



ST. VINCENT PALLOTTI COLLEGE OF ENGINEERING & TECHNOLOGY, NAGPUR

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

B. Tech. Scheme of Examination & Syllabus 2023-24

INFORMATION TECHNOLOGY

SEMESTER VII

SrNo	Course Category	Course Code	Course Title	Hours per Week			Credits	Maximum Marks					No of Hours for ESE
				L	T	P		Mid Semester Examination	Continual Assessment	End Sem Examination	Total	Minimum Passing Marks	
1	PCC	23IT701T	Information and Cyber Security	3	-	-	3	15	15	70	100	45	3
2	PCC	23IT701P	Information and Cyber Security Lab	-	-	2	1	-	25	25	50	25	-
3	PCC	23IT702P	Software Lab - 2	-	-	4	2	-	25	25	50	25	-
4	PEC	23IT703T	Program Elective - IV	4	-	-	4	15	15	70	100	45	3
5	PEC	23IT704T	Program Elective - V	4	-	-	4	15	15	70	100	45	3
6	ELC	23IT705P	Project - II	-	-	4	2	-	50	50	100	50	-
7	ELC	23IT706P	Summer / Winter Internship*	-	-	-	2	-	50	-	50	25	-
8	MDM	23IT731M	MDM – V (Refer MDM Basket)	3	-	-	3	15	15	70	100	45	3
Total				14	-	10	21	60	210	380	650	-	-

* Summer / Winter Internship (Evaluation of Four weeks Internship Completion till 6th Semester)

Program Elective - IV	
23IT703T(i)	Data Warehousing and Mining
23IT703T(ii)	Natural Language Processing
23IT703T(iii)	Edge Computing

Program Elective - V	
23IT704T(i)	Deep Learning
23IT704T(ii)	Advanced in Database Management System
23IT704T(iii)	Digital Forensics

Multidisciplinary Minor - V	
23IT731M	Data Visualization and Techniques

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INFORMATION TECHNOLOGY

SEVENTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
23IT701T	Information and Cyber Security	3	-	-	3	15	15	70	100

Course Objectives	Course Outcomes
This course is intended <ol style="list-style-type: none">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 <ol style="list-style-type: none">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	[9Hrs]
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, Asymmetric key cryptography – RSA, ECC, Key management , Diffie-Hellman key exchange.	
Unit II: Integrity, Authentication, Network and Web Security	[9Hrs]
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	[9Hrs]
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: Cyber offences, Cybercrimes for Mobile and Wireless Devices	[9Hrs]
How criminals plan the attack, Cyberstalking, Cybercafé, Botnets, Attack vector, Trends in mobility, Security challenges posted by mobile devices, 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	[9Hrs]
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, Latest trends in Cybersecurity	

Text Books


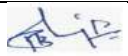
Sr. No.	Title	Authors	Edition	Publisher
1	Cryptography and Network Security	Forouzan	1 st	Tata-Mcgraw Hill.
2	Cyber Security- Understanding Cyber Crimes, Computer Forensics and Legal Perspectives	Nina Godbole, Sunit Belapure	1 st	Wiley India Pvt.Ltd
3	Cryptography and Network Security: Principle and Practice	William Stallings	7 th	PHI

Reference Books

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

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SEVENTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
23IT701P	Information and Cyber Security Lab	-	-	2	1	25	25	50

Course Objectives	Course Outcomes
This course is intended 1. To develop and test applications related to information security and cyber security 2. To implement the cryptographic and authentication algorithms for information security 3. To use and analyze network security tools and vulnerability assessment tools for cyber security	Students will be able to 1. Develop programs and Evaluate confidentiality, integrity and authentication and non-repudiation using security algorithms 2. Implement different symmetric and asymmetric ciphers 3. Analyze detection and prevention of various cybersecurity attacks 4. 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.
2	Implement Asymmetric Cryptography algorithm.
3	Implement RSA algorithm.
4	Implement Message Digest algorithm (MD5 / SHA). Create message digest and test it
5	Develop and verify Digital Signature.
6	Demonstrate Intrusion Detection System (IDS) using any tool (SNORT or Suricata).
7	Setup a secure web server using SSL / TLS.
8	Case study on recent cyber-attacks and solution provided

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 CompleteReference	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

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Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
23IT702P	Software Lab – 2	-	-	4	2	25	25	50

Course Objectives	Course Outcomes
This course is intended 1. To impart necessary and practical knowledge of components of Emerging Technologies. 2. To develop skills required to build real-life projects.	Students will be able to 1. Demonstrate Tableau and Power BI with real life projects. 2. Illustrate Emerging Technologies and its hardware and software components 3. Analyze and apply various AI Tools. 4. Design Presentation and document using LaTeX and Demonstrate Data analytics using Machine Learning. 5. Design an application using React JS and Node JS

Expt. No.	Experiments based on
1	Practical's are based on Tableau
2	Practical's are based on PowerBi
3	Practical's based on Internet of Things (IoT)
4	Practical's based on Artificial Intelligence Tools
5	Practical's based on Latex
6	Practical's based on Data Analytics using Machine Learning
7	Practical's are based on Data Visualization Tools.
8	Micro Project

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 ,Dr Hemant Kumar Gianey, Joseph Kofi Wireko	1 st	BPB Publications

Online Resources

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://firefly.com/practical-typesetting/
6	https://www.canva.com/graphs/

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SEVENTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
23IT703T(i)	PE – IV Data Warehousing and Mining	4	-	-	4	15	15	70	100

Course Objectives	Course Outcomes
This course is intended 1. To learn and understand various Data Mining Techniques. 2. To understand various algorithms in Data Mining Technique 3. To understand Business Intelligence and big data applications in future	Students will be able to- 1. Summarize concepts of data warehousing and its applications in the real world. 2. Relate and apply the data preprocessing approaches and statistical tools for exploratory data analysis. 3. Interpret and apply various OLAP models in Business analytics. 4. Identify various data mining techniques for knowledge extraction in data warehouses. 5. Apply and investigate various mining patterns and association rules on real time data set.

Unit I : Introduction to Data Warehousing:	[9Hrs]
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	[9Hrs]
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	[9Hrs]
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	[9Hrs]
Importance, Data Mining functionalities, KDD and Data Mining, Data Mining v/s Query tools, interesting patterns, Architecture, Classification of Data Mining systems, Applications of Data Mining, Introduction to Big Data	
Unit V: Mining Frequent Patterns and Association: Basic Concepts	[9Hrs]
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	2 nd	Wiley
2	Data Mining (Concepts and Techniques)	Ponniahan Han and Kamber	3 rd	Elsevier
3	Data Mining and Business Intelligence	Shinde and Chandrashekhar	2 nd	Dream tech Press

Reference Books

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

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SEVENTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
23IT703T(ii)	PE – IV Natural Language Processing	4	-	-	4	15	15	70	100

Course Objectives	Course Outcomes
This course is intended 1. To understand natural language processing and its basic algorithms for solving real-world problems. 2. To familiarize learners with various language models. 3. To understand machine learning techniques used in NLP.	Students will be able to 1. Define core concepts of Natural language processing and levels of language analysis 2. Explore learning state-of-the-art NLP research areas such as parsing algorithms, ambiguity resolution and machine translation. 3. Apply Natural Language Processing concepts in Information extraction, semantic web search, machine translation, text summarization, spam detection. 4. To understand basics of Machine Translation and its various patterns.

Unit I : Introduction to Natural Language:	[9Hrs]
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:	[9Hrs]
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:	[9Hrs]
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:	[9Hrs]
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:	[9Hrs]
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	2 nd	Pearson Publication
2	Speech and Language Processing	D. Jurafsky, J. H. Martin	2 nd	Prentice Hall, 2008.
3	Introduction to Natural Language Processing	Eisenstein, Jacob	1 st	United Kingdom, MIT Press

Reference Books

Sr.No.	Title	Authors	Edition	Publisher
1	Natural language processing and information retrieval	Tiway, 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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SEVENTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
23IT703T(iii)	PE – IV Edge Computing	4	-	-	4	15	15	70	100

Course Objectives	Course Outcomes
This course is intended 1. To understand Need of Edge Computing 2. To Understand Scope of Edge Computing 3. To understand Challenges and Opportunities in Edge Computing	Students will be able to 1. Explain Edge Computing concepts, architectures, and deployment models. 2. Apply Edge Computing frameworks, programming models, and deployment techniques. 3. Design edge-enabled solutions for distributed and IoT applications. 4. Analyze challenges related to security, privacy, scalability, and performance in Edge Computing. 5. Demonstrate the use of virtualization, containerization, and orchestration platforms for Edge Computing applications.

Unit I : Introduction:	[9Hrs]
Introduction to Edge Computing, Need and Benefits of Edge Computing, Key Technologies, Edge Computing Systems and Architectures, and Comparison of Cloud, Fog, and Edge Computing.	
Unit II: Fireworks: Data Analytics in Hybrid Cloud-Edge Environment:	[9Hrs]
Edge Computing Fundamentals, Architecture and Design Principles, Programming and Execution Models, Framework Comparison, Application Development and Deployment, Implementation Techniques, and Case Studies.	
Unit III: Edge Computing Applications and Distributed Processing	[9Hrs]
Introduction to Distributed Edge Computing, Collaborative Processing at the Edge, Smart City Applications, Industrial IoT Applications, Healthcare and Intelligent Transportation Systems, Edge Application Design and Deployment, Task Scheduling Techniques, Resource Management, Performance Evaluation and Optimization of Edge Services.	
Unit IV: Challenges and Opportunities in Edge Computing:	[9Hrs]
Edge Application Development, Resource Management, Data Abstraction, Service Management, Security and Privacy, Application Deployment, Scheduling Techniques, Performance Optimization, Scalability, and Business Opportunities in Edge Computing.	
Unit V: Edge Computing Infrastructure and Platforms:	[9Hrs]
Virtualization using Virtual Machines and Containers, Container Orchestration with Docker and Kubernetes, Network and Resource Management, Edge Analytics, Edge Development Frameworks, Cloud-Edge Integration, and Deployment of Edge Applications.	

Text Books



Sr.No.	Title	Authors	Edition	Publisher
1	Edge Computing: A Primer	Jie Cao, Quan Zhang, Weisong Shi	3 rd	Springer
2	Edge Computing Fundamentals,Advances and Applications	K. Anitha Kumari, G. Sudha ,Sadasivam, D. Dharani	4 th	CRC Press
3	Internet of Things: A Hands-On Approach	Arshdeep Bahga, Vijay Madiseti	2 nd	Universities Press

Reference Books

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

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SEVENTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
23IT704T(i)	PE – V Deep Learning	4	-	-	4	15	15	70	100

Course Objectives	Course Outcomes
<p>This course is intended</p> <ol style="list-style-type: none"> 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 	<p>Students will be able to-</p> <ol style="list-style-type: none"> 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 To demonstrate various Deep Learning application.

Unit I : Introduction to Deep Learning	[9Hrs]
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	[9Hrs]
Introduction to CNNs , CNN operations, Applications of CNNs: Image Recognition, Object Detection Introduction to Hyperparameter Tuning: Learning rate, number of filters, etc., Simple Convolution Network, Deep Convolutional Models. Introduction to RNNs , Vanilla RNN, Long Short-Term Memory (LSTM) networks, Applications of RNNs , Back propagation through time (BPTT), Vanishing and Exploding Gradients, Gated recurrent Unit.	
Unit III: Deep Unsupervised Learning	[9Hrs]
Autoencoders, Markov Networks, Variational Autoencoders, Autoencoders for Image Compression and Reconstruction, Autoencoders for Anomaly Detection. Introduction of GANs(Generative Modeling) , Different Types of GANs, Components of GANs, Training and Prediction of GANs, GAN Loss Function, Challenges Faced by GANs, Application of GANs	
Unit IV: Regularization for Deep Learning	[9Hrs]
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	[9Hrs]
Introduction to NLP, Preprocessing task in NLP, Word Embedding for Deep Learning, Sentimental Analysis, Face recognition, Image segmentation, object detection, Automatic Image Captioning , Capture and Representation, Image Processing.	

Text Books

Sr. No.	Title	Authors	Edition	Publisher
1	Deep learning.	Bengio, Yoshua, Ian J. Goodfellow, and Aaron		MIT Pres
2	Fundamentals of Deep Learning: Designing Next-Generation Machine	Nikhil Buduma		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.	Schmidhuber	2nd	Neural computation 9.8

Online Resources

1	GeeksforGeeks.orgs
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						MSE	CA	ESE	Total
23IT704T(ii)	PE – V Advanced in Database Management System	4	-	-	4	15	15	70	100

Course Objectives	Course Outcomes
This course is intended 1. To learn and understand various Database Architectures and Applications. 2. To understand various emerging techniques in database. 3. To understand how analytic and big data affect various functions now and in the future.	Students will be able to- 1. Explain database architectures and advanced SQL programming. 2. Analyze distributed database systems and transactions. 3. Apply parallel database processing techniques. 4. Demonstrate modern database technologies. 5. Apply Big Data and Hadoop technologies.

Unit I : Database Architectures:	[9Hrs]
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	[9Hrs]
: 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	[9Hrs]
: Introduction, I/O Parallelism, Interquery Parallelism, Intraquery Parallelism, Intraoperation Parallelism, Interoperation Parallelism, Query Optimization, Design of Parallel Systems.	
Unit IV: Emerging Database Technologies:	[9Hrs]
Introduction to No SQL; New SQL Databases- Internet, Databases, Cloud Databases, Mobile Databases, SQLite Database, XML Databases, MongoDB.	
Unit V: Introduction to Big Data	[9Hrs]
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

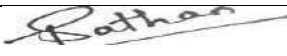
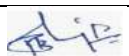
Sr.No.	Title	Authors	Edition	Publisher
1	Database System Concepts	Silberschatz A., Korth H., Sudarshan S	6 th	McGraw Hill Publication
2	Database Systems: Concepts, Design and Application	S. K. Singh	5 th	Pearson Publication

Reference Books

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

Online Resources

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

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SEVENTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
23IT704T(iii)	PE – V Digital Forensics	4	-	-	4	15	15	70	100

Course Objectives	Course Outcomes
This course is intended <ol style="list-style-type: none">To study Digital Forensics Fundamentals and Computer ForensicsTo learn about examination, preventing and fighting digital crimesTo model about data acquisition and storing digital evidenceTo explore digital forensics tools	Students will be able to <ol style="list-style-type: none">Understand the fundamental of Digital ForensicSummarize the requirements for use of data acquisition.Demonstrate investigate incidencesExploring the role of e-mail in investigationsUnderstand digital forensics tools

Unit I : Introduction to Digital Forensics	[9Hrs]
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	[9Hrs]
Storage formats, Using acquisition tools, Data Recovery: RAID (Redundant Arrays of Independent Disks) Data acquisition, RAID Levels.	
Unit III: Crime and Incident Scene Processing	[9Hrs]
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	[9Hrs]
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	[9Hrs]
Disk & 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


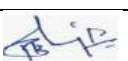
Sr.No.	Title	Authors	Edition	Publisher
1.	Digital Forensics	Andre Arnes	1 st	Wiley
2.	Digital Forensics with Open-Source Tools	Harlan Carvey , Cory Altheide	1 st	Syngress

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, Einfinger 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://mrctet.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/

		July 2026	NEP 1.0	Applicable for 2026-27
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ST. VINCENT PALLOTTI COLLEGE OF ENGINEERING & TECHNOLOGY, NAGPUR

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

B. Tech. Scheme of Examination & Syllabus 2023-24

INFORMATION TECHNOLOGY

SEVENTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
23IT731M	MDM – V Data Visualization and Techniques	3	-	-	3	15	15	70	100

Course Objectives	Course Outcomes
<p>This course is intended</p> <ol style="list-style-type: none"> To Familiarize students with the basic and advanced techniques of information visualization and scientific visualization Learn key techniques of the visualization process and implement Detailed view of visual perception, the visualized data and the actual visualization, interaction and distorting techniques. 	<p>Students will be able to-</p> <ol style="list-style-type: none"> Explain the fundamentals of data visualization, types of data, visualization pipeline, visual perception principles. Select and apply appropriate basic visualization techniques to effectively represent and compare data. Analyze and visualize multidimensional, temporal, spatial, and experimental data using advanced and specialized visualization methods. Use suitable data visualization tools and technologies to clean, process, create, and present visual representations for engineering applications. Evaluate and design advanced visualizations for complex datasets .

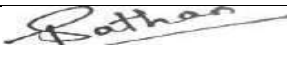

Unit I : Introduction to Data Visualization	[9Hrs]
What Is Visualization? History of Visualization, Evaluation and ethics: avoiding distortion, fair comparisons, uncertainty display (error bars, intervals), privacy, responsible aggregation. Visualization use cases across engineering disciplines.	
Unit II : Fundamental Visualization Techniques	[9Hrs]
Tabular and textual data representation, Charts and graphs: bar, line, pie, area, Scatter plots and bubble charts, Histograms and frequency plots, Comparison, distribution, and relationship visualization, Choosing the right chart for the data, Common visualization mistakes and best practices, Case studies.	
Unit III : Multidimensional and Specialized Visualizations	[9Hrs]
Multivariate data visualization concepts, Heat maps and correlation plots, Tree maps and hierarchical visualization ,Network and flow visualization, Geospatial data visualization basics, Time-series visualization techniques, Visualization of experimental and sensor data.	
Unit IV : Tools and Technologies for Data Visualization	[9Hrs]
Overview of data visualization tools, Spreadsheet-based visualization (Power BI / Tableau), Introduction to programming-based visualization concepts , Dashboards and interactive visualization concepts, Exporting and presenting visual results, Tool selection for different engineering application.	
Unit V : Advanced Concepts and Applications	[9Hrs]
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, data structures used in data visualization.	

Text Books

S.N	Title	Authors	Edition	Publisher
1.	Data Visualization: Principles and Practice	Alexandru C. Telea	2nd	CRC Press / Taylor & Francis
2.	Information Visualization: Perception for Design	Colin Ware	4th	Elsevier
3.	Fundamentals of Data Visualization	Claus O. Wilke	1st	O'Reilly Media

Reference Books

S.N	Title	Authors	Edition	Publisher
1.	The Visual Display of Quantitative Information	Edward R. Tufte	2nd	Graphics Press
2.	Storytelling with Data: A Data Visualization Guide for Business Professionals	Cole Nussbaumer Knaflic	1st	Wiley
3.	Visualize This: The FlowingData Guide to Design, Visualization, and Statistics	Nathan Yau	1st n	Wiley

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