ST. VINCENT PALLOTTI COLLEGE OF ENGINEERING & TECHNOLOGY, NAGPUR

(An autonomous institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

B. Tech. Scheme of Examination & Syllabus 2021-22

INFORMATION TECHNOLOGY

SEVENTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
21IT701T	Information and Cyber Security	3	-		3	30	70	100

Course Objectives	Course Outcomes
This course is intended • To develop students ability to understand the concepts of Information and Cyber security goals in various applications. • To understand and analyze Cryptography, Integrity, Authentication, Network and Web Security. • To Interpret different types and tools of Cybercrimes along with legal, social, ethical and psychological perspectives.	**Students will be able to** • Analyze and Solve security issues using cryptographic algorithms. • Summarize and classify different network and web security mechanism used in real world applications. • Illustrate various tools and techniques used in cybercrimes. • Make Use of attacks and challenges faced in cybercrimes for mobile and wireless devices in practical applications. • Examine legal, social, ethical and psychological perspectives of cybercrime through real life case studies.

Unit I: Security Basics and Cryptography	**[8Hrs]**
OSI Security architecture, Model for network security and network access security, Cryptography - Symmetric key cryptography - Ceaser cipher, Transposition cipher, DES, AES and Blowfish block ciphers, Block ciphers modes, Asymmetric key cryptography – RSA, ECC, Key management , Diffie-Hellman key exchange.	
Unit II: Integrity, Authentication, Network and Web Security	**[8Hrs]**
Authentication requirements and Hash function, MD5, SHA, Digital signature, X.509 Service, PGP Email security, IP Security - AH and ESP Protocol, Web security - SSL and SET protocol	
Unit III: Cybercrime - Introduction, Tools and Methods	**[6Hrs]**
Cybercrime- Definition, Information Security, Classification of Cybercrimes, Tools and methods – Proxy Servers, Phishing, Password cracking, Keyloggers and Spywares, DoS and DDoS, SQL Injection, Buffer overflow	
Unit IV: Cyberoffences, Cybercrimes for Mobile and Wireless Devices	**[8Hrs]**
How criminals plan the attack, Cyberstalking, Cybercafé, Botnets, Attack vector, Trends in mobility, Security challenges posted by mobile devices, Registry settings, Authentication service security, attacks on mobile devices , Security implications, Security policies and measures in mobile computing Era	
Unit V: Cybercrime and Cybersecurity – The Legal Perspectives, Social, Political, Ethical and Psychological Dimensions, Real Life Case Studies	**[6Hrs]**
Cybercrime and Legal landscape around the world, Indian IT Act and its Amendments, Intellectual Property in Cyberspace, Ethical dimensions of cybercrimes, Psychology ,mindset and skills of cybercriminals, Information warfare, Real life case studies of cybercrimes , financial frauds, Online and digital signature scams and measures taken	

Text Books

Sr. No.	Title	Authors	Edition	Publisher
1	Cryptography and Network Security	Forouzan	1st	Tata-Mcgraw Hill , ISBN -97 8-00-707-0208-0.
2	Cyber Security- Understanding Cyber Crimes, Computer Forensics and Legal Perspectives	Nina Godbole, Sunit Belapure	1st	Wiely India Pvt.Ltd ISBN- 978-81-265-2179-1
3	Cryptography and Network Security: Principle and Practice", Seventh Edition	William Stallings	7th	PHI ISBN 978-0-13-335469-0

Reference Books

Sr. No.	Title	Authors	Edition	Publisher
1	Information Security: The Complete Reference	Mark Rhodes-Ousleyl	2nd	Wiley publication
2	Cryptography and Network Security	C K Shyamala, N Harini, Dr. TR Padmanabhan	1st	Wiley India,

Online Resources

1	https://www.wileyindia.com/cdcontent.php
2	https://www.javatpoint.com/cryptography-definition
3	https://www.javatpoint.com/cyber-security-tutorial

SEVENTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
21IT701P	Information and Cyber Security Lab	-	-	2	1	25	25	50

Course Objectives	Course Outcomes
This course is intended • To develop and test applications related to information security and cyber security • To implement the cryptographic and authentication algorithms for information security • To use and analyze network security tools and vulnerability assessment tools for cyber security	**Students will be able to** • Develop programs and Evaluate confidentiality, integrity and authentication and non-repudiation using security algorithms • Implement different symmetric and asymmetric ciphers • Analyze detection and prevention of various cybersecurity attacks • Use the different cybersecurity tools and methods for testing and analyzing cybercrimes and findings solution

Expt. No.	Experiments based on
1	Implement Symmetric Cryptography algorithm (DES/AES/Blowfish). Compare various block cipher modes of operation for same Plaintext data
2	Implement Asymmetric Cryptography algorithm (RSA). Generate and analyze key size and security implications
3	Implement Message Digest algorithm (MD5 / SHA). Create message digest and test it
4	Develop and verify Digital Signature using SHA and RSA.
5	Demonstrate Intrusion Detection System (IDS) using any tool (SNORT or Suricata).
6	Setup secure web server using SSL / TLS.
7	Perform basic Penetration test on web application using OWASP ZAP or Metasploit
8	Analyze Vulnerabilities in software applications using SonarQube or other tool

Text Books

Sr.No.	Title	Authors	Edition	Publisher
1	Cryptography and Network Security	Forouzan	1st	Tata-Mcgraw Hill ,.
2	Cyber Security- Understanding Cybercrimes Computer Forensics and Legal Perspectives	Nina Godbole, Sunit Belapure	1st	Wiely India pvt.Ltd

Reference Books

Sr.No	Title	Authors	Edition	Publisher
1	Information Security: The Complete Reference	Mark Rhodes-Ousleyl	2nd	Wiley publication

Online Resources

1	OWASP (Open Web Application Security Project)- https://owasp.org/)
2	Code quality and static analysis tools - https://www.sonarsource.com/
3	SNORT – Network Intrusion Detection and prevention System - snort.org

SEVENTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
21IT702P	Software Lab – II	-	-	4	2	25	25	50

Course Objectives	Course Outcomes
This course is intended • To impart necessary and practical knowledge of components of Emerging Technologies. • To develop skills required to build real-life projects.	**Students will be able to** ● Demonstrate Tableau and Power BI with real life projects. ● Illustrate Emerging Technologies and its hardware and software components ● Analyze and apply various AI Tools. ● Design Presentation and document using LaTEX and Demonstrate Data analytics using Machine Learning. ● Design an application using React JS and Node JS

Expt. No.	Experiments based on
1	Practical's are based on Tablaeu
2	Practical's are based on PowerBi
3	Practical's based on Internet of Things (IoT)
4	Practical's based on Artifical Intelligence Tools
5	Practical's based on Latex
6	Practical's based on Data Analytics using Machine Learning
7	To building the front end using React JS
8	Develop the application using Node JS / Mongo DB

Text Books

Sr.No.	Title	Authors	Edition	Publisher
1	Practical Tableau	Ryan Sleeper	April 2018	O'Reilly Media, Inc.
2	Internet of Things (IoT) Paperback	Dr Kamlesh Lakhwani (Author), Dr Hemant Kumar Gianey (Author), Joseph Kofi Wireko (Author)	1st Edition 1 January 2020	BPB Publications

Online R sources

1	https://www.geeksforgeeks.org/introduction-to-tableau/
2	https://www.tutorialspoint.com/power_bi/power_bi_introduction.htm
3	https://365datascience.com/tutorials/python-tutorials/data-analysis-python/
4	https://designmodo.com/ai-tools-designers/
5	https://firexfly.com/practical-typesetting/
6	https://www.canva.com/graphs/

SEVENTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
21IT703T (i)	PE-IV Data Warehousing and Mining	3	-	-	3	30	70	100

Course Objectives	Course Outcomes
This course is intended • To learn and understand various Data MiningTechniques. • To understand various algorithms in Data MiningTechnique • To understand Business Intelligence and big data applications in future	**Students will be able to**· • Summarize concepts of data warehousing and its applications in the real world. • Relate and apply the data preprocessing approaches and statistical tools for exploratory data analysis. • Interpret and apply various OLAP models in Business analytics. • Identify various data mining techniques for knowledge extraction in data warehouses. • Apply and investigate various mining patterns and association rules on real time data set.

Unit I : Introduction to Data Warehousing:	**[8Hrs]**
Evolution of decision support systems, Operational v/s decision support systems, Data warehousing lifecycle, Architecture, Building blocks, Components of DW, Data Marts and Metadata.	
Unit II : Data Preprocessing	**[7Hrs]**
Why preprocess the data? Descriptive data summarization, Data cleaning, Data integration and transformation, Data reduction, Data Discretization and Concept Hierarchy Generation.	
Unit III: OLAP Analytical Processing	**[7Hrs]**
OLAP in Data warehouse, Demand for online analytical processing, need for multidimensional analysis, OLAP definitions and rules, OLAP characteristics, major features and functions. OLAP models- ROLAP, MOLAP, HOLAP, Data cubes and operations on cubes.	
Unit IV: Introduction of Data Mining	**[7Hrs]**
Importance, Data Mining functionalities, KDD and Data Mining, Data Mining v/s Query tools, interesting patterns, Architecture, Classification of Data Mining systems, Major issues from Data warehousing and Data Mining, Applications of Data Mining.	
Unit V: Mining Frequent Patterns and Association: Basic Concepts	**[7Hrs]**
Market Basket analysis, Frequent Item sets, Association rules, Mining Methods: Apriori Algorithm, Generating Association rules from Frequent Item sets. FP Growth.	

Text Books

Sr.No.	Title	Authors	Edition	Publisher
1	Data Warehousing Fundamentals	Paulraj	2nd	Wiley
2	Data Mining (Concepts and Techniques)	Ponniah Han and Kamber	3rd	Elsevier
3	Data Mining and Business Intelligence	Shinde and Chandrashekhar	2nd	Dream tech Press

Reference Books

Sr.No.	Title	Authors	Edition	Publisher
1	Introduction to Data Mining	Tan, Steinbach, Vipin Kumar	2nd	Pearson Education
2	Fundamentals of Data Warehouses	Jarke, Vassiliou	2nd	Springer.
3	Data Mining : Concepts and Techniques	Hanghang Tong, Jian Pei	4th	Morgan Kaufmann Series

Online Resources

1	https://www.geeksforgeeks.org/data-mining-techniques/?ref=ml_lbp
2	https://learn.saylor.org/mod/book/tool/print/index.php?id=30931
3	https://www.javatpoint.com/history-of-data-mining

SEVENTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
21IT703T (ii)	PE-IV Natural Language Processing	3	-	-	3	30	70	100

Course Objectives	Course Outcomes
This course is intended ● To understand natural language processing and its basicalgorithms for solving real-world problems. ● To familiarize learners with various language models. ● To understand machine learning techniques used in NLP.	**Students will be able to·** ● Define core concepts of Natural language processing and levels of language analysis ● Explore learning state-of-the-art NLP research areas such as parsing algorithms, ambiguityresolution and machine translation. ● Apply Natural Language Processing concepts in Information extraction, semantic web search, machine translation, text summarization, spam detection. ● To understand basics of Machine Translation and its various patterns.

Unit I : Introduction to Natural Language:	**[8Hrs]**
The Study of Language Applications of Natural Language Understanding, Evaluating Language Understanding Systems The Different Levels of Language Analysis, Representations and Understanding The Organization of Natural Language Understanding Systems..	
Unit II Linguistic Background: Grammars and Parsing:	**[8Hrs]**
An Outline of English Syntax Words- The Elements of Simple Noun Phrases Verb Phrases and Simple Sentences Noun Phrases Revisited Adjective Phrases Adverbial Phrases, Grammars and Sentence Structure What Makes a Good Grammar A Top-Down Parser A Bottom-Up Chart Parser Top-Down Chart Parsing Finite State Models and Morphological Processing Grammars and Logic	
Unit III: Semantics and Discourse Analysis:	**[8Hrs]**
Lexical Semantics; Corpus study; Study of Various language dictionaries like WorldNet, and Babelnet. Attachment for fragment of English, Relations among lexemes & their senses – Homonymy, Polysemy, Synonymy, Hyponymy, Semantic Ambiguity, Word Sense Disambiguation (WSD), Knowledge-based approach (Lesk's Algorithm), Supervised (Naïve Bayes, Decision List).	
Unit IV: Computational tools for text analysis:	**[7Hrs]**
Tokenization, Stemming, Lemmatization, Natural Language Toolkit (NLTK): Corpora and other data resources, Uses of corpora: Lexicography, Grammar and Syntax, Stylistics, Training, and evaluation. Basic corpus analysis: Frequency distribution building and analyzing a corpus. Tokenization in the NLTK, Tokenizing text	
Unit V: Applications and Recent Trends in NLP:	**[7Hrs]**
Information Extraction, Question answering, Machine Translation, MT evaluation tools such as Bleu, (word error rate) WER etc. Automatic text summarization, Sentiment Speech Recognition, Semantic web search, Automatic text Clustering..	

Text Books

Sr.No.	Title	Authors	Edition	Publisher
1	Natural Language Understanding,	Allen, James	2nd	Pearson Publication
2	Speech and Language Processing,	D. Jurafsky, J. H. Martin	2nd	Prentice Hall, 2008.
3	"Introduction to Natural Language Processing	Eisenstein, Jacob	1st	United Kingdom", MIT Press

Reference Books

Sr.No.	Title	Authors	Edition	Publisher
1	"Natural language processing and information retrieval"	Tiwary, U. S., and Tanveer Siddiqui.	NA	Oxford University Press, Inc., 2008.
2	Foundations of Statistical Natural Language Processing	Christopher D. Manning, Hinrich Schutze	NA	MIT Press, 1999.

Online Resources

1	https://www.deeplearning.ai/resources/natural-language-processing/
2	https://nptel.ac.in/courses/106/106/106106211/ Prof. Ramseshan Ramchandran IIT Madras.
3	https://www.mltut.com/best-resources-to-learn-natural-language-processing/

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INFORMATION TECHNOLOGY

SEVENTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
21IT703T (iii)	PE-IV Edge Computing	3	-	-	3	30	70	100

Course Objectives	Course Outcomes
This course is intended ● To understand Need of Edge Computing ● To Understand Scope of Edge Computing ● To understand Challenges and Opportunities in Edge Computing	**Students will be able to·** ● Describe the key architectures and applications in edge computing ● Critically evaluate research publications on cloud services and edge computing ● Develop and deliver oral presentations for research publications on cloud and edge computing. ● Implement software using standard open-source cloud and edge computing software for data analytic. ● Develop and execute a research project related to data analytic and edge computing

Unit I : Introduction:	**[8Hrs]**
What is Edge Computing? - Need, Key Techniques, Definition, Benefits & Systems.	
Unit II: Fireworks: Data Analytics in Hybrid Cloud-Edge Environment:	**[7Hrs]**
Introduction, System Design: Terminologies, Architecture, Programmability, Execution Model Comparison, Implementation and Discussion.	
Unit III: Distributed Collaboration Execution on the Edges and Its Application on the AMBER Alter:	**[7Hrs]**
Introduction, Motivation: AMBER Alter, Distributed Collaborative Execution on the Edge, AMBER Alter Assistant: Application Scenario, Application Design, Implementation Details, Task Scheduling, Evaluation: Experimental Setup, Collaboration of Local Edge Nodes, Task Scheduling.	
Unit IV: Challenges and Opportunities in Edge Computing:	**[7Hrs]**
Programmability, Naming, Data Abstraction, Service Management, Privacy and Security, Application Distribution, Scheduling Strategies, Business Model, Optimization Metrices.	
Unit V: Existing Edge Computing Tools:	**[7Hrs]**
What is your role in Edge Computing? Virtualization: Virtual Machine & Container, Network Virtualization, Resource Management : Kubernetes and Docker, Developing Platforms for Edge Computing: Edge Analytics, Development Tools and Platforms.	

Text Books

Sr.No.	Title	Authors	Edition	Publisher
1	Edge Computing: A Primer	Jie Cao, Quan Zhang, Weisong Shi	3rd	Springer
2	Edge Computing Fundamentals, Advances and Applications	K. Anitha Kumari, G. Sudha , Sadasivam, D. Dharani	4th	CRC Press
3	Edge Computing	Ajit Singh	2nd	Shroff Publishers

Reference Books

Sr.No.	Title	Authors	Edition	Publisher
1	Edge Computing: From Hype to Reality	Fadi Al-Turjman	1st	Springer
2	Multi- Access Edge Computing in Action	Dario Sabella, Alex Reznik	2nd	CRC Press
3	Edge Computing – Technology, Management and Integration	Sam Goundar	3rd	CRC Press

Online Resources

1	https://www.accenture.com/in-en/insights/cloud/edge-computing-index
2	https://www.geeksforgeeks.org/edge-computing/?ref=ml_lbp
3	https://www.javatpoint.com/what-is-edge-computing

SEVENTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
21IT704T (i)	PE-V Deep Learning	3	-	-	3	30	70	100

Course Objectives	Course Outcomes
This course is intended • To learn various types of Artificial Neural Networks • To familiarize different models in Neural Networks (CNN,ANN,RNN) and their applications • To elaborate various deep unsupervised techniques available in the field of deep learning	**Students will be able to·** • Gain basic knowledge of Neural Networks • Apply appropriate deep learning algorithms for analyzing the data for a variety of problems. • Use the unsupervised deep learning models and analyze the performance • Gain familiarity with recent trends and applications of Deep Learning

Unit I : Introduction to Deep Learning	**[8Hrs]**
Evolution of AI, Machine Learning vs Deep Learning, Deep Learning types, History of Deep Learning, , , Model of Artificial Neuron, Activation functions, McCulloch Pitts Neuron, Perceptrons, Forward and Back Propagation, Gradient Descent (GD).	
Unit II : Deep Learning Models	**[7Hrs]**
Introduction to CNNs, CNN operation,s Architectures, Simple Convolution Network, Deep Convolutional Models –LeNet, ResNet, AlexNet and others. Introduction to RNNs, Back propagation through time (BPTT), Vanishing and Exploding Gradients, Gated recurrent Unit, Long Short-Term Memory Networks, Dropouts.	
Unit III: Deep Unsupervised Learning	**[8Hrs]**
Autoencoders (standard, sparse, denoising, contractive, etc), Motivation for Sampling, Markov Networks, Variational Autoencoders. Introduction of GANs(Generative Modeling) , Different Types of GANs, Components of GANs, Training and Prediction of GANs, Brief on GAN Loss Function, Challenges Faced by GANs, Application of GANs	
Unit IV: Regularization for Deep Learning	**[7Hrs]**
Overview of Overfitting, Types of biases, Bias Variance Tradeoff Regularization Methods: L1, L2 regularization, Parameter sharing, Dropout, Weight Decay, Batch normalization, Early stopping, Data Augmentation, Adding noise to input and output	
Unit V: Applications of Deep Learning	**[7Hrs]**
Image segmentation, object detection, Automatic Image Captioning , Capture and Representation, Image Processing, Introduction to NLP, Word Vector representation ,Speech recognition, Video Analytics	

Text Books

Sr.No.	Title	Authors	Edition	Publisher
1	Deep learning.	Bengio, Yoshua, Ian J. Goodfellow, and Aaron Courville.	NA	MIT Press, 2015
2	Fundamentals of Deep Learning: Designing Next-Generation Machine Intelligence Algorithm	Nikhil Buduma	NA	O'Reilly, 2017.

Reference Books

Sr.No.	Title	Authors	Edition	Publisher
1	Learning deep architectures for AI	Bengio, oshua.	2nd	Foundations and trends in Machine Learning 2.1
2	Long short-term memory.	Hochreiter, Sepp, and Jargen Schmidhuber.	2nd	Neural computation 9.8

Online Resources

1	Deep Learning Fundamentals :Theory and Python –Takuma Kimura-Udemy course
2	https://www.coursera.org/specializations/deep-learinng

SEVENTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
21IT704T(ii)	PE-V Advance in Database Management System	3	-	-	3	30	70	100

Course Objectives	Course Outcomes
This course is intended ● To learn and understand various Database Architectures and Applications. ● To understand various emerging techniques in database. ● To understand how analytic and big data affect various functions now and in the future.	**Students will be able to·** ● Do Programming in PL/SQL include stored procedures, stored functions, cursors and packages ● To apply the knowledge of various Database Architecture in real life application. ● To apply emerging trends; techniques in Database. ● To appreciate the impact of analytics and big data on the information industry and the external ecosystem for analytical and data services.

Unit I : Database Architectures:	**[8Hrs]**
Centralized and Client-Server Architectures, 2 Tier and 3 Tier Architecture, Advance SQL: Accessing SQL from a Programming Language, Function & Procedures, Triggers, Advanced Aggregate features.	
Unit II : Distributed Databases	**[7Hrs]**
: Homogeneous and Heterogeneous Databases, Distributed Data Storage, Distributed Transactions, Commit Protocols, Concurrency Control in Distributed Databases, Availability, Distributed Query Processing Heterogeneous Distributed Databases, Cloud-Based Databases.	
Unit III: Parallel Databases	**[7Hrs]**
: Introduction, I/O Parallelism, Interquery Parallelism, Intraquery Parallelism, Intraoperation Parallelism, Interoperation Parallelism, Query Optimization, Design of Parallel Systems.	
Unit IV: Emerging Database Technologies:	**[7Hrs]**
Introduction to No SQL; New SQL Databases- Internet, Databases, Cloud Databases, Mobile Databases, SQLite Database, XML Databases, MongoDB.	
Unit V: Data Warehouse and Data mining	**[7Hrs]**
: Architecture and Components of Data Warehouse, OLAP, Goals of Data Mining, Data Mining Tasks, Introduction to Big Data Hadoop: HDFS, Dealing with Massive Datasets-Map Reduce and Hadoop. Introduction to HBase: Overview, HBase Data Model, HBase Region, Hive.	

Text Books

Sr.No.	Title	Authors	Edition	Publisher
1	Database System Concepts	Silberschatz A., Korth H., Sudarshan S,	6th	McGraw Hill Publication,
2	Database Systems: Concepts, Design and Application,	S. K. Singh,	5th	Pearson Publication,

Reference Books

Sr.No.	Title	Authors	Edition	Publisher
1	The Algorithm Design Manual	Steven S Skiena,	2nd	Springer, ISBN 978-81-8489-865-1,
2	Algorithms in a Nutshell, A Desktop Quick	George T. Heineman, Gary Pollice, Stanley Selkow,	3rd	O'Reilly,
3	Fundamentals of Algorithms,	Gilles Brassard, Paul Bratle,	2nd	Pearson Publication,

Online Resources

1	https://www.w3schools.com
2	https://www.javatpoint.com

SEVENTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
21IT704T (iii)	PE-V Digital Forensics	3	-	-	3	30	70	100

Course Objectives	Course Outcomes
This course is intended • To study Digital Forensics Fundamentals and Computer Forensics • To learn about examination, preventing and fighting digital crimes • To model about data acquisition and storing digital evidence • To explore digital forensics tools	**Students will be able to**· • Understand the fundamental of Digital Forensic • Summarize the requirements for use of data acquisition. • Demonstrate investigate incidences • Exploring the role of e-mail in investigations • Understand digital forensics tools

Unit I : Introduction to Digital Forensics	**[8Hrs]**
Definition, Nature and Scope.Uses of Digital Forensics – Digital Forensic Tools – Tool Selection - Role of Forensic Analyst and Forensic tools – Traditional Analysis vs Tools-based Analysis – Forensic Analysis Tools Requirements.	
Unit II : Data Acquisition and Recovery	**[7Hrs]**
Storage formats, Using acquisition tools, Data Recovery: RAID(Redundant Arrays of Independent Disks) Data acquisition, RAID Levels.	
Unit III: Crime and Incident Scene Processing	**[7Hrs]**
Processing Crime and Incident Scenes: Identifying digital evidence, collecting evidence in private sector incident scenes, processing law enforcement crime scenes, preparing for a search securing a computer incident or crime scene, seizing digital evidence at the scene, storing digital evidence, obtaining a digital hash, reviewing a case.	
Unit IV: E-mail and Mobile Device Forensics	**[7Hrs]**
Understanding files structure and file system, NTFS disks, Disk Encryption and Registry Manipulation. Computer Forensics software and hardware tools	
Unit V: Digital Forensic Tools Categories	**[8Hrs]**
Disk & amp; Data capture tools – File Viewers – File Analysis Tools - Network Forensic Tools – Database Forensics Tools –Mobile Devices Analysis Tools – Email Analysis Tools – Internet Analysis Tools – Registry Analysis Tools	

Text Books

Sr.No.	Title	Authors	Edition	Publisher
1.	Digital Forensics	Andre Arnes	1st	Wiley
2.	Digital Forensics with Open-Source Tools	Harlan Carvey , Cory Altheide	1st	Syngress

Reference Books

Sr.No.	Title	Authors	Edition	Publisher
1.	Computer Forensics: Incident Response Essentials	Warren G. Kruse II and Jay G. Heiser	1st	Pearson Education
2.	Guide to Computer Forensics and Investigations	Nelson B, Phillips A, Enfinger F, Stuart C -	2nd	Cengage Learning 2018

Online Resources

1	https://www.simplilearn.com/what-is-digital-forensics-article
2	https://www.geeksforgeeks.org/digital-forensics-in-information-security/
3	https://mrcet.com/downloads/digital_notes/CSE/III%20Year/12082022/DIGITAL%20FORENSICS.pdf
4	https://www.scribd.com/document/699574054/ETI-U-III-Notes
5	https://www.mcaclash.com/semfour-df/

SEVENTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
21IT761O (ii)	OE-III Web Technology	3	-	-	3	30	70	100

Course Objectives	Course Outcomes
This course is intended ● To delivers an overview for developing Web-based applications. ● To focus on techniques for building server-side programs for dynamically generated Web sites. ● To Provide hands-on experience in implementing security measures and testing web applications.	**Students will be able to**· ● Understand & demonstrate the important HTML tags for designing static pages and separate design from content using Cascading Style sheet, XML & JavaScript. ● Acquire advanced knowledge of HTML5 and CSS3 for creating dynamic and responsive web pages. ● Understand backend programming languages such as Node.js for server-side scripting. ● Identify common web security threats and vulnerabilities. ● Gain insights into future trends and advancements in web technology.

Unit I : Introduction to Web Technologies	**[8Hrs]**
Overview of the Internet and the World Wide Web, Evolution of web technologies, Client-server architecture and web protocols (HTTP, HTTPS), Basics of HTML, CSS, and JavaScript, Introduction to web standards and W3C.	
Unit II: Frontend Development	**[7Hrs]**
Advanced HTML5 features (e.g., canvas, audio, video), Advanced CSS techniques (e.g., Flexbox, Grid, animations), Responsive web design principles, Introduction to frontend frameworks like Bootstrap or Foundation, Client-side scripting with JavaScript (DOM manipulation, events handling).	
Unit III: Backend Development	**[7Hrs]**
Introduction to backend programming languages (Node.js), server-side scripting with Node.js and Express.js framework, Database management using SQL (e.g., MySQL, PostgreSQL) and/or NoSQL (e.g., MongoDB) databases, Introduction to RESTful APIs, Authentication, and authorization techniques.	
Unit IV: Web Application Security	**[7Hrs]**
Common web security threats (e.g., XSS, CSRF, SQL injection), Secure coding practices and input validation, HTTPS and SSL/TLS encryption, Authentication mechanisms (e.g., OAuth, JWT), Web application firewalls (WAF) and intrusion detection/prevention systems (IDS/IPS).	
Unit V: Emerging Trends in Web Technology	**[8Hrs]**
Introduction to Progressive Web Apps (PWAs), Exploring Web Assembly and its applications, Introduction to WebRTC for real-time communication, Exploring the Internet of Things (IoT) and its integration with web development, Future trends in web development (e.g., serverless architecture, machine learning in web applications)	

Text Books

Sr.No.	Title	Authors	Edition	Publisher
1	Web Technologies: A Computer Science Perspective	Jeffrey C. Jackson	1st	Pearson Education
2	HTML5 and CSS3 All-in-One For Dummies	Andy Harris and Chris Minnick	3rd	A Wiley Brand
3	Node.js Web Development: Server-side Development with Node 10 made easy	David Herron	4th	Packt Publishing, Birmingham, 2018

Reference Books

Sr.No.	Title	Authors	Edition	Publisher
1	JavaScript: The Good Parts	Douglas Crockford	3rd	O'Reilly Media
2	HTML: The Complete Reference	Thomas A. Powell	5th	McGraw Hill
3	Web Security: A White Hat Perspective	Hanley Brown	1st	Routledge

Online Resources

1	https://www.w3schools.com/REACT/DEFAULT.ASP
2	https://www.javatpoint.com/nodejs-tutorial
3	https://www.tutorialspoint.com/mongodb/index.htm
4	https://spring.io/guides/gs/securing-web

SEVENTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
21IT761O (i)	OE-III Agile Software Development	3	-	-	3	30	70	100

Course Objectives	Course Outcomes
This course is intended • Students will practice and use scrum. • Will apply knowledge for real time applications.	**Students will be able to**· • Articulate the agile principles, practices, and roles of Scrum. • Perform Scrum Release Planning, and Scrum Sprint Planning. • Deconstruct user stories into tasks and ideal day estimates. • End a Sprint with Sprint Reviews and Sprint Retrospectives. • Use Scrum with multiple, or distributed, project teams

Unit I :	**[8Hrs]**
Agile development, Classification of methods, Introduction and background, Agile Manifesto and Principles, Overview of Scrum, Extreme Programming, Feature Driven development, Lean Software Development, Agile project management, Design and development practices in Agile projects, Test Driven Development, Continuous Integration, Refactoring, Pair Programming, Simple Design, User Stories, Agile Testing, Agile Tools	
Unit II :	**[7Hrs]**
Introduction to Scrum, Project phases, Agile Estimation, Planning game, Product backlog, Sprint backlog, Iteration planning, Initial Stages of Building a Requirement Document, Techniques for Requirements Elicitation, Burn down chart, Sprint planning and retrospective, Daily scrum, Scrum roles – Product Owner, Scrum Master, Scrum Team, Tools for Agile project management, scaled agile framework.	
Unit III:	**[7Hrs]**
R User story definition, Characteristics and content of user stories, Agile design practices, Role of design Principles including Single Responsibility Principle, Open Closed Principle, Need and significance of Refactoring, Refactoring Techniques, Continuous Integration	
Unit IV:	**[7Hrs]**
The Agile lifecycle and its impact on testing, The agile alliances, Test-Driven Development (TDD), Testing user stories - acceptance tests and scenarios, Planning and managing testing cycle, Test automation, Tools to support the Agile tester, Agile testing – Nine principles and six concrete practices for testing on agile teams.	
Unit V:	**[7Hrs]**
Market scenario and adoption of Agile, Roles in an Agile project, Agile applicability, Agile in Distributed teams, Business benefits, Challenges in Agile, Risks and Mitigation, Agile projects on Cloud, Balancing Agility with Discipline, Agile rapid development technologies.	

Text Books

Sr.No.	Title	Authors	Edition	Publisher
1	Agile Software Development with Scrum	Ken Schawber, Mike Beedle	1st	Pearson
2	Agile Software Development, Principles, Patterns and Practices	Robert C. Martin	3rd	Prentice Hall
3	Agile Testing: A Practical Guide for Testers and Agile	Lisa Crispin, Janet Gregory	4th	Addison Wesley

Reference Books

Sr.No.	Title	Authors	Edition	Publisher
1	Agile Software Development: The Cooperative Game	Alistair Cockburn	1st	Addison-Wesley Professional
2	User Stories Applied: For Agile Software	Robert C. Martin	1st	Mike Cohn

Online Resources

1	https://www.geeksforgeeks.org/
2	https://www.tutorialspoint.com

SEVENTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
21IT706P	Capstone Course -II	-	-	2	1	50	-	50

Course Objectives	Course Outcomes
This course is intended • To integrate the knowledge gained as a result of pursuing a given degree program in college • The course should enable the students to integrate the skills and concepts learned systematically	**Students will be able to** • *To demonstrate their understanding of General aptitude.* • Demonstrate Database *concepts related to* Summarize the real life problem. • Demonstrate the concept of analysis of algorithms, and implement various algorithm. • Apply knowledge of Operating System algorithms & technique for computing solution. • Describe the functionalities of IP addressing, fragmentation, and IP support protocols

Unit I: General Aptitude **[5Hrs]**

Number System, Probability, Graph, Statistics, Profit & Loss, Time, Distance & Speed, Seating arrangement, Calendar & Clock.

Unit II: Database **[5Hrs]**

ER-model. Relational model: relational algebra, tuple calculus, SQL. Integrity constraints, normal forms. File organization, indexing (e.g., B and B+ trees). Transactions and concurrency control.

Unit III: Algorithm **[4Hrs]**

Searching, sorting, hashing. Asymptotic worst-case time and space complexity. Algorithm design techniques: greedy, dynamic programming and divide-and-conquer. Graph traversals, minimum spanning trees, shortest paths.

Unit IV: Operating System **[4Hrs]**

System calls, processes, threads, inter-process communication, concurrency and synchronization. Deadlock. CPU and I/O scheduling. Memory management and virtual memory. File systems.

Unit V: Computer Network **[6Hrs]**

Concept of layering: OSI and TCP/IP; Routing protocols: shortest path, flooding, distance vector and link state routing; Fragmentation and IP addressing, IPv4, CIDR notation, Basics of IP support protocols (ARP,DHCP, ICMP), Network Address Translation (NAT); Transport layer: flow control and congestion control, UDP, TCP, sockets; Application layer protocols: DNS, SMTP, HTTP, FTP, Email.

Reference Books

S.N	Title	Authors	Edition	Publisher
1.	GATE CSE/IT	Er. Shanti Kirupani| , Prachi Jain, Amrita Mishra	2024	Arihant Publication
2.	GATE CSE/IT	-	2024	Khanna Publication
3.	GATE CSE/IT	-	2024	G K Publication
4.	GATE CSE/IT	-	2024	Made Easy Publication

Web Resources:

1. GeeksforGeeks : https://www.geeksforgeeks.org/
2. https://m.youtube.com/shorts/TE6kjpC0Wf8
3. https://www.youtube.com/playlist?list=PLIPZ2_p3RNHiKzrbK8AwJgBUMYivFrGiO.