III B.Tech (CSE-AIML) COURSE STRUCTURE (R23)

1 SEMESTER

S. No	Subject Code	SUBJECT	Cat. Code	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	L	T	P	CREDITS
1	B23AI51	Information Retrieval Systems	PC	30	70	100	3	0	0	3
2	B23CS52	Computer Networks	PC	30	70	100	3	1	0	3
3	B23AI52	Operating Systems	PC	30	70	100	3	0	0	3
4	B23AI53	**Professional Elective-I** 1. Software Engineering 2. Cloud Computing 3. Internet of Things 4. Exploratory Data Analysis with Python 5. Automata Theory & Compiler Design	PE	30	70	100	3	0	0	3
5	B23CC51	**Open Elective-I** (OR) Entrepreneurship Development & Venture Creation	OE	30	70	100	3	0	0	3
6	B23AI56	Information Retrieval Lab	PC	30	70	100	0	0	3	1.5
7	B23CS57	Computer Networks Lab	PC	30	70	100	0	0	3	1.5
8	B23CS58	Full Stack development -2 /SWAYAM Plus- Data Engineer/AI Engineer/	SOC	30	70	100	0	1	2	2
9	B23CS59	Tinkering Lab *(User Interface Design using Flutter)*	ES	30	70	100	0	0	2	1
10	B23CSP50	Evaluation of Community Service Project Intern ship	-	-	-	-	-	-		2
						Total	15	1	10	23

II- SEMESTER

S.No.	Subject Code	SUBJECT	Cat. Code	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	L	T	P	CREDITS
1	B23AI61	Natural Language Processing	PC	30	70	100	3	0	0	3
2	B23AI62	Deep Learning	PC	30	70	100	3	0	0	3
3	B23AI63	Data Visualization	PC	30	70	100	3	0	0	3
4	B23CS64 B23AI64B B23AI64C B23AI64D	**Professional Elective-II** 1.Software Testing Methodology 2.Cryptography & Network Security 3.DevOps 4.Recommender Systems 5.Any of the 12-Week SWAYAM /NPTEL Course suggested by the BoS	PE	30	70	100	3	0	0	3
5	B23CS65A B23AI65B B23AI65C B23AI65D	**Professional Elective-III** 1. Software Project Management 2. Mobile Adhoc Networks 3. Computer Vision 4. NoSQL Databases Any of the 12-Week SWAYAM /NPTEL Course suggested by the BoS	PE	30	70	100	3	0	0	3
6	B23AIO	**Open Elective-II**	OE	30	70	100	3	0	0	3
7	B23AI66	Deep Learning Lab	PC	30	70	100	0	0	3	1.5
8	B23AI67	Data Visualization Lab	PC	30	70	100	0	0	3	1.5
9	B23SH61	Soft skills	SEC	30	70	100	0	1	2	2
10	B23CC6A	Technical Paper Writing & IPR					2	0	0	-
		Total					20	1	08	23

III B.TECH SEMISTER-I

S. No	Subject Code	SUBJECT	Cat. Code	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	L	T	P	CREDITS
1	B23AI51	Information Retrieval Systems	PC	30	70	100	3	0	0	3
2	B23CS52	Computer Networks	PC	30	70	100	3	0	0	3
3	B23AI52	Operating Systems	PC	30	70	100	3	0	0	3
4	B23AI53	**Professional Elective-I** 1.Software Engineering 2.Cloud Computing 3.Internet of Things 4. Exploratory Data Analysis with Python 5.Automata Theory & Compiler Design	PE	30	70	100	3	0	0	3
5	B23CC51	**Open Elective-I** (OR) Entrepreneurship Development & Venture Creation	OE	30	70	100	3	0	0	3
6	B23AI56	Information Retrieval Lab	PC	30	70	100	0	0	3	1.5
7	B23CS57	Computer Networks Lab	PC	30	70	100	0	0	3	1.5
8	B23CS58	Full Stack development -2 /SWAYAM Plus-Data Engineer/AI Engineer/	SOC	30	70	100	0	1	2	2
9	B23CS59	Tinkering Lab *(User Interface Design using Flutter)*	ES	30	70	100	0	0	2	1
10	B23CSP50	Evaluation of Community Service Project Intern ship					-	-		2
						Total	15	1	10	23

III B.TECH I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	-	-	30	70	100	3
SUBCODE: B23AI51	INFORMATION RETRIEVAL SYSTEMS						

COURSE OUTCOMES:

At the end of the course students will be able to

CO1: Apply the foundational concepts of information retrieval (IR) systems, including domain analysis and system evaluation methods.

CO2: Apply data structures and algorithms such as inverted files and signature files for efficient information retrieval

CO3: Construct and analyze PAT trees, PAT arrays, and stop lists for optimized text indexing and lexical analysis

CO4: Evaluate different stemming algorithms and methods for thesaurus construction used in IR systems.

CO5: Implement and compare various string searching algorithms to enhance retrieval performance in text-based systems.

SYLLABUS:

UNIT-I
Introduction to Information storage and retrieval systems: Domain Analysis of IR systems, IR and other types of Information Systems, IR System Evaluation **Introduction to Data structures and algorithms related to Information Retrieval**: Basic Concepts, Data structures, Algorithms.

UNIT-II
 Inverted Files and Signature Files: Introduction, Structures used in Inverted Files, building an Inverted file using a sorted array, Modifications to the Basic Techniques.
Signature Files: Concepts of Signature files, Compression, Vertical Partitioning, Horizontal Partitioning.

UNIT-III
 New Indices for Text, Lexical Analysis and Stop lists: PAT Trees and PAT Arrays:
 Introduction, PAT Tree structure, Algorithms on the PAT Trees, Building PAT Trees as PATRICA Trees, PAT representation as Arrays. Stoplists.

UNIT-IV
 Stemming Algorithms and Thesaurus Construction: Types of Stemming algorithms,
 Experimental Evaluations of Stemming, stemming to Compress Inverted Files.
 Thesaurus Construction: Features of Thesauri, Thesaurus Construction, Thesaurus construction from Texts, Merging existing Thesauri.

UNIT-V
String Searching Algorithms: Introduction, Preliminaries, The Naive Algorithm, The Knutt-Morris-Pratt Algorithm, The Boyer-Moore Algorithm, The Shift-Or Algorithm, The Karp-Rabin Algorithm.

TEXT BOOKS

1. Modern Information Retrieval,Ricardo Baeza-Yates, Neto, PEA,2007.
2. Information Storage and Retrieval Systems: Theory and Implementation, Kowalski, Gerald, Mark Academic Press, 2000.

III B.TECH I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	-	-	30	70	100	3
SUBCODE: **B23CS52**	**COMPUTER NETWORKS**						

COURSE OBJECTIVES:

- To under stand the Fundamental Concepts related to sources, shadows and shading
- To under stand the Geometry of Multiple Views

COURSE OUTCOMES

At the end of the course students will be able to

CO1: Apply different network models & communication techniques, methods and protocol standards

CO2: Examine different transmission media for transferring error free data

CO3: Compare and Classify medium access control protocols Ethernet protocols

CO4: Examine the Network Layer Design Issues and internet protocols (IPV4 & IPV6).

CO5: Reflect application layer services and client server protocols working with the client server paradigms

SYLLABUS:

UNIT-I

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

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

The Network Layer: Network Layer Design Issues, Routing Algorithms, Congestion, Congestion control algorithms. The Network Layer in the Internet, The IP Version 4 Protocol, IP Addresses- Classful, CIDR, NAT, IP Version 6 Protocol, Transition from IPV4 to IPV6

UNIT-IV
The Transport Layer: The Transport Layer Services, Transport Layer Protocols: UDP, TCP and SCTP

UNIT-V
The Application Layer: The World Wide Web, HTTP, Domain Name Space, Remote Loging, Electronic Mail and File Transfer

TEXT BOOKS:
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.

III B.TECH I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	-	-	30	70	100	3
SUBCODE: **B23AI52**	**OPERATING SYSTEMS**						

COURSE OUTCOMES

At the end of the course students will be able to

CO1: Make use of different operating System services and implement system calls for the Services

CO2: Examine Different types of Algorithms for process Scheduling and Compare the Scheduling Criteria

CO3: Organize Different Synchronization Tools for Concurrency and use different Mechanisms for Deadlock free

CO4: Organize Different Memory Management Strategies and Operate Different Algorithms for Deadlock free

CO5: Organize File System management and Different File System protection Mechanisms

SYLLABUS:

UNIT-I

Operating Systems Overview: Introduction, operating system functions, operating systems operations, Computing environments, Free and Open-Source Operating Systems System Structures: Operating System Services, User and Operating-System Interface, system calls, Types of System Calls, system programs, operating system Design and Implementation, operating system structure, Building and Booting an Operating System, Operating system debugging

UNIT-II

Processes: Process Concept, Process scheduling, Operations on processes, Inter-process communication. Threads and Concurrency: Multithreading models, Thread libraries, Threading issues. CPU Scheduling: Basic concepts, Scheduling criteria, Scheduling algorithms, Multiple processor scheduling.

UNIT–III

Synchronization Tools: The Critical Section Problem, Peterson's Solution, Mutex Locks, semaphores, Monitors, Classic problems of Synchronization. Deadlocks: system Model, Deadlock characterization, Methods for handling Deadlocks, Deadlock prevention, Deadlock avoidance, Deadlock detection, Recovery from Deadlock.

UNIT-IV

Memory- Management Strategies: Introduction, Contiguous memory allocation, Paging, Structure of the Page Table, Swapping. Virtual Memory Management: Introduction, Demand paging, Copy-on-write, Page replacement Allocation of frames, Thrashing Storage Management: Overview of Mass Storage Structure, HDD Scheduling.

UNIT-V

File System: File System Interface: File concept, Access methods, Directory Structure; File system Implementation: File-system structure, File-system Operations, Directory implementation, Allocation method, Free space management; File-System Internals: File-System Mounting, Partitions and Mounting, File Sharing. Protection: Goals of protection, Principles of protection, Protection Rings, Domain of protection, Access matrix

TEXT BOOKS:

1. Operating System Concepts, Silberschatz A, GalvinPB, GagneG,10thEdition, Wiley, 2018.
2. Modern Operating Systems, Tanenbaum AS,4th Edition, Pearson ,2016

REFERENCE BOOKS:

1. Operating Systems -Internals and Design Principles, Stallings W, 9thedition, Pearson, 2018
2. Operating Systems: A Concept Based Approach, D. M Dhamdhere, 3rd Edition, McGraw- Hill, 2013

Online Learning Resources:
   1. https://nptel.ac.in/courses/106/106/106106144/
   2. http://peterindia.net/OperatingSystems.html

III B.TECH I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	-	-	30	70	100	3
SUBCODE: **B23AI53A**	**SOFTWARE ENGINEERING**						

COURSE OBJECTIVES

The objectives of this course are to introduce

- Software life cycle models, Software requirements and SRS document.
- Project Planning, quality control and ensuring good quality software.
- 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

CO1: Identify the suitable Software Life cycle models in Software Engineering
CO2: Analyze the software management and requirements specifications of the SRS Documents
CO3: Analyze various design and Development solutions for Software Project
CO4: Compare and assess Various Testing and Quality management techniques
CO5: Analyze the concepts of CASE and software maintenance concepts

SYLLABUS:

UNIT-I
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
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

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

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, Software quality Software quality management system, ISO9000.SEICapability maturity model. Few other Important quality standards, and SixSigma.

UNIT-V

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, Software maintenance process models and Estimation of maintenance cost.

Software Reuse: Reuse-definition,in troduction, reason behind no re uses ofar, Basic issues in any reuse program, A reuse approach, and Reuse at organization level.

TEXT BOOKS:

1.FundamentalsofSoftwareEngineering,RajibMall,5thEdition,PHI.

2.Software Engineering A Practitioner's Approach, Roger S. Pressman, 9thEdition, McGraw Hill International Edition.

REFERENCE BOOKS:

1.Software Engineering, Ian Sommerville,10thEdition,Pearson.

2.Software Engineering, Principles and Practices, Deepak Jain, Oxford University Press.

e-RESOURCES:

1) https://nptel.ac.in/courses/106/105/106105182/
2) https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_01260589506387148827_shared/overview
3) https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_013382690411003904735_shared/overview

III B.TECH I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	-	-	30	70	100	3
SUBCODE: **B23AI53B**	**CLOUD COMPUTING**						

COURSE OBJECTIVES:

- To explain the evolving utility computing model called cloud computing.
- To introduce the various levels of services offered by cloud.
- To discuss the fundamentals of cloud enabling technologies such as distributed computing, service-oriented architecture and virtualization.
- To emphasize the security and other challenges in cloud computing.
- 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

CO1: Understand the architecture and concept of different cloud models: IaaS, PaaS, SaaS.
CO2: Explain parallel and distributed computing
CO3: Examine taxonomy of virtualization techniques, virtualization and cloud Computing
CO4: Design and deploy cloud computing security and risk measures
CO5: Importance of Advanced concepts in cloud computing

SYLLABUS

UNIT -I
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 AppEngine).

UNIT-II
Cloud Enabling Technologies: Ubiquitous Internet, parallel and distributed computing, elements of parallel computing, hardware architectures for parallel computing (SISD, SIMD, MISD, MIMD), elements of distributed computing, Inter-process communication, technologies for distributed computing, remote procedure calls (RPC), service-oriented architecture (SOA), Web services, virtualization.

UNIT-III

Virtualization and Containers: Characteristics of virtualized environments, taxonomy of virtualization techniques, virtualization and cloud Computing, pros and cons of virtualization, technology examples (XEN, VMware), building blocks of containers, container platforms (LXC, Docker), container orchestration, Docker Swarm and Kubernetes, public cloud VM (e.g. Amazon EC2) and container (e.g. Amazon Elastic Container Service) offerings.

UNIT-IV:

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

Advanced concepts in cloud computing: Server less computing, Function-as-a-Service, server less computing architecture, public cloud (e.g. AWS Lambda) and open-source (e.g. Open FaaS) server less platforms, Internet of Things (IoT), applications, cloud-centric IoT and layers, edge and fog computing, DevOps, infrastructure-as-code, quantum cloud computing.

TEXT BOOKS:

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)

III B.TECH I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	-	-	30	70	100	3
SUBCODE: B23AI53C	**INTERNET OF THINGS**						

COURSE OBJECTIVES:

- Vision and Introduction to Internet of Things(IoT).
- Understand IoT Market perspective.
- Data and Knowledge Management and use of Devices in IoT Technology.
- 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

CO1: Apply fundamental concepts and application protocols of the Internet of Things (IoT) including M2M communication

CO2: Analyze different IoT business models, market trends, and the role of standardizations in M2M/IoT system architecture.

CO3: Apply knowledge of device communication and protocols to design web connectivity and messaging systems

CO4: Organize and manage data acquisition, storage, and analytics in IoT/M2M

CO5: Evaluate real-world IoT systems considering technical constraints

SYLLABUS

UNIT-I
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
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
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
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
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.

TEXT BOOKS:

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, 2015

REFERENCE BOOKS:

1. **Designing the Internet of Things, Adrian McEwen and Hakim Cassimally,Wiley**
2. Getting Started with the Internet of Things, CunoPfister ,Oreilly

III B.TECH I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	-	-	30	70	100	3
SUBCODE: B23AI53D	**EXPLORATORY DATA ANALYSIS WITH PYTHON**						

COURSE OBJECTIVES

The main objectives of the course are to

- Introduce the fundamentals of Exploratory Data Analysis
- Cover essential exploratory techniques for understanding multivariate data by
- summarizing it through statistical methods and graphical methods.
- Evaluate the Models and select the best model

COURSE OUTCOMES:

At the end of the course students will be able to

CO1: Understand the role of Exploratory Data Analysis (EDA) in the data science process and differentiate it from classical and Bayesian analysis.

CO2: Apply different chart types such as line, bar, scatter, bubble, and pie charts using libraries like mat plot lib and sea born.

CO3: Analyze the effects of mathematical operations involving NaNs and apply forward, backward, and index-based filling techniques.

CO4: Perform univariate, bivariate, and multivariate analysis to understand relationships among variables.

CO5: Select the best model based on comparative performance and prepare it for deployment

SYLLABUS

UNIT-I

Exploratory Data Analysis Fundamentals: Understanding data science, the significance of EDA, steps in EDA, Making sense of data, Numerical data, Categorical data, Measurement scales, Comparing EDA with classical and Bayesian analysis, Software tools available for EDA, Getting started with EDA.

Sample Experiments:

1. a) Download Dataset from Kaggle using the following link :
       https://www.kaggle.com/datasets/sukhmanibedi/cars4u
   b) Install python libraries required for Exploratory Data Analysis (numpy, pandas, matplotlib, seaborn)

2. Perform Numpy Array basic operations and Explore Numpy Built-in functions.
3. Loading Dataset into pandas dataframe
4. Selecting rows and columns in the dataframe

UNIT-II
Visual Aids for EDA: Technical requirements, Line chart, Bar charts, Scatter plot using seaborn, Polar chart, Histogram, Choosing the best chart
Case Study: EDA with Personal Email, Technical requirements, Loading the dataset, Data transformation, Data cleansing, Applying descriptive statistics, Data refactoring, Data analysis.
Sample Experiments:
1. Apply different visualization techniques using sample dataset
       a. Line Chart b. Bar Chart c. Scatter Plots d.Bubble Plot
2. Generate Scatter Plot using seaborn library for iris dataset
3. Apply following visualization Techniques for a sample dataset
       a. Area Plot b. Stacked Plot c. Pie chart d. Table Chart
4. Generate the following charts for a dataset.
       a. Polar Chart b. Histogram c.Lollipop chart
5. Case Study: Perform Exploratory Data Analysis with Personal Email Data

UNIT-III
Data Transformation: Merging database-style data frames, Concatenating along with an axis, Merging on index, Reshaping and pivoting, Transformation techniques, Handling missing data, Mathematical operations with NaN, Filling missing values, Discretization and binning, Outlier detection and filtering, Permutation and random sampling, Benefits of data transformation, Challenges.
Sample Experiments:
1. Perform the following operations
       a) Merging Dataframes   b) Reshaping with Hierarchical Indexing
       c) Data Deduplication   d) Replacing Values
2. Apply different Missing Data handling techniques
       a)NaN values in mathematical Operations   b) Filling in missing data
       c) Forward and Backward filling of missing values   d) Filling with index values
       e) Interpolation of missing values
3. Apply different data transformation techniques
       a) Renaming axis indexes   b) Discretization and Binning
       c) Permutation and Random Sampling   d) Dummy variables

UNIT-IV
Descriptive Statistics: Distribution function, Measures of central tendency, Measures of dispersion, Types of kurtosis, Calculating percentiles, Quartiles, Grouping Datasets, Correlation, Understanding univariate, bivariate, multivariate analysis, Time Series Analysis
Sample Experiments:
1. Study the following Distribution Techniques on a sample data
       a) Uniform Distribution b) Normal Distributionc) Gamma Distribution
       d) Exponential Distributione) Poisson Distribution f) Binomial Distribution
2. Perform Data Cleaning on a sample dataset.
3. Compute measure of Central Tendency on a sample dataset
       a) Mean b)Median c)Mode
4. Explore Measures of Dispersion on a sample dataset

a) Variance b) Standard Deviation c) Skewness d) Kurtosis

5. a) Calculating percentiles on sample dataset

     b) Calculate Inter Quartile Range(IQR) and Visualize using Box Plots

6. Perform the following analysis on automobile dataset.

     a) Bivariate analysis b)Multivariate analysis

7. Perform Time Series Analysis on Open Power systems dataset

UNIT-V

Model Development and Evaluation: Unified machine learning workflow, Data preprocessing, Data preparation, Training sets and corpus creation, Model creation and training, Model evaluation, Best model selection and evaluation, Model deployment

Case Study: EDA on Wine Quality Data Analysis

Sample Experiments:

1. Perform hypothesis testing using stats models library

     a) Z-Test b)T-Test

2. Develop model and Perform Model Evaluation using different metrics such as prediction score, R2 Score, MAE Score, MSE Score.

3. Case Study: Perform Exploratory Data Analysis with Wine Quality Dataset

TEXT BOOK:

1. Suresh Kumar Mukhiya, Usman Ahmed, Hands-On Exploratory Data Analysis with Python, Packt Publishing, 2020.

REFERENCE BOOKS:

1. Ronald K. Pearson, Exploratory Data Analysis Using R, CRC Press, 2020
2. RadhikaDatar, Harish Garg, Hands-On Exploratory Data Analysis with R: Become an expert in exploratory data analysis using R packages, 1st Edition, Packt Publishing, 2019

WEB REFERENCES:

1. https://github.com/PacktPublishing/Hands-on-Exploratory-Data-Analysis-with-Python
2. https://www.analyticsvidhya.com/blog/2022/07/step-by-step-exploratory-dataanalysis-eda-using-python/#h-conclusion
3. https://github.com/PacktPublishing/Exploratory-Data-Analysis-with-Python-Cookbook

III B.TECH I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	-	-	30	70	100	3
SUBCODE: B23AI53E	**AUTOMATA THEORY AND COMPILER DESIGN**						

COURSE OUTCOMES:

At the end of the course students will be able to

CO1: Understand the basic concepts of automata theory including alphabets, strings, languages, and problems

CO2: Construct parse trees and identify ambiguity in grammars and languages

CO3: Analyze the language accepted by a Turing Machine and its computational power.

CO4: Apply lexical analysis using tools such as Lex for token generation.

CO5: Analyze different evaluation orders for SDDs and apply translation schemes to annotated parse trees.

SYLLABUS

UNIT-I
 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 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
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 Un decidability: Un decidability, A Language that is Not Recursively Enumerable, An Un decidable Problem That is RE, Un decidable Problems about Turing Machines

UNIT-IV
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 R18 B.Tech. CS&D Syllabus JNTU Hyderabad

UNIT-V
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

TEXT BOOKS:

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. Introduction to Formal languages Automata Theory and Computation, Kamala Krithivasan, Rama R, Pearson.
2. Introduction to Languages and The Theory of Computation, John C Martin, TMH.
3. lex&yacc – John R. Levine, Tony Mason, Doug Brown, O'reilly
4. Compiler Construction, Kenneth C. Louden, Thomson. Course Technology.

III B.TECH I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	0	0	30	70	100	3
SUBCODE: **B23CC51**	ENTREPRENEURSHIP						

COURSE OBJECTIVES:

1) To develop and strengthen entrepreneurial quality and motivation in students.

2) To impart basic entrepreneurial skills and understandings to run a business efficiently and effectively

COURSE OUTCOMES: At the end of the course, student will be able to

- Study the concept of   entrepreneurship , knowledge and skills of entreprenuer.

- Get the awareness on business environment

- Get the awareness on industrial policies

- Gain the competency on preparing business plan

- Study the impact of launching small business and understand resource planning for start up

SYLLABUS

UNIT-I

ENTREPRENEURAL COMPETENCE
Entrepreneurship concept – Entrepreneurship as a Career – Entrepreneurial Personality - Characteristics of Successful, Entrepreneur – Knowledge and Skills of Entrepreneur.

UNIT-II

ENTREPRENEURAL ENVIRONMENT
Business   Environment - Role of Family and Society - Entrepreneurship Development Training and Other Support Organisational Services.

UNIT-III

INDUSTRIAL POLICIES
Central   and State Government Industrial Policies and Regulations - International Business.

UNIT-IV

BUSINESS PLAN PREPARATION
Sources of Product for Business - Prefeasibility Study - Criteria for Selection of Product - Ownership - Capital - Budgeting Project Profile Preparation - Matching Entrepreneur with the Project - Feasibility Report Preparation and Evaluation Criteria.

UNIT- V

LAUNCHING OF SMALL BUSINESS
Finance and Human Resource Mobilization Operations Planning - Market and Channel Selection - Growth Strategies - Product Launching – Incubation, Venture capital, IT start ups.
Monitoring   and Evaluation of Business - Preventing Sickness and Rehabilitation of Business Units- Effective Management of small Business.

TEXT BOOKS

1. Hisrich, Entrepreneurship, Tata McGraw Hill, New Delhi, 2001.

2. S.S.Khanka, Entrepreneurial Development, S.Chand and Company Limited, NewDelhi, 2001.

REFERENCES

1. Mathew Manimala, Entrepreneurship Theory at the Crossroads, Paradigms &Praxis, Biztrantra ,2nd Edition ,2005
2. Prasanna Chandra, Projects – Planning, Analysis, Selection, Implementation and Reviews, Tata McGraw-Hill, 1996.
3. P.Saravanavel, Entrepreneurial Development, Ess Pee kay Publishing House, Chennai -1997.
 4. Arya Kumar. Entrepreneurship. Pearson. 2012 5. Donald F Kuratko, T.V Rao. Entrepreneurship: A South Asian perspective. Cengage Learning. 2012

III B.TECH I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	0	0	3	30	70	100	1.5
SUBCODE: **B23AI56**	**INFORMATION RETRIEVAL LAB**						

COURSE OUTCOMES:

On completion of this course, the student will be able to

- Compute the similarity bet ween text documents
- Apply all pre-processing steps for text-data
- Implement classification of text documents.
- Perform document clustering using different algorithms.
- Implement Page Rank algorithm for any network.

Programming Language: Python/R

SYLLABUS

LAB EXPERIMENTS:

1. Representation of a Text Document in Vector Space Model and Computing Similarity between two documents.
2. Pre-processing of a Text Document: stop word removal and stemming
3. Construction of an Inverted Index for a given document collection comprising of at least 50 documents with a total vocabulary size of at least 1000 words.
4. Classification of a set of Text Documents into known classes (You may use any of the Classification algorithms like Naive Bayes, Max Entropy, Rochio's, Support Vector Machine). Standard Datasets will have to be used to show the results.
5. Text Document Clustering using K-means. Demonstrate with a standard dataset and compute performance measures- Purity, Precision, Recall and F-measure.
6. Crawling/ Searching the Web to collect news stories on a specific topic (based on user input). The program should have an option to limit the crawling to certain selected websites only.
7. To parse XML text, generate Web graph and compute topic specific page rank
8. Implement Matrix Decomposition and LSI for a standard dataset.
9. Mining Twitter to identify tweets for a specific period (and/or from a geographical location) and identify trends and named entities.
10. Implementation of PageRank on Scholarly Citation Network.

III B.TECH I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	0	0	3	30	70	100	1.5
SUBCODE: **B23CS57**				**COMPUTER NETWORKS LAB**			

SYLLABUS

LIST OF EXPERIMENTS:

1. Study of Network devices in detail and connect the computers in Local Area Network.

2. Write a Program to implement the data link layer farming methods such as

    i) Character stuffing ii) bit stuffing.

3. Write a Program to implement data link layer farming method checksum.

4. Write a program for Hamming Code generation for error detection and correction.

5. Write a Program to implement on a data set of characters the three CRC polynomials – CRC 12, CRC 16 and CRC CCIP.

6. Write a Program to implement Sliding window protocol for Goback N.

7. Write a Program to implement Sliding window protocol for Selective repeat.

8. Write a Program to implement Stop and Wait Protocol.

9. Write a program for congestion control using leaky bucket algorithm

10. Write a Program to implement Dijkstra's algorithm to compute the Shortest path through a graph.

11. Write a Program to implement Distance vector routing algorithm by obtaining routing table at each node (Take an example subnet graph with weights indicating delay between nodes).

12. Write a Program to implement Broadcast tree by taking subnet of hosts.

13. Wireshark

    i. Packet Capture Using Wire shark

    ii. Starting Wire shark

    iii. Viewing Captured Traffic

    iv. Analysis and Statistics & Filters.

14. How to run Nmap scan

15. Operating System Detection using Nmap

16. Do the following using NS2 Simulator

    i. NS2 Simulator-Introduction

ii. Simulate to Find the Number of Packets Dropped

iii. Simulate to Find the Number of Packets Dropped by TCP/UDP

iv. Simulate to Find the Number of Packets Dropped due to Congestion

v. Simulate to Compare Data Rate& Throughput.

III B.TECH I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	0	0	2	30	70	100	1
SUBCODE: **B23CS58**	FULL STACK DEVELOPMENT- 2						

COURSE OBJECTIVES

The main objectives of the course are to
- Make use of router, template engine and authentication using sessions to develop application in ExpressJS.
- Build a single page application using RESTful APIs in ExpressJS
- Apply router and hooksin designing ReactJS application
- Make use of MongoDB queries to perform CRUD operations on document database

SYLLABUS

Experiments covering the Topics:
- Typescript
- ExpressJS – Routing, HTTP Methods, Middleware, Templating, Form Data
- ExpressJS – Cookies, Sessions, Authentication, Database, RESTful APIs
- ReactJS – Render HTML, JSX, Components – function & Class, Props and States, Styles, Respond to Events
- ReactJS – Conditional Rendering, Rendering Lists, React Forms, React Router, Updating the Screen
- ReactJS – Hooks, Sharing data between Components, Applications – To-do list and Quiz
- MongoDB – Installation, Configuration, CRUD operations, Databases, Collections and Records

Sample Experiments:

1. Typescript
  a. Write a program to understand simple and special types.
  b. Write a program to understand function parameter and return types.
  c. Write a program to show the importance with Arrow function. Use optional, default and REST parameters.
  d. Write a program to understand the working of typescript with class, constructor, properties, methods and access specifiers.
  e. Write a program to understand the working of namespaces and modules.
  f. Write a program to understand generics with variables, functions and constraints.

2. Express JS – 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.

3. Express JS – Templating, Form Data
    a. Write a program using templating engine.
    b. Write a program to work with form data.

4. Express JS – Cookies, Sessions, Authentication
    a. Write a program for session management using cookies and sessions.
    b. Write a program for user authentication.

5. 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.

6. 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).

7. 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.

8. 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.

9. 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.

10. 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.

11. ReactJS Applications – To-do list and Quiz
    a. Design to-do list application.

12. 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()

13. 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().

14. 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. Programming the World Wide Web, 7th Edition, Robet W Sebesta, Pearson, 2013.
2. Pro MERN Stack: Full Stack Web App Development with Mongo, Express, React, and Node, Vasan Subramanian, 2nd edition, APress, O'Reilly.

Web Links:

1. ExpressJS - https://www.tutorialspoint.com/expressjs
2. ReactJS - https://www.w3schools.com/REACT (and)   https://react.dev/learn#
3. MongoDB - https://learn.mongodb.com/learning-paths/introduction-to-mongodb

III B.TECH I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	0	0	3	30	70	100	1.5
SUBCODE: **B23CS59**	**TINKERING LAB** (USER INTERFACE DESIGN USING FLUTTER)						

COURSE OBJECTIVES:

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

SYLLABUS

LIST OF EXPERIMENTS:
Students need to implement the following experiments
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.

TEXT BOOK:

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.

S.No.	Subject Code	SUBJECT	Cat. Code	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	L	T	P	CREDITS
1	B23AI61	Natural Language Processing	PC	30	70	100	3	0	0	3
2	B23AI62	Deep Learning	PC	30	70	100	3	0	0	3
3	B23AI63	Data Visualization	PC	30	70	100	3	0	0	3
4	B23CS64 B23AI64B B23AI64C B23AI64D	**Professional Elective-II** 1.Software Testing Methodology 2.Cryptography & Network Security 3.DevOps 4.Recommender Systems 5.Any of the 12-Week SWAYAM /NPTEL Course suggested by the BoS	PE	30	70	100	3	0	0	3
5	B23CS65A B23AI65B B23AI65C B23AI65D	**Professional Elective-III** 1.Software Project Management 2.Mobile Adhoc Networks 3.Computer Vision 4.NoSQL Databases 5.Any of the 12-Week SWAYAM /NPTEL Course suggested by the BoS	PE	30	70	100	3	0	0	3
6	B23AIO	**Open Elective-II**	OE	30	70	100	3	0	0	3
7	B23AI66	Deep Learning Lab	PC	30	70	100	0	0	3	1.5
8	B23AI67	Data Visualization Lab	PC	30	70	100	0	0	3	1.5
9	B23SH61	Soft skills	SEC	30	70	100	0	1	2	2
10	B23CC6A	Technical Paper Writing & IPR	AC	-	-	-	2	0	0	-
		Total					20	1	08	23

III B.TECH II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	0	0	30	70	100	3
SUBCODE: **B23AI61**	**NATURAL LANGUAGE PROCESSING**						

COURSE OBJECTIVES

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

COURSE OUTCOMES:

At the end of the course students will be able to

CO1: Identify a given text with basic Language features

CO2: To design an innovative application using NLP components

CO3: Construct a rule based system to tackle morphology/syntax of a language

CO4: Design a tag set to be used for statistical processing for real-time applications

CO5: To compare and contrast the use of different statistical approaches for different types of NLP applications

SYLLABUS

UNIT-I
INTRODUCTION: Origins and challenges of NLP – Language Modeling: Grammar-based LM, Statistical LM – Regular Expressions, Finite-State Automata – English Morphology, Transducers for lexicon and rules, Tokenization, Detecting and Correcting Spelling Errors, Minimum Edit Distance.

UNIT-II
WORD LEVEL ANALYSIS: Unsmoothed N-grams, Evaluating N-grams, Smoothing, Interpolation and Back off – Word Classes, Part- of-Speech Tagging, Rule-based, Stochastic and Transformation-based tagging, Issues in PoS tagging – Hidden Markov and Maximum Entropy models.

UNIT-III
SYNTACTIC ANALYSIS: Context-Free Grammars, Grammar rules for English, Treebanks, Normal Forms for grammar – Dependency Grammar – Syntactic Parsing, Ambiguity, Dynamic Programming parsing – Shallow parsing Probabilistic CFG, Probabilistic CYK, Probabilistic Lexicalized CFGs – Feature structures, Unification of feature structures

UNIT-IV
SEMANTICS AND PRAGMATICS: Requirements for representation, First-Order Logic, Description Logics – Syntax-Driven Semantic analysis, Semantic attachments – Word Senses, Relations between Senses, Thematic Roles, selectional restrictions – Word Sense Disambiguation, WSD using Supervised, Dictionary & Thesaurus, Bootstrapping methods – Word Similarity using Thesaurus and Distributional methods.

UNIT-V
DISCOURSE ANALYSIS AND LEXICAL RESOURCES: Discourse segmentation, Coherence – Reference Phenomena, Anaphora Resolution using Hobbs and Centering Algorithm – Coreference Resolution – Resources: Porter Stemmer, Lemmatizer, Penn Treebank, Brill's Tagger, WordNet, Prop Bank, FrameNet, Brown Corpus, British National Corpus (BNC).

TEXT BOOKS:

1. Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics and Speech, 2nd Edition, Daniel Jurafsky, James H. Martin -Pearson Publication,2014.
2. Natural Language Processing with Python, First Edition, Steven Bird, Ewan Klein and Edward Loper, OReilly Media,2009.

REFERENCE BOOKS:

1. Language Processing with Java and Ling Pipe Cookbook, 1st Edition, Breck Baldwin, Atlantic Publisher, 2015.
2. Natural Language Processing with Java, 2nd Edition, Richard M Reese, OReilly Media,2015.
3. Handbook of Natural Language Processing, Second, Nitin Indurkhya and Fred J. Damerau, Chapman and Hall/CRC Press, 2010.Edition
4. Natural Language Processing and Information Retrieval, 3rd Edition, Tanveer Siddiqui, U.S. Tiwary, Oxford University Press,2008

III B.TECH II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	0	0	30	70	100	3
SUBCODE: B23AI62	DEEP LEARNING						

COURSE OBJECTIVES:

1. The objective of this course is to cover the fundamentals of neural networks as well as some advanced topics such as recurrent neural networks, long short-term memory cells and convolution neural networks.

COURSE OUTCOMES:

At the end of the course students will be able to

CO1: Choose the structure and function of a biological neuron and relate its features to artificial models like the McCulloch–Pitts unit and perceptron
CO2: Distinguish feed forward networks and Deep Neural networks
CO3: Mathematically choose the deep learning approaches and paradigms
CO4: Apply the deep learning techniques for various applications
CO5: Analyze and apply emerging deep learning architectures

SYLLABUS

UNIT-I
Basics- Biological Neuron, Idea of computational units, McCulloch–Pitts unit and Thresholding logic, Linear Perceptron, Perceptron Learning Algorithm, Linear separability, Convergence theorem for Perceptron Learning Algorithm.

UNIT-II
Feed forward Networks-Multilayer Perceptron, Gradient Descent,Back propagation,
Empirical Risk Minimization, regularization, autoencoders.
Deep Neural Networks: Difficulty of training deep neural networks, Greedylayer wise training.

UNIT-III
Better Training of Neural Networks-Newer optimization methods for neural networks (Adagrad, adadelta, rmsprop, adam, NAG), second order methods for training,Saddle point problem in neural networks, Regularization methods (dropout, drop connect, batch normalization).

UNIT-IV

Recurrent Neural Networks- Back propagation through time, Long Short Term Memory, Gated Recurrent Units, Bidirectional LSTMs, Bidirectional RNNs.

Convolutional Neural Networks: LeNet, AlexNet. Generative models: Restrictive Boltzmann Machines (RBMs), Introduction to MCMC and Gibbs Sampling, gradient computations in RBMs, Deep Boltzmann Machines.

UNIT-V

Recent trends-Variational Auto encoders, Trans formers, GPT Applications: Vision, NLP, Speech

TEXTBOOKS:

1. Deep Learning, Ian Good fellow and Yoshua Bengio and Aaron Courville, MIT Press, 2016.

REFERENCEBOOKS:

1. NeuralNetworks:ASystematicIntroduction,RaúlRojas,1996
2. PatternRecognitionandMachineLearning,ChristopherBishop,2007
3. DeepLearningwithPython,FrançoisChollet,ManningPublications,2017

III B.TECH II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	0	0	30	70	100	3
SUBCODE: B23AI63	**DATA VISUALIZATION**						

COURSE OBJECTIVE

- Familiarize students with the basic and advanced techniques of information visualization and scientific visualization
- Learn key techniques of the visualization process
- A detailed view of visual perception, the visualized data and the actual visualization, interaction and distorting techniques

COURSE OUTCOMES:

At the end of the course students will be able to

CO1: Make use of the fundamentals of data visualization
CO2: Design effective visual representations by applying visualization models
CO3: Classify and apply appropriate visualization and interaction techniques for one-dimensional to multi-dimensional data
CO4: Develop visualizations for structured data types such as trees, graphs, clusters, and networks
CO5: Analyze and implement visualization strategies for complex datasets

SYLLABUS

UNIT-1
Introduction: What Is Visualization? History of Visualization, Relationship between Visualization and Other Fields the Visualization Process, Introduction of visual perception, visual representation of data, Gestalt principles, information overloads.

UNIT-II
Creating visual representations, visualization reference model, visual mapping, visual analytics, Design of visualization applications.

UNIT-III
Classification of visualization systems, Interaction and visualization techniques misleading, Visualization of one, two and multi-dimensional data, text and text documents.

UNIT-IV
Visualization of groups, trees, graphs, clusters, networks, software, Metaphorical visualization

UNIT-V
Visualization of volumetric data, vector fields, processes and simulations, Visualization of maps, geographic information, GIS systems, collaborative visualizations, Evaluating visualizations
Recent trends in various perception techniques, various visualization techniques, data structures used in data visualization.

TEXTBOOK:

1. WARD, GRINSTEIN, KEIM.Interactive Data Visualization: Foundations, Techniques, and Applications. Natick : A K Peters, Ltd.
2. E. Tufte, The Visual Display of Quantitative Information, Graphics Press.

RESOURCES: https://kdd.cs.ksu.edu/Courses/CIS536/Lectures/Slides/Lecture-34-Main_6up.pdf

III B.TECH II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	0	0	30	70	100	3
SUBCODE: **B23CS64A**	**SOFTWARE TESTING METHODOLOGY**						

COURSE OBJECTIVES

- To provide knowledge of the concepts in software testing such as testing process, criteria, strategies, and methodologies.
- 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

CO1: Apply fundamental testing concepts and models to identify bugs and evaluate software reliability using path and flow graphs.

CO2: Analyze transaction flow, data flow, and domain testing techniques to assess software test coverage and effectiveness

CO3: Use logic-based testing strategies, such as decision tables and path expressions, to design effective test cases

CO4: Construct state graphs and perform transition testing to evaluate software behavior under different conditions

CO5: Implement software testing automation using tools like JMeter, Selenium, or Soap UI to validate software functionality and performance

SYLLABUS

UNIT-I
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
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
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
State, State Graphs and Transition testing: state graphs, good & bad state graphs, state testing, Testability tips.

UNIT-V:
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).

TEXT BOOKS:

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.

III B.TECH II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	0	0	30	70	100	3
SUBCODE: B23AI64B	CRYPTOGRAPHY & NETWORK SECURITY						

COURSE OBJECTIVES:

1. Apply modular arithmetic in modern cryptography
2. Make use of Substitution and transposition transformations in Symmetric Encryption Algorithms.
3. Make use of number theory knowledge in Asymmetric Encryption algorithms.
4. Analyze various Hash functions and digital signatures for online authentication
5. Analyze network security protocols for providing better security

COURSE OUTCOMES

At the end of the course students will be able to

CO1: Apply modular arithmetic in modern cryptography

CO2: Make use of Substitution and transposition transformation Symmetric

Encryption Algorithms

CO3: Make use of number theory knowledge in Asymmetric Encryption algorithms.

CO4: Analyze various Hash functions and digital signatures for online

authentication

CO5: Analyze network security protocols for providing better security

SYLLABUS

UNIT-I
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
Introduction to Symmetric Cryptography: Algebraic Structures-Groups, Rings, Fields, GF(2^n) fields, Polynomials.
Mathematics of Asymmetric cryptography: Primes, checkingfor Primness, Euler's phi-functions, Fermat's Little Theorem, Euler's Theorem, Generating Primes, Primality Testing, Factorization, Chinese Remainder Theorem, Quadratic Congruence, Exponentiation and Logarithm.

UNIT-III
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
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
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.

TEXT BOOKS:

1. Cryptography and Network Security - Principles and Practice: William Stallings, Pearson Education, 7th Edition, 2017
2. Cryptography and Network Security: Behrouz A. ForouzanDebdeep, Mc Graw Hill, 3rd Edition, 2015

REFERENCE BOOKS:

1. Cryptography and Network Security: AtulKahate, 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.

III B.TECH II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	0	3	30	70	100	4.5
SUBCODE: **B23AI64C**	**DEVOPS**						

COURSE OBJECTIVES:

The main objectives of this course are to:

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

COURSE OUTCOMES

At the end of the course students will be able to

CO1: Apply the principles of the DevOps lifecycle and architecture to integrate DevOps practices within Agile and traditional SDLC-based software projects

CO2: Apply version control operations using GIT and evaluate code quality through unit testing and tools like Sonar Qube

CO3: Develop and manage continuous integration pipelines using Jenkins, including job scheduling, user roles, and master-slave configurations.

CO4: Implement containerization and continuous deployment workflows using Docker and test applications using Selenium.

CO5: Deploy and manage applications using configuration management tools such as Ansible, Kubernetes/Open Shift, Puppet, and Chef.

SYLLABUS

UNIT-I

Introduction to DevOps: Introduction to SDLC, Agile Model. Introduction to DevOps. DevOps Features, DevOps Architecture, DevOps Lifecycle, Understanding Workflow and principles, Introduction to DevOps tools, Build Automation, Delivery Automation, Understanding Code Quality, Automation of CI/ CD. Release management, Scrum, Kanban, delivery pipeline, bottlenecks, examples

UNIT-II

Source Code Management(GIT): The need for source code control, The history of source code management, Roles and code, source code management system and migrations. What is Version Control and GIT, GIT Installation, GIT features, GIT workflow, working with remote repository, GIT commands, GIT branching, GIT staging and collaboration.

UNITTESTING-CODE COVERAGE: Junit, nUnit & Code Coverage with Sonar Qube, SonarQube - Code Quality Analysis.

UNIT-III

Build Automation - Continuous Integration (CI): Build Automation, what is CI Why Cl is Required, CI tools, Introduction to Jenkins (With Architecture), Jenkins workflow, Jenkins master slave architecture, Jenkins Pipelines, **PIPELINE BASICS -** Jenkins Master, Node, Agent, and Executor Freestyle Projects& Pipelines, Jenkins for Continuous Integration, Create and Manage Builds, User Management in Jenkins Schedule Builds, Launch Builds on Slave Nodes**.**

UNIT-IV

 Continuous Delivery: Importance of Continuous Delivery, CONTINUOUS DEPLOYMENT CD Flow, Containerization with Docker: Introduction to Docker, Docker installation, Docker commands, Images & Containers, Docker File, running containers, working with containers and publish to DockerHub.
 Testing Tools: Introduction to Selenium and its features, Java Script testing.

UNIT-V

Configuration Management - **ANSIBLE:** Introduction to Ansible, Ansible
tasks Roles, Jinja2 templating, Vaults, Deployments using Ansible.
CONTAINERIZATION USING   KUBERNETES(OPENSHIFT): Introduction to Kubernetes Namespace& Resources, CI/CD - On OCP, BC, DC&ConfigMaps, Deploying Apps on Open shift Container Pods. Introduction to Puppet master and Chef.

 List of Experiments:
1. Write code for a simple user registration form for an event.
2. Explore Git and GitHub commands.
3. Practice Source code management on GitHub. Experiment with the source code written in exercise 1.
4. Jenkins installation and setup, explore the environment.
5. Demonstrate continuous integration and development using Jenkins.
6. Explore Docker commands for content management.
7. Develop a simple containerized application using Docker.
8. Integrate Kubernetes and Docker

9. Automate the process of running containerized application developed in exercise 7 using Kubernetes.
10. Install and Explore Selenium for automated testing.
11. Write a simple program in JavaScript and perform testing using Selenium.
12. Developtestcasesfortheabovecontainerizedapplicationusingselenium.

TEXTBOOKS

1. Joyner, Joseph., Devops for Beginners: Devops Software Development Method Guide for Software Developers and It Professionals, 1st Edition MihailsKonoplows, 2015.
2. Alisson Machado de Menezes., Hands-on DevOps with Linux,1st Edition, BPB Publications, India, 2021.

REFERENCEBOOKS

1. Len Bass,Ingo Weber,Liming Zhu.DevOps: A software Architect's Perspective. Addison Wesley; ISBN-10
2. Gene Kim Je Humble, Patrick Debois, John Willis. The DevOps Handbook, 1st Edition, IT Revolution Press, 2016.
3. Verona,JoakimPracticalDevOps,1stEdition,PacktPublishing,2016.
4. JoakimVerona.Practical Devops,2ndEdition.Ingramshorttitle;2ndedition (2018). ISBN10: 1788392574
5. Deepak Gaikwad,Viral Thakkar.DevOpsToolsfrom Practitioner'sViewpoint.Wileypublications.ISBN:9788126579952

III B.TECH II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	0	0	30	70	100	3
SUBCODE: B23AI64D	RECOMMENDER SYSTEMS						

III B.TECH II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	0	0	30	70	100	3
SUBCODE: B23AI64D	**RECOMMENDER SYSTEMS**						

COURSE OBJECTIVES

- This course covers the basic concepts of recommender systems, including personalization algorithms, evaluation tools, and user experiences

COURSE OUTCOMES

At the end of the course students will be able to

CO1: Explain and apply basic linear algebra concepts in the context of recommender systems

CO2: Analyze potential vulnerabilities and evaluate attacks on collaborative recommender systems

CO3: Apply similarity-based retrieval methods for recommendation.

CO4: Compare and evaluate the effectiveness of different hybrid strategies

CO5: Examine social tagging and trust-based systems for enhancing recommendations.

SYLLABUS

UNIT-I
Introduction: Recommender system functions, Linear Algebra notation: Matrix addition, Multiplication, transposition, and inverses, covariance matrices, Understanding ratings, Applications of recommendation systems, Issues with recommender system.

UNIT-II
Collaborative Filtering: User-based nearest neighbour recommendation, Item-based nearest neighbour recommendation, Model based and pre-processing based approaches, Attacks on collaborative recommender systems.

UNIT-III
Content-based recommendation: High level architecture of content-based systems, Advantages and drawbacks of content based filtering, Item profiles, discovering features of documents, obtaining item features from tags, representing item profiles, Methods for learning user profiles, Similarity based retrieval, Classification algorithms.
Knowledge based recommendation: Knowledge representation and reasoning, Constraint based recommenders, Case based recommenders.

UNIT-IV
Hybrid approaches: Opportunities for hybridization, Monolithic hybridization design: Feature combination, Feature augmentation, Parallelized hybridization design: Weighted, Switching, Mixed, Pipelined hybridization design: Cascade Meta-level, Limitations of hybridization strategies.

UNIT-V
Evaluating Recommender System: Introduction, General properties of evaluation research, Evaluation designs, Evaluation on historical datasets, Error metrics, Decision-Support metrics, User-Centred metrics.
Recommender Systems and communities: Communities, collaboration and recommender systems in personalized web search, Social tagging recommender systems, Trust and recommendations

TEXT BOOKS:

1. Jannach D., Zanker M. and FelFering A., Recommender Systems: An Introduction, Cambridge University Press(2011), 1st ed.
2. Ricci F., Rokach L., Shapira D., Kantor B.P., Recommender Systems Handbook, Springer(2011), 1st ed.

REFERENCES:

1. Manouselis N., Drachsler H., Verbert K., Duval E., Recommender Systems For Learning, Springer (2013), 1st ed.

III B.TECH II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	0	0	30	70	100	3
SUBCODE: B23CS65A	**SOFTWARE PROJECT MANAGEMENT**						

COURSE OBJECTIVES:

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

- To describe and determine the purpose and importance of project management from the perspectives of planning, tracking and completion of project
- To compare and differentiate organization structures and project tructures
- To implement a project to manage project schedule, expenses and resources with the application of suitable project management tools

COURSE OUTCOMES

At the end of the course students will be able to

CO1: Apply the concepts to be followed in the conventional software management

CO2: Apply the process model to perform software life cycle phases

CO3: Implement the project architecture based on different techniques and plans

CO4: Make use of responsibilities and activities to complete software projects successfully

CO5: Apply concepts of Agility and DevOps to perform software projects

SYLLABUS

UNIT-I
Conventional Software Management: The water fall model, conventional software Management performance.
Evolution of Software Economics: Software Economics, pragmatic software cost estimation.
Improving Software Economics: Reducing Software product size, improving software processes, improving team effectiveness, improving automation, Achieving required quality, peer inspections.
The old way and the new: The principles of conventional software Engineering, principles of modern software management ,transitioning to an iterative process.

UNIT-II
Life cycle phases: Engineering and production stages, inception, Elaboration, construction, transition phases. **Artifacts of the process:** The artifactsets, Management artifacts, Engineering artifacts, program maticartifacts.

UNIT-III
Model based software architectures: A Management perspective and technical perspective**.**
Work Flows of the process: Software process work flows, Iteration workflows.
Check points of the process: Majorm ilestones, Minor Milestones, Periodic status assessments.
Iterative Process Planning: Work break down structures, planning guidelines, cost and schedule estimating, It eration planning process,P ragmatic planning.

UNIT-IV
Project Organizations and Responsibilities: Line-of-Business Organizations,Project Organizations, evolution of Organizations.
Process Automation: Automation Building blocks, The Project Environment.
Project Control and Process in strumentation: The seven core Metrics, Management in dicators, quality in dicators, life cycle expectations ,pragmatic Software Metrics, Metricsautomation.

UNIT-V
Agile Methodology, A DAPTing to Scrum, Patterns for Adopting Scrum, Iterating towards Agility**.**
Fundamentals of DevOps: Architecture, Deployments, Orchestration, Need, Instance of applications, DevOps delivery pipeline, DevOpseco system. DevOps adoption in projects: Technology aspects,Agilingcapabilities,Toolstackimplementation,Peopleaspect,processes

TEXTBOOKS:

1. Software Project Management,WalkerRoyce,PEA,2005.
2. Succeeding with Agile:Software Development Using Scrum,Mike Cohn,AddisonWesley.
3. The DevOps Handbook:How to Create World-Class Agility, Reliability,and Securityin Technology Organizations, Gene Kim, John Willis, Patrick Debois, Jez Humb,1st Edition,O'Reillypublications,2016.

REFERENCEBOOKS:

1. Software Project Management,BobHughes,3/e,MikeCotterell,TMH
2. Software Project Management, JoelHenry,PEA
3. Software Project Management inpractice, PankajJalote,PEA, 2005,
4. Effective Software Project Management,RobertK.Wysocki,Wiley,2006.
5. Project Management in IT,Kathy Schwalbe,Cengage.

III B.TECH II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	0	0	30	70	100	3
SUBCODE: B23AI65B	MOBILE ADHOC AND SENSOR NETWORKS						

COURSE OUTCOMES

At the end of the course students will be able to

CO1: Apply fundamental concepts of Ad Hoc and Wireless Sensor Networks (WSNs) to analyze their architecture, applications, and associated challenges

CO2: Design routing and transport layer protocols for Ad Hoc networks considering design constraints and performance requirements

CO3: Analyze security challenges and apply security protocols in Ad Hoc and Wireless Sensor Networks to protect against attacks

CO4: Model and evaluate data communication and energy consumption in sensor network deployments under various application scenarios

CO5: Implement and simulate WSN systems using sensor operating systems (TinyOS, TOSSIM) and node-level tools to assess network behavior

SYLLABUS

UNIT-I
Introduction- Adhoc networks. Mobile Ad-Hoc networking with a View of 4G Wireless, Off-the-Shelf Enables of Ad Hoc, IEEE 802.11 in Ad Hoc Networks:

UNIT-II
Protocols, Performance and Open Issues, Scatternet Formation in Bluetooth Networks, Antenna Beamforming and Power Control for Ad Hoc Networks, Topology Control in Wireless Ad Hoc Networks, Broadcasting and Activity Scheduling in Ad Hoc Networks.

UNIT-III
Location Discovery, Routing Approaches in Mobile AdHoc Networks, Energy-Efficient Communication in AdHoc Wireless, AdHoc Networks Security, Self-Organized and Cooperative Ad Hoc Networking.

UNIT-IV
Simulation and Modeling of Wireless, Mobile, and AdHoc Networks, Modeling Cross-Layering Interaction Using Inverse Optimization Algorithmic Challenges in Ad Hoc Networks.

UNIT-V

Sensor Networks: Introduction to sensor network, Unique constraints and challenges, Localization and Tracking, Networking Sensors, Infrastructure establishment, Sensor Tasking and Control, Sensor network databases, Sensor Network Platforms and tools, Industrial Applications and Research directions.

TEXT BOOKS:

1. Mobile Adhoc Networks–Aggelou, George(McGraw-Hill).
2. Mobile Adhoc Networking –Stefano   Basagni (Editor), Marco Conti(Editor), Silvia Giordano(Editor),Ivan Stojmenovi&Cacute (Editor) (Wiley-IEEE Press).

REFERENCES:

1. Wireless Sensor Networks: An Information Processing Approach–Feng Zhao,Leonidas Guibas(Elsevier).
2. Hand book of Sensor Networks: Algorithms and Architectures–Ivan Stojmenovi&Cacute(Wiley).

III B.TECH II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	0	0	30	70	100	3
SUBCODE: B23AI65C	COMPUTER VISION						

COURSE OBJECTIVES:

- To understand the Fundamental Concepts related to sources, shadows and shading
- To understand the Geometry of Multiple Views

COURSE OUTCOMES

At the end of the course students will be able to

CO1: Apply local shading models to analyze lighting effects and interpret image structures

CO2: Represent and analyze texture using oriented pyramids and local models

CO3: Apply principles of multi-camera systems to enhance scene understanding.

CO4: Analyze the robustness of model fitting methods in noisy or uncertain environments.

CO5: Evaluate real-world applications like mobile robot localization and medical image registration..

SYLLABUS

UNIT–I

CAMERAS: Pinhole Cameras Radiometry –Measuring Light: Light in Space, Light Surfaces, Important Special Cases Sources, Shadows, And Shading: Qualitative Radiometry, Sources and Their Effects, Local Shading Models, Application: Photometric Stereo, **inter reflections**: Global Shading Models Color: The Physics of Color, Human Color Perception, Representing Color, A Model for Image Color, Surface Color from Image Color.

UNIT-II:

Linear Filters: Linear Filters and Convolution, Shift Invariant Linear Systems, Spatial Frequency and Fourier Transforms, Sampling and Aliasing, Filters as Templates, **Edge Detection:** Noise, Estimating Derivatives, Detecting Edges Texture0: Representing Texture, Analysis (and Synthesis) Using Oriented Pyramids, Application: Synthesis by Sampling Local Models, Shape from Texture.

UNIT-III

The Geometry of Multiple Views: Two Views Stereopsis: Reconstruction, Human Stereopsis, Binocular Fusion, Using More Cameras Segmentation by Clustering: What is Segmentation? Human Vision: Grouping and Getstalt ,**Applications:** Shot Boundary Detection and Background Subtraction, Image Segmentation by Clustering Pixels, Segmentation by Graph-Theoretic Clustering,

UNIT-IV

Segmentation by Fitting a Model: The Hough Transform, Fitting Lines, Fitting Curves, fitting as a Probabilistic Inference Problem, Robustness Segmentation and Fitting Using Probabilistic Methods: Missing Data Problems, Fitting, and Segmentation, The EM Algorithm in Practice, tracking with Linear Dynamic Models: Tracking asan Abstract Inference Problem, Linear Dynamic Models, Kalman Filtering, Data Association, Applications and Examples

UNIT-V

Geometric Camera Models: Elements of Analytical Euclidean Geometry, Camera Parameters and the Perspective Projection, Affine Cameras and Affine Projection Equations Geometric Camera Calibration: Least-Squares Parameter Estimation, A Linear Approach to Camera Calibration, Taking Radial Distortion into Account, Analytical Photo grammetry**,**

Case study: Mobile Robot Localization Model- Based Vision: Initial Assumptions, Obtaining Hypotheses by Pose Consistency, Obtaining Hypotheses by pose Clustering, Obtaining Hypotheses Using Invariants, Verification, Case study: Registration In Medical Imaging Systems, Curved Surfaces and Alignment.

TEXT BOOKS:

1. David A. Forsyth and Jean Ponce: Computer Vision – A Modern Approach, PHI Learning (Indian Edition), 2009.

REFERENCE BOOKS:

1. E. R. Davies: Computer and Machine Vision – Theory, Algorithms and Practicalities, Elsevier (Academic Press), 4th edition, 2013.
2. R. C. Gonzalez and R. E. Woods "Digital Image Processing" Addison Wesley 2008. 3. Richard Szeliski "Computer Vision: Algorithms and Applications" Springer-Verlag London Limited 2011.

III B.TECH II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	0	0	30	70	100	3
SUBCODE: **B23AI65D**	— **No SQL Databases**						

COURSE OUTCOMES:

At the end of the Course the student will be able to

CO1: Explain and compare different types of NoSQL Databases

CO2: Compare and contrast RDBMS with different NoSQL databases.

CO3: Demonstrate the detailed architecture and performance tune of Document-oriented NoSQL databases.

CO4: Explain performance tune of Key-Value Pair NoSQL databases.

CO5: Apply NoSQL development tools on different types of NoSQL Databases.

SYLLABUS

UNIT-I

Overview and History of NoSQL Databases. Definition of the Four Types of NoSQL Database, The Value of Relational Databases, Getting at Persistent Data, Concurrency, Integration, Impedance Mismatch, Application and Integration Databases, Attack of the Clusters, The Emergence of NoSQL, Key Points.

UNIT-II

Comparison of relational databases to new NoSQL stores, Mongo DB, Cassandra, HBASE, Neo4j use and deployment, Application, RDBMS approach, Challenges NoSQL approach, Key-Value and Document Data Models, Column-Family Stores, Aggregate-Oriented Databases. Replication and sharding, Map Reduce on databases. Distribution Models, Single Server, Sharding, Master-Slave Replication, Peer-to-Peer Replication, Combining Sharding and Replication.

UNIT-III

NoSQL Key/Value databases using MongoDB, Document Databases, Document oriented Database Features, Consistency, Transactions, Availability, Query Features, Scaling, Suitable Use Cases, Event Logging, Content Management Systems, Blogging Platforms, Web Analytics or Real-Time Analytics, E-Commerce Applications, Complex Transactions Spanning Different Operations, Queries against Varying Aggregate Structure.

UNIT-IV

Column-oriented NoSQL databases using Apache HBASE, Column-oriented NoSQL databases using Apache Cassandra, Architecture of HBASE, Column-Family Data Store Features, Consistency, Transactions, Availability, Query Features, Scaling, Suitable Use Cases, Event Logging, Content Management Systems, Blogging Platforms, Counters, Expiring Usage.

UNIT-V

No SQL Key/Value databases using Riak, Key-Value Databases, Key-Value Store, Key-Value Store Features, Consistency, Transactions, Query Features, Structure of Data, Scaling, Suitable Use Cases, Storing Session Information, User Profiles, Preferences, Shopping Cart Data, Relationships among Data, Multi operation Transactions, Query by Data, Operations by Sets. Graph NoSQL databases using Neo4, NoSQL database development tools and programming languages, Graph Databases, Graph Database. Features, Consistency, Transactions, Availability, Query Features, Scaling, Suitable Use Cases.

TEXT BOOKS:

1. Sadalage,P.&Fowler,NoSQLDistilled:ABriefGuidetotheEmergingWorldof PolyglotPersistence, Wiley Publications,1st Edition,2019.

WEB REFERENCES:

1. https://www.ibm.com/cloud/learn/nosql-databases
2. https://www.coursera.org/lecture/nosql-databases/introduction-to-nosql-VdRNp
3. https://www.geeksforgeeks.org/introduction-to-nosql/
4. https://www.javatpoint.com/nosql-databa

III B.TECH II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	0	0	3	30	70	100	1.5
SUBCODE: B23AI66	DEEP LEARNING LAB						

COURSE OUTCOMES:

On completion of this course, the student will be able to
- Implement deep neural networks to solve real world problems
- Choose appropriate pre-trained model to solve real time problem
- Interpret the results of two different deep learning models

Software Packages required:
- Keras
- Tensorflow
- PyTorch

COURSE OUTCOMES

At the end of the course students will be able to

CO1: Apply modular arithmetic in modern cryptography

CO2: Make use of Substitution and transposition transformation Symmetric
Encryption Algorithms

CO3: Make use of number theory knowledge in Asymmetric Encryption algorithms.

CO4: Analyze various Hash functions and digital signatures for online
authentication

CO5: Analyze network security protocols for providing better security

SYLLABUS

LIST OF EXPERIMENTS:

1. Implement multi-layer perceptron algorithm for MNIST Handwritten Digit Classification.
2. Design a neural network for classifying movie reviews (Binary Classification) using IMDB dataset.
3. Design a neural Network for classifying news wires (Multi class classification) using Reuters dataset.
4. Design a neural network for predicting house prices using Boston Housing Price dataset.

5. Build a Convolution   Neural Network for MNIST Handwritten Digit Classification.

6. Build a Convolution Neural Network for simple image(dogs and Cats) Classification

7. Use a pre-trained convolution neural network (VGG16) for image classification.

8. Implement one hoten coding of words or characters.

9. Implement word embedding's for IMDB dataset.

10.Implement a Recurrent Neural Network for IMDB movie review classification

problem.

TEXT BOOKS:

1. Reza ZadehandBharath Ram sundar, "Tensorflow for Deep Learning", O'Reilly publishers, 2018

REFERENCES:

1. https://github.com/fchollet/deep-learning-with-python-notebooks

III B.TECH II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	0	0	3	30	70	100	1.5
SUBCODE: **B23AI67**	**DATA VISUALIZATION LAB**						

COURSE OBJECTIVES:

- To visualize the different datasets using histograms, line charts.
- To understand the use of bar charts and box plots.
- To understand Scatter plots, mosaic plots
- To understand different Map visualizations
- To learn advanced graphs such as correlogram, heatmap and 3D graphs.

COURSE OUTCOMES:

At the end of the course student will be able to

- Visualize the different datasets using histograms, line charts.
- Make use of bar charts and box plots on different datasets
- Apply Scatter plots, mosaic plots in R for different datasets
- Apply different Map visualizations in R
- Create advanced graphs such as correlogram, heatmap and 3D graphs.

SYLLABUS

List of Experiments:

1. a) Load VADeaths (Death Rates in Virginia)dataset in R and visualize the data using different histograms.

   b) Load air quality dataset in R and visualize La Guardia Airport's dialy maximum temperature using histogram.

2. Load Air Passengers dataset in R and visualize the data using line chart that shows increase in air passengers over given time period.

3. a) Load iris dataset in R, visualize the data using different Bar Charts and also demonstrate the use of stacked plots.

   b) Load air quality dataset in R and visualize ozone concentration in air.

4. a) Load iris dataset in R, visualize the data using different Box plots including group by option and also use color palette to represent species.

   b) Load air quality dataset in R and visualize air quality parameters using box plots.

5. Visualize iris dataset using simple scatter, multivariate scatter plot and also visualize scatter plot matrix to visualize multiple variables across each other.

6. Load diamonds dataset in R and visualize the structure in datasets with large data points using hexagon binning and also add color palette then use the

7. Load Hair Eye Color dataset in R and plot categorical data using mosaic plot.

8. Load mtcars dataset in R and visualize data using heat map.

9. Install leaflet library in R and perform different map visualizations.

10. Visualize iris dataset using 3d graphs such as scatter3d, cloud, xyplot.

11. Make use of correlogram to visualize data in correlation matrices for iris dataset.

12. Install maps library in R and draw different map visualizations.

WEB REFERENCES:

1. https://www.analyticsvidhya.com/blog/2015/07/guide-data-visualization-r/
2. https://www.geeksforgeeks.org/data-visualization-in-r/

III B.TECH II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	0	1	2	30	70	100	2
SUBCODE: **B23SH61**	**SOFT SKILLS**

III B.TECH II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	0	1	2	30	70	100	2
SUBCODE: **B23SH61**				**SOFT SKILLS**			

COURSE OBJECTIVES:

- To equip the students with the skills to effectively communicate in English
- To train the students in interview skills, group discussions and presentation skills
- To motivate the students to develop confidence
- To enhance the students' interpersonal skills
- To improve the students' writing skills

COURSE OUTCOMES

At the end of the course students will be able to

CO1: Understand the corporate etiquette.

CO2: Make presentations effectively with appropriate body language

CO3: Students able to understand enhance their writing abilities

CO4: Be composed with positive attitude

CO5: Understand the core competencies to succeed in professional and personal

SYLLABUS

UNIT -I
 Analytical Thinking & Listening Skills: Self-Introduction, Shaping Young Minds - A Talk by Azim Premji (Listening Activity), Self – Analysis, Developing Positive Attitude, Perception.
Communication Skills: Verbal Communication; Non Verbal Communication (Body Language)

UNIT-II
 Self-Management Skills: Anger Management, Stress Management, Time Management, Six Thinking Hats, Team Building, Leadership Qualities
Etiquette: Social Etiquette, Business Etiquette, Telephone Etiquette, Dining Etiquette

UNIT-III
 Standard Operation Methods: Basic Grammars, Tenses, Prepositions, Pronunciation, Letter Writing; Note Making, Note Taking, Minutes Preparation, Email & Letter Writing

UNIT-IV
Job-Oriented Skills: Group Discussion, Mock Group Discussions, Resume Preparation, Interview Skills, Mock Interviews

UNIT-V
Interpersonal relationships: Introduction, Importance, Types, Uses, Factors affecting interpersonal relationships, Accommodating different styles, Consequences of interpersonal relationships

TEXT BOOKS:

1. Barun K. Mitra, Personality Development and Soft Skills, Oxford University Press, 2011.
2. S.P. Dhanavel, English and Soft Skills, Orient Blackswan, 2010.

REFERENCE BOOKS:

1. R.S.Aggarwal, A Modern Approach to Verbal & Non-Verbal Reasoning, S.Chand& Company Ltd., 2018.
2. Raman, Meenakshi& Sharma, Sangeeta, Technical Communication Principles and Practice, Oxford University Press, 2011.

E-RESOURCES:
1. https://swayam-plus.swayam2.ac.in/courses/course-details?id=P_CAMBR_01

III B.TECH II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	2	0	0	30	70	100	-
SUBCODE: **B23CC6A**	**TECHNICAL PAPER WRITING & IPR**						

COURSE OBJECTIVE:

- The course will explain the basic related to writing the technical reports and understanding the concepts related to formatting and structuring the report. This will help students to comprehend the concept of proofreading, proposals and practice

COURSE OUTCOMES

At the end of the course students will be able to

CO1: Understand the structure of the technical paper and its components

CO2: Review the literature and acquire the skills to write a technical paper for first submission

CO3: Understand the process and development of IPR.

CO4: Create awareness about the scope of patent rights.

CO5: Analyze the new developments in IPR include latest software

SYLLABUS

UNIT-I

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

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

Proofreading and summaries: Proofreading, summaries, Activities on summaries. **Presenting final reports:** Printed presentation, Verbal presentation skills, Introduction to proposals and practice.

UNIT-IV

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
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

TEXT BOOKS:

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.
3. Ramappa,T., "Intellectual Property Rights Under WTO", 2nd Ed., S Chand, 2015.

REFERENCE BOOKS:

1. Adrian Wallwork , English for Writing Research Papers, Springer New York Dordrecht Heidelberg London, 2011.
2. 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/