive Photos and Videos.
UNIT-V (10Hrs)	**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.	SanniSiltanen- 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
e-Resources:	
1.	J. Mukhopadhyay, *Virtual Reality and Augmented Reality*, NPTEL, : https://onlinecourses.nptel.ac.in/noc23_cs83/preview

Course Code	Category	L	T	P	C	C.I.E.	S.E.E.	Exam
B23CD3212	PE	3	--	--	3	30	70	3 Hrs.

COMPUTER GRAPHICS & ANIMATION

(For CSD)

Course Objectives:

1.	To introduce the fundamentals of 3D modeling and animation software (MAYA), including user interface, navigation tools, and object manipulation.
2.	To equip students with knowledge and skills in 3D modeling and texturing using NURBS, polygons, UV mapping, and Photoshop for texture editing.
3.	To impart the principles of animation and rigging techniques including deformers, constraints, and joint systems for creating realistic animations.
4.	To provide hands-on experience with graphic design tools like Adobe Photoshop and Illustrator for digital image creation, manipulation, and 3D visual effects.

Course Outcomes

S.No	Outcome	Knowledge Level
1.	**Describe** the Maya interface, tools, viewport, and object attributes.	K2
2.	**Apply** modeling and texturing techniques using NURBS, polygons, UV mapping, and Photoshop editing.	K3
3.	**Examine** lighting techniques, rendering types, and render settings in animation.	K3
4.	**Demonstrate** animation principles, rigging tools, constraints, and camera animation.	K3
5.	**Use** Photoshop and Illustrator tools for graphic	K3

SYLLABUS

UNIT-I (10Hrs)	**Introductionto3D**: Introduction to MAYA Interface, Software and Hardware Requirement Understanding about View Ports, Tool bar & Menu bar **Layers**, Shortcut Keys, Understanding Primitive objects Channel Box & Hot Box Channel Attributes & Outline Editor.
UNIT-II (10Hrs)	**Tools and techniques in Modeling & Texturing:** Introduction to modeling with Primitive objects NURBS & polygon tools, Organic and Industrial designs, Editing Nurbs & Polygons, Learning Menus in Surfaces and Polygons Tabs & Shortcut. Introduction to Materials & Understanding Materials & Behavior, Understanding UV Texture Editor & Applying Single Color to object. Hypershade Understanding different types of Maps, Understanding, UVmapping & UVmanipulation, Editing texture in Photoshop UV snap shot .Applying materials and textures to models and props Shortcuts.

UNIT-III (10Hrs)	**Lighting** & **Rendering:** Understanding Color Theory & Introduction to lighting, Importance of light in Animation Basic Lighting Concepts types of lights, Change the color of the light attributes rendering, Introduction to rendering & Knowing Renderers, Software Rendering & Hardware Rendering Vector Rendering & Mental Ray Rendering Selecting a Render Type & Interactive Photorealistic Rendering (IPR) Batch Rendering, Working with the Options in Render setting.
UNIT-IV (10Hrs)	**Animation & Rigging**: Introduction to Animation in MAYA & Time Codes Principles of animation (squash and stretch, timing etc.) Doing Object animation & Understanding the Behavior of Shapes of Objects Making play blasts Working with Animation Curves Graph Editor, Time Line Shortcuts, Camera Animation & Setting Resolution Gates. Knowing Deformers and their functionality (Linear & Non-Linear Deformers) Knowing Constraints (Point, Scale, Parent, Pole Vector, Aim) introduction to Joints difference between Local Axis and World Axis for Joints.
UNIT-V (10Hrs)	**Graphic Designing Tools- Photoshop & Illustrator**: Changing blending modes and opacity, Using and editing an opacity mask, Using layers to keep your art project organized, Creating clipping masks, Tracing a scanned image with Live Trace, Applying warp effects and the envelope feature, Understanding the Appearance panel, real·ting effects and styles, Using multiple strokes and fills, Creating and manipulating type, Creating symbols and using the symbol tools, Understanding and creating the four kinds of custom brushes, Using themes tool for complex gradients, Applying3D effects.

Textbooks:	
1.	TerezaFlaxman**.Maya2015CharacterModelingand Animation.**FocalPress. (unit-I,unit-II)
2.	Richard Williams ”The Animator's Survival Kit”, Faber & Faber, 2010(unit-III,unit-IV)
3.	Chris Meyer, Trish Meyer “Creating Motion Graphics with After Effects, Essential and Advanced Techniques”, Taylor & Francis, 2013. (unit-v)
Reference Books:	
1.	Michael Betancourt, ”The History of Motion Graphics From Avant-garde to Industry in the United States”, Wild side Press.2013
2.	EdHooks “Acting for Animators4”,Routledge,2017
3.	TomSito “Timing for Animation, 40th Anniversary Edition”,CRCPress,2021.
4.	A Dariush Derakhshani. **Introducing Auto desk Maya2016.**Paperback
5.	Paperback. **The Art of Maya An Introduction to 3D Computer Graphics.**Autodesk
e-Resources:	
1.	S. Das, *Computer Graphics*, NPTEL, : https://onlinecourses.nptel.ac.in/noc22_cs35/preview
2.	G. Maestri, *Maya 2023 Essential Training*, LinkedIn Learning, : https://www.linkedin.com/learning/maya-2023-essential-training
3.	Adobe Inc., *Photoshop and Illustrator Tutorials*, Adobe, : https://helpx.adobe.com/learning.html

Course Code	Category	L	T	P	C	C.I.E.	S.E.E.	Exam
B23CD3213	**PC**	**--**	**--**	**3**	**1.5**	**30**	**70**	**3 Hrs.**

MULTIMEDIA APPLICATION DEVELOPMENT LAB

(For CSD)

Course Objectives: Students are expected

1.	**To apply image editing techniques in GIMP** for effects like drip portrait, double exposure, and object removal.
2.	**To create basic 3D models in Blender** such as a toy train, bird, and wooden chair.
3.	**To perform audio editing with Audacity and basic interactive design**, and design print media using any editor.

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

S.No	Outcome	Knowledge Level
1.	**Apply** simple photo editing tasks in GIMP	K3
2.	**Design** objects using Blender3D	K5
3.	**Prepare** operations on audio files using Audacity	K5
4.	**Rewrite** some actions using Action Script	K5
5.	**Create** visiting cards, brochures using image editor	K5

Software's Required:

GIMP/Blender/Audacity/Adobe Animate/Adobe Photoshop/canva.

SYLLABUS

1.	Perform the following tasks 1. Create a Drip Portrait Effect in GIMP 2. Create a Double Exposure Effect in GIMP 3. Turn Any Photo into a Cartoon in GIMP
2.	Perform the following tasks 1. Quick and Easy Color Match Technique in GIMP (Photo Compositing) 2. Remove objects from a Photo in GIMP
3.	Design a simple Toy Train using Blender 3D
4.	Design a simple bird on an inscribed base using Blender 3D
5.	Design a Realistic Wooden chair using Blender 3D
6.	Perform the following tasks using Audacity i. Recording and Playback ii. Importing audio tracks iii. Selecting audio

7.	Perform the following tasks using Audacity i. Editing the tempo of the audio ii. Editing the pitch of the audio iii. Splitting audio tracks iv. Exporting audio
8.	Perform the following tasks using Action script i. Assigning actions to an object and button ii. Tinting a movie clip's color and controlling colors with sliders iii. Crete a text field and password input field
9.	Perform the following tasks using any editor i. Create your visiting card ii. Design a poster for technical poster presentation iii. Create a brochure for an event
10.	Speech Recognition and Command Tools: Design an interface that caters to users with disabilities or diverse needs
11.	Google Speech API, Arduino, Raspberry Pi
12.	Develop a simple command-line or voice-based interface for a task.
Reference Books:	
1.	**"The Book of GIMP: A Complete Guide to Nearly Everything",** Olivier Lecarme & Karine Delvare, No Starch Press.
2.	**"Blender for Dummies",** Jason van Gumster, Wiley.
E-Resource:	
1.	https://daviesmediadesign.com/20-gimp-photo-manipulation-tutorials-for-2020/
2.	https://www.skillshare.com/en/blog/10-blender-projects-for-beginners/
3.	https://www.instructables.com/Basic-recording-and-editing-with-Audacity/

Course Code	Category	L	T	P	C	C.I.E.	S.E.E.	Exam
B23CD3206	**PC**	**--**	**--**	**3**	**1.5**	**30**	**70**	**3 Hrs.**

MACHINE LEARNING USING PYTHON LAB

(For CSD & CSIT)

Course Objectives: The main objective of the course is to

1	To learn about computing central tendency measures and Data preprocessing techniques.
2	To learn about classification and regression algorithms
3	To apply different clustering algorithms for a problem.

Course Outcomes:

S.No	Outcome	Knowledge Level
1.	Apply statistical and data pre-processing techniques using Python for effective data analysis.	K3
2.	Implement and evaluate various classification and regression algorithms using Python.	K3
3.	Apply clustering techniques and analyze their performance using suitable evaluation metrics.	K3

SYLLABUS

1.	Compute Central Tendency Measures: Mean, Median, Mode Measure of Dispersion: Variance, Standard Deviation using Python.
2.	Apply the following Pre-processing techniques for a given dataset using Python. a. Attribute selection b. Handling Missing Values c. Discretization d. Elimination of Outliers
3.	Apply KNN algorithm for classification and regression using Python.
4.	Demonstrate decision tree algorithm for a classification problem and perform parameter tuning for better results using Python.
5.	Demonstrate decision tree algorithm for a regression problem using Python.
6.	Apply Random Forest algorithm for classification and regression using Python.
7.	Demonstrate Naïve Bayes Classification algorithm using Python.
8.	Apply Support Vector algorithm for classification using Python.
9.	Demonstrate simple linear regression algorithm for a regression problem using Python.
10.	Apply Logistic regression algorithm for a classification problem using Python.
11.	Demonstrate Multi-layer Perceptron algorithm for a classification problem using Python.
12.	Implement the K-means algorithm and apply it to the data you selected. Evaluate performance by measuring the sum of the Euclidean distance of each example from its class center. Test the performance of the algorithm as a function of the parameters K.

Reference Books:	
1.	**"Introduction to Machine Learning with Python" ,** Andreas C. Müller & Sarah Guido
2.	**"Python Machine Learning"** by Sebastian Raschka

Course Code	Category	L	T	P	C	C.I.E.	S.E.E.	Exam
B23CD3215	SEC	--	1	3	2	30	70	3 Hrs.

INTERNET OF THINGS LAB

(For CSD & CSIT)

Course Objectives:

1	To know how to use various hardware components and Protocols in IoT applications
2	To Know how to develop various IoT applications

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

S.No	Outcome	Knowledge Level
1	Use sensors, actuators, Arduino and Raspberry pi in IoT applications	K3
2	Design and Develop various IoT applications.	K5

SYLLABUS

1.	To interface Bluetooth with Raspberry Pi/Arduino and write a program to send sensor data to smart phone using Bluetooth.
2.	To interface Bluetooth with Raspberry Pi/Arduino and write a program to to turn ON/OFF LED when '1'/'0' is received from smart phone using Bluetooth.
3.	Application of WiFi in IoT Systems.
4.	App design for WiFi application to ON/OFF Light.
5.	Use of various network protocols in IoT systems.
6.	Application of 802.15.4 Zigbee in IoT Systems.
7.	Design a simple IoT System comprising sensor, Wireless Network connection, Data Analytics
8.	Design and Interface ESP32 with DC motor using L298 motor driver.
9.	Experiment on connectivity of Rasberry Pi with existing system components.

Text Books:

1.	Internet of Things: Architecture, Design Principles and Applications, Rajkamal, McGraw Hill Higher Education. 2017
2.	Internet of Things - A Hands-on Approach, Arshdeep Bahga and Vijay Madisetti, Universities Press, 1st edition, 2014.

Reference Books:

1.	Designing the Internet of Things, Adrian McEwen and Hakim Cassimally, Wiley, 1st edition, 2014.
2.	Getting Started with the Internet of Things CunoPfister,Oreilly. 2011
3.	Getting Started with Raspberry Pi, Matt Richardson & Shawn Wallace, O'Reilly (SPD),2014.

e-Resources:

1.	Introduction to Internet of Things, https://swayam.gov.in/nd1_noc20_cs66/preview
2.	An Introduction to Programming the Internet of Things(IoT) specialization, https://www.coursera.org/specializations/iot

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/

Course Code	Category	L	T	P	C	C.I.E.	S.E.E.	Exam
B23MC3201	MC	2	--	--		30	--	

EMPLOYABILITY SKILLS

(For AIDS, CIC, CSIT, CSD, ECE and EEE)

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