Counselling Code : VBIT

VIGNANA BHARATHI Institute of Technology®

(A UGC Autonomous Institution, Approved by AICTE, Accredited by NBA & NAAC-A Grade, Affiliated to JNTUH)

B.Tech (Honors)

Offered by

Dept. of CSE

R21-COURSESTRUCTURE & SYLLABUS

VIGNANA BHARATHI INSTITUTE OF TECHNOLOGY
(AUTONOMOUS)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

IIIYEARI-SEMESTER

Sl.No	Course Code	Course Title	Mode of Learning	Credits
1	**Professional Elective–I**			
	21HCS31T1	Data analytics	Blended/Conventional	3
	21HCS31T2	Advanced Computer Architecture		
	21HCS31T3	Digital Image Processing		
	21HCS31T4	Distributed Systems		

III YEAR II-SEMESTER

Sl.No	Course Code	Course Title	Mode of Learning	Credits
1	21HCS32T1	Research Methodologies	Conventional	3
	Professional Elective–II			
2	21HCS32T2	Artificial Intelligence	Conventional	3
	21HCS32T3	Software Project Management		
	21HCS32T4	Information Retrieval Systems		
	21HCS32T5	Distributed Databases.		

IV YEARI-SEMESTER

Sl.No	Course Code	Course Title	Mode of Learning	Credits
1	**Professional Elective –III**			
	21HCS41T1	Deep Learning	Conventional	3
	21HCS41T2	Soft Computing		
	21HCS41T3	Advanced Algorithms		
	21HCS41T4	Cloud Computing		
2	**Professional Elective– IV**			
	21HCS41T5	Real Time Operating System	Conventional	3
	21HCS41T6	Ad-Hoc & Sensor Networks		
	21HCS41T7	High Performance Computing		
	21HCS41T8	Information Storage Management		

IVYEARII-SEMESTER

Sl.No	Course Code	Course Title	Mode of Learning	Credits
1	21HCS42TP	Technical Paper Writing	Under the mentorship of a supervisor	2
2	**Professional Elective– V/VI**			
	21HCS42T1	Computer Vision	MOOCS	3
	21HCS42T2	Block chain Technology		
	21HCS42T3	Internet of Things		
	21HCS42T4	Software Testing Methodologies		
	21HCS42T5	Big Data Management		
	21HCS42T6	Natural Language Processing		
	21HCS42T7	Robotic Process Automation		
	21HCS42T8	Security Analysis		

Note:

I. **Professional Elective (PE) course should be selected (which is not studied) from each Professional Electives list provided in regular B. Tech. course.**

II. **Courses can be chosen as in above table.**

21HCS31T1: DATA ANALYTICS

(Professional Elective - I)

B.Tech III Year I Sem (Honors)

L	T	P	C
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Prerequisites

- Data Base Management Systems, Computer Oriented Statistical Methods

Course Objectives

- To explore the fundamental concepts of data analytics.
- To learn the principles and methods of statistical analysis.
- To develop problem solving abilities using Mathematics.
- To apply algorithmic strategies while solving problems.
- To understand the various search methods and visualization techniques.

Course Outcomes

- Identify the various sources of Big Data.
- Apply several key big data technologies used for storage, analysis and manipulation of data.
- Design methodologies to extract data from structured and un-structured data for analytics
- Apply Regression algorithms to perform data analytics.
- To carry out standard data visualization and formal inference processors.

UNIT - I

Data Management: Design Data Architecture and manage the data for analysis, understand various sources of Data like Sensors/Signals/GPS etc. Data Management, Data pre-processing, Missing Values - Outlier Detection and Treatment.

UNIT- II

Introduction to Tools and Environment, Application of Modelling in Business, Databases & Types of data and variables, Data Modelling Techniques, Missing imputations etc. Need for Business Modeling.

UNIT -III

Regression – Concepts, Blue property assumptions, Least Square Estimation, Variable Rationalization, and Model Building etc. Logistic Regression: Model Theory, Model fit Statistics, Model Construction, Analytics applications to various Business Domains etc.

UNIT - IV

Supervised and Unsupervised Learning, Tree Building – Regression, Classification, Over fitting, Pruning and Complexity, Multiple Decision Trees etc.
Time Series Methods: Arima, Measures of Forecast Accuracy, STL approach, Extract features from generated model as Height, Average Energy etc and Analyze for prediction.

UNIT - V:

Data Visualization: Pixel Oriented Visualization Techniques, Geometric Projection Visualization Techniques, Icon based Visualization Techniques Hierarchical Visualization Techniques, Visualizing

Complex Data and Relations.

TEXT BOOKS:

1. Data Mining Concepts and Techniques, Han, Kamber, 3rd Edition, Morgan Kaufmann Publishers.
2. Associate Analytics Handbook.

REFERENCES:

1. Mining of Massive Datasets, Jure Leskovec Stanford Univ. Anand Rajaraman Milliway Labs Jeffrey D Ullman Stanford Univ.
2. Michael Minelli, Michele Chambers, AmbigaDhiraj ,"Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends", John Wiley & Sons, 2013.
3. Bart Baesens, "Analytics in a Big Data World: The Essential Guide to Data Science and its Applications", John Wiley & Sons, 2014

21HCS31T2: ADVANCED COMPUTER ARCHITECTURE

(Professional Elective - I)

B.Tech III Year I Sem (Honors)

L	T	P	C
3	-	-	3

Prerequisites: Computer Organization

Course Objectives:

- To impart the concepts and principles of parallel and advanced computer architectures.
- To develop the design techniques of Scalable and multithreaded Architectures.
- To apply the concepts and techniques of parallel and advanced computer architectures to design modern computer systems.

Course Outcomes: Gain knowledge of

- Computational models and Computer Architectures.
- Concepts of parallel computer models.
- Scalable Architectures, Pipelining, Superscalar processors, multiprocessors.
- Interpret the performance of a processor based on metrics such as execution time, cycles per instruction (CPI), Instruction count etc.
- Predict the challenges of realizing different kinds of parallelism (such as instruction, data, thread, core level) and leverage them for performance advancement.

UNIT - I

Theory of Parallelism, Parallel computer models, The State of Computing, Multiprocessors and Multicomputers,MultivectorandSIMDComputers,PRAMandVLSImodels,Architecturaldevelopment tracks, Program and network properties, Conditions of parallelism, Program partitioning and Scheduling, Program flow Mechanisms, System interconnect Architectures.

UNIT - II

Principals of Scalable performance, Performance metrics and measures, Parallel Processing applications, Speed up performance laws, Scalability Analysis and Approaches, Hardware Technologies, Processes and Memory Hierarchy, Advanced Processor Technology, Superscalar and Vector Processors, Memory Hierarchy Technology, Virtual Memory Technology.

UNIT - III

Bus Cache and Shared memory, Backplane bus systems, Cache Memory organizations, Shared-Memory Organizations, Sequential and weak consistency models, Pipelining and superscalar techniques, Linear Pipeline Processors, Non-Linear Pipeline Processors, Instruction Pipeline design, Arithmetic pipeline design, superscalar pipeline design.

UNIT - IV

Parallel and Scalable Architectures, Multiprocessors and Multicomputers, Multiprocessor system interconnects, cache coherence and synchronization mechanism, Three Generations of Multicomputers, Message-passing Mechanisms, Multivector and SIMD computers, Vector Processing Principals, Multivector Multiprocessors, Compound Vector processing, SIMD computer Organizations, The

connection machine CM-5,

UNIT - V

Scalable, Multithreaded and Dataflow Architectures, Latency-hiding techniques, Principals of Multithreading, Fine-Grain Multicomputers, Scalable and multithreaded Architectures, Dataflow and hybrid Architectures.

Text Book

1. Advanced Computer Architecture, Kai Hwang, 2nd Edition, Tata McGraw HillPublishers.
2. Computer Architecture, J.L. Hennessy and D.A. Patterson, 4th Edition,ELSEVIER.

References:

1. Advanced Computer Architectures, S.G.Shiva, Special Indian edition, CRC, Taylor&Francis.
2. Introduction to High Performance Computing for Scientists and Engineers, G. Hager and G. Wellein, CRC Press, Taylor & FrancisGroup.
3. Advanced Computer Architecture, D. Sima, T. Fountain, P. Kacsuk, Pearsoneducation.
4. Computer Architecture, B. Parhami, Oxford Univ.Press.

21HCS31T3: DIGITAL IMAGE PROCESSING

(Professional Elective - I)

B.Tech III Year I Sem (Honors) **L T P C**
3 - - 3

Prerequisites

- Students are expected to have knowledge in linear signals and systems, Fourier Transform, basic linear algebra, basic probability theory and basic programming techniques; knowledge of Digital Signal Processing is desirable.
- A course on "Computational Mathematics"
- A course on "Computer Oriented Statistical Methods"

Course Objectives

- Provide a theoretical and mathematical foundation of fundamental Digital Image Processing concepts.
- The topics include image acquisition; sampling and quantization; preprocessing; enhancement; restoration; segmentation; and compression.
- To introduce the concepts of image processing and basic analytical methods to be used in image processing.
- To familiarize students with image enhancement and restoration techniques.
- To explain different Image compression techniques.

Course Outcomes

- Demonstrate the knowledge of the basic concepts of two-dimensional signal acquisition, sampling, and quantization.
- Demonstrate the knowledge of filtering techniques.
- Demonstrate the knowledge of 2D transformation techniques.
- Demonstrate the knowledge of image enhancement, segmentation, restoration and compression techniques.
- Demonstrate the knowledge of Image Compression Models.

UNIT-I: Fundamentals of Image processing and Image Transforms: Basic steps of Image processing system sampling and quantization of an Image – Basic relationship between pixels Image Transforms: 2 – D Discrete Fourier Transform, Discrete Cosine Transform (DCT), Discrete Wavelet transforms

UNIT-II: Image Processing Techniques: Image Enhancement: Spatial Domain methods: Histogram Processing, Fundamentals of Spatial Filtering, Smoothing Spatial filters, Sharpening Spatial filters Frequency Domain methods: Basics of filtering in frequency domain, image smoothing, image sharpening, selective filtering Image Segmentation: Segmentation concepts, point, line and Edge detection, Thresholding, region based segmentation

UNIT-III: Image Compression Image compression fundamentals – coding Redundancy, spatial and temporal redundancy. Compression models : Lossy and Lossless, Huffmann coding, Arithmetic coding, LZW coding, run length coding, Bit Plane coding, transform coding, predictive coding , wavelet coding, JPEG standards.

UNIT-IV: Basic Steps of Video Processing: Analog video, Digital Video, Time varying Image Formation models : 3D motion models, Geometric Image formation , Photometric Image formation,

sampling of video signals, filtering operations .

UNIT-V: 2-D Motion Estimation: Optical flow, general methodologies, pixel based motion estimation, Block matching algorithm, Mesh based motion Estimation, global Motion Estimation, Region based motion estimation, multi resolution motion estimation. Waveform based coding, Block based transform coding, predictive coding, Application of motion estimation in video coding.

TEXT BOOKS

1. Gonzaleze and Woods ,"Digital Image Processing ", 3rd edition , Pearson
2. Yao wang, Joem Ostarmann and Ya – quin Zhang, "Video processing and communication ",1st edition , PHI

REFERENCE TEXT BOOKS

1. M. Tekalp ,"Digital video Processing", Prentice Hall International
2. Relf, Christopher G.,"Image acquisition and processing with LabVIEW", CRC press
3. Aner ozdemi R, "Inverse Synthetic Aperture Radar Imaging with MATLAB Algorithms", John Wiley & Sons.
4. Chris Solomon, Toby Breckon ,"Fundamentals of Digital Image Processing A Practical Approach with Examples in Matlab", John Wiley & Sons.

21HCS31T4: DISTRIBUTED SYSTEMS

(Professional Elective-I)

B.Tech III Year I Sem (Honors)

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COURSE OBJECTIVES

1. To understand the foundations of distributed systems.
2. To learn issues related to clock Synchronization and the need for global state in distributed systems.
3. To understand the significance of agreement, fault tolerance and recovery protocols in Distributed Systems.
4. To introduce the concepts of distributed file systems, shared memory and message passing systems, synchronization and resource management.
5. To introduce the concepts of Transactions and Concurrency Control and Distributed deadlocks

COURSEOUTCOMES:

1. Distinguish distributed computing paradigm from other computing paradigms.
2. Able to explain various distributed algorithms, such as logical clocks and leader election.
3. Illustrate the mechanisms of inter process communication in distributed system.
4. Explain name services and distributed shared memory.
5. The students will be able to define, explain and illustrate fundamental principles of concurrent transaction processing.

UNIT -I

Characterization of Distributed Systems: Introduction, Examples of Distributed systems,Resource sharing and web, challenges.
System Models: Introduction, Architectural and Fundamental models.

UNIT -II

Time and Global States: Introduction, Clocks, Events and Process states, synchronizingphysical clocks, Logical time and Logical clocks, Global states, Distributed Debugging.
Coordination and Agreement: Introduction, Distributed mutual exclusion, Elections, Multicast Communication, Consensus and Related problems.

UNIT -III

Inter Process Communication: Introduction, The API for the internet protocols, External Data Representation and Marshalling, Client-Server Communication, Group Communication, Case Study: IPC in UNIX.
Distributed Objects and Remote Invocation: Introduction, Communication between Distributed Objects, Remote Procedure Call, Events and Notifications, Case study-Java RMI.

UNIT -IV

Distributed File Systems: Introduction, File service Architecture, Case Study1: Sun Network File System, Case Study 2: The Andrew File System.

Name Services: Introduction, Name Services and the Domain Name System, Directory Services, Case study of the Global Name Service.
Distributed Shared Memory: Introduction Design and Implementation issues, Sequential Consistency and Ivy case study, Release consistency and Munimum case study, other consistency Models.

UNIT- V

Transactions and Concurrency Control: Introduction, Transactions, Nested Transactions, Locks, Optimistic concurrency control, Timestamp ordering, Comparison of methods for Concurrency control.
Distributed Transactions: Introduction, Flat and Nested Distributed Transactions, Atomic Commit protocols, Concurrency control in distributed transactions, Distributed deadlocks, Transaction recovery

TEXT BOOK:

1. Distributed Systems, Concepts and Design, George Coulouris, JDollimore and Tlm Kindberg, Pearson Education, 4h Edition, 2009.

REFERENCE BOOKS:

1. Distributed Systems, Principles and paradigms, Andrew S.Tanenbaum, Maarten Van
2. Steen, Second Edition, PHI.
3. Distributed Systems, An Algorithm Approach, Sikumar Ghosh, Chapman & Hall/CRC,
4. Taylor & Fransis Group, 2007.
5. Distributed Systems, Principles and Paradigms, Andrew S.Tanenbaum, Maarten Van Steen, 2d Edition, PHl.
6. Distributed Systems, An Algorithm Approach, Sukumar Ghosh,Chapman&HalyCRC, Taylor & Fransis Group, 2007.

III YEAR II SEM

21HCS32T1: RESEARCH METHODOLOGIES

B.Tech III Year II Sem (Honors)

L	T	P	C
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Prerequisite: None

Course Objectives:
- To understand the research problem
- To know the literature studies, plagiarism and ethics
- To get the knowledge about technical writing and induce paper publication skills

Course Outcomes: Gain the sound knowledge of the following important elements:
- Distinguish research methods
- Carryout literature review thoroughly to identify contemporary research problems
- Data collection and analysis
- Write and publish a technical research paper
- Review papers effectively

UNIT - I
INTRODUCTION:
Objective of Research; Definition and Motivation; Types of Research; Research Approaches; Steps in Research Process; Criteria of Good Research.
UNIT - II
RESEARCH FORMULATION AND LITERATURE REVIEW:
Problem Definition and Formulation; Literature Review; Characteristics of Good Research Problem; Literature Review Process; Plagiarism, Ethics in Research.
UNIT - III
DATA COLLECTION:
Primary and Secondary Data; Primary and Secondary Data Sources; Data Collection Methods; Data Processing; Classification of Data.
DATA ANALYSIS:
Statistical Analysis; Multivariate Analysis; Correlation Analysis; Regression Analysis; Principle Component Analysis; Samplings
UNIT - IV
RESEARCH DESIGN:
Need for Research Design; Features of a Good Design; Types of Research Designs; Induction and Deduction.
HYPOTHESIS FORMULATION AND TESTING:
Hypothesis; Important Terms; Types of Research Hypothesis; Hypothesis Testing; Z-Test; t-Test; f-Test; Making a Decision; Types of Errors; ROC Graphics.
UNIT - V
PRESENTATION OF THE RESEARCH WORK:
Business Report; Technical Report; Research Report; General Tips for Writing Report; Presentation of Data; Oral Presentation; Bibliography and References; Intellectual Property Rights; Open-Access Initiatives; Plagiarism.

TEXT BOOKS:

1. Research Methodology. Methods & Technique: Kothari. C.R.
2. Stuart Melville and Wayne Goddard, “Research methodology: an introduction for science & engineering students’”

REFERENCES:

1. Practical Research: planning and Design (8th Edition) – Paul D. Leedy and Jeanne E. Ormrod.
2. A Hand Book of Education Research – NCTE
3. Methodology of Education Research – K.S. Sidhu.
4. Tests, Measurements and Research methods in Behavioural Sciences- A.K. Singh.
5. Statistical Methods- Y.P. Agarwal.
6. Methods of Statistical Ananlysis- P.S Grewal.
7. Fundamentals of Statistics – S.C. Gupta, V.K. Kapoor.
8. Intellectual Property Rights by Deborah E. Bouchoux, Cengage Learning.
9. Managing Intellectual Property – The Strategic Imperative, Vinod V.Sople, 2nd Edition, PHI Learning Private Limited.
10. Research methodology – S.S. Vinod Chandra, S. Anand Hareendran

21HCS32T2:ARTIFICIAL INTELLIGENCE

(Professional Elective - II)

B.Tech III Year II Sem (Honors)

L	T	P	C
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Course Objectives

- To train the students to understand different types of AI agents.
- Various AI search algorithms.
- Fundamentals of knowledge representation.
- To apply knowledge representation, reasoning.
- Study of Markov Models enable the student ready to step into applied AI.

Course Outcomes

- Understand AI problems and problem solving agents and search strategies
- Apply advanced search techniques and acquire basic knowledge representation and reasoning logic.
- Apply reasoning under uncertainty.
- Understand learning strategies.
- Understand implementation of expert system.

UNIT - I

Introduction: AI problems, Agents and Environments, Structure of Agents, Problem Solving Agents Basic Search Strategies: Problem Spaces, Uninformed Search (Breadth-First, Depth-First Search, Depth-first with Iterative Deepening), Heuristic Search (Hill Climbing, Generic Best-First, A*), Constraint Satisfaction (Backtracking, Local Search).

UNIT - II

Advanced Search: Constructing Search Trees, Stochastic Search, A* Search Implementation, Minimax Search, Alpha-Beta Pruning.

Basic Knowledge Representation and Reasoning: Propositional Logic, First-Order Logic, Forward Chaining and Backward Chaining, Introduction to Probabilistic Reasoning, Bayes Theorem

UNIT - III

Advanced Knowledge Representation and Reasoning: Knowledge Representation Issues, Non monotonic Reasoning, Other Knowledge Representation Schemes

Reasoning Under Uncertainty: Basic probability, Acting Under Uncertainty, Bayes' Rule, Representing Knowledge in an Uncertain Domain, Bayesian Networks.

UNIT - IV

Learning: What Is Learning? Rote Learning, Learning by Taking Advice, Learning in Problem Solving, Learning from Examples, Winston's Learning Program, Decision Trees.

UNIT - V

Expert Systems: Representing and Using Domain Knowledge, Shell, Explanation, Knowledge Acquisition.

TEXT BOOK:

1. Russell, S. and Norvig, P, Artificial Intelligence: A Modern Approach, Third Edition, PrenticeHall, 2010.

REFERENCES:

1. Artificial Intelligence, Elaine Rich, Kevin Knight, Shivasankar B. Nair, The McGraw Hill publications, Third Edition, 2009.

2. George F. Luger, Artificial Intelligence: Structures and Strategies for Complex Problem Solving, Pearson Education, 6th ed., 2009.

21HCS32T3: SOFTWARE PROJECT MANAGEMENT

(Professional Elective - II)

B.Tech III Year II Sem (Honors)

L	T	P	C
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Course Objectives

- A basic knowledge of software project management principles
- The ability to come up with a project schedule and assign resources
- Choose an appropriate project development methodology (e.g. waterfall,spiral ...)
- Identify project risks, monitor and track project deadlines.
- The capability to work in a team environment and be aware of different modes of communications.

Course Outcomes

- Identify and describe how different project contexts will impact upon all aspects of a software development project
- Identify and describe the key phases of project management and the key skills associated with each.
- Determine an appropriate project management approach through an evaluation of the business contextandprojectscopeandknowledgeofagileandtraditionalprojectmanagement approaches.
- Demonstrate through application, knowledge of the key project management skills, such as product and work break-down structure, schedule; governance including progress reporting, risk and quality management.
- As part of a small team research and produce a concise piece of writing suitable for presentation to senior management.

UNIT-I

Conventional Software Management: The waterfall model, conventional software Management performance. Overview of Project Planning – Stepwise Project Planning.

Improving Software Economics: Reducing Software product size, improving software processes, improving team effectiveness, improving automation, Achieving required quality, peer inspections.

UNIT-II

The old way and the new way: The principles of conventional software Engineering, principles of modern software management, transitioning to an iterative process.

Life cycle phases: Engineering and production stages, Inception, Elaboration, Construction, Transition phases.

Artifacts of the process: The artifact sets, Management artifacts, Engineering artifacts, programmatic artifacts.

UNIT –III

Work Flows of the process: Software process workflows, Iteration workflows. **Checkpoints of the process: Major** milestones, Minor Milestones, Periodic status assessments.

Iterative Process Planning: Work breakdown structures, planning guidelines, cost and schedule estimating, Iteration planning process, Pragmatic planning.

UNIT–IV

Process Automation: Automation Building blocks.

Project Control and Process instrumentation: These Vencor Metrics, Management indicators, quality indicators, life cycle expectations, pragmatic Software Metrics, Metrics automation.

Tailoring the Process: Process discriminants.

UNIT–V

Project Organizations and Responsibilities:

Line-of-Business Organizations, Understanding Behavior – Organizational Behavior **Future Software Project Management:** Modern Project Profiles, Next generation Software economics, modern process transitions.

Case Study: The command Center Processing and Display system-Replacement (CCPDS-R).

TEXT BOOKS:

1. Software Project Management, Walker Royce: Pearson Education,2005.

REFERENCES:

1. Software Project Management, Bob Hughes and Mike Cotterell:Tata McGraw-HillEdition.
2. Software Project Management, Joel Henry, Pearson Education.

Software Project Management in practice, Pankaj Jalote, Pearson Education.2

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21HCS32T4: INFORMATION RETRIEVAL SYSTEMS

(Professional Elective-II)

B.Tech III Year II Sem (Honors)

L	T	P	C
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Course Objectives

- To learn the important concepts and algorithms in IRS
- To understand the data/file structures that is necessary to design, and implement information retrieval (IR) systems.
- Demonstrate Information visualization technologies like Cognition and perception in the Internet or Web search engine.
- Analyze ranked retrieval of a very large number of documents with hyperlinks between them.
- Describe hands-on experience store, and retrieve information from www using semantic approaches.

Course Outcomes

- Ability to understand IR principles to locate relevant information in large collections of data
- Ability to understand information extraction using indexing, and various data structure algorithms.
- Ability to design different document clustering algorithms and understand automatic indexing.
- Ability to use various search algorithms and perform information visualization.
- Ability to understand the ways to design an Information Retrieval System for web search tasks**.**

UNIT – I

Introduction to Information Retrieval Systems: Definition of Information Retrieval System, Objectives of Information Retrieval Systems, Functional Overview, Relationship to Database Management Systems, Digital Libraries and Data Warehouses.

Information Retrieval System Capabilities: Search Capabilities, Browse Capabilities, Miscellaneous Capabilities.

UNIT - II

Cataloging and Indexing: History and Objectives of Indexing, Indexing Process, Automatic Indexing, Information Extraction.

Data Structure: Introduction to Data Structure, Stemming Algorithms, Inverted File Structure, N-Gram Data Structures, PAT Data Structure, Signature File Structure, Hypertext and XML Data Structures, Hidden Markov Models.

UNIT - III

Automatic Indexing: Classes of Automatic Indexing, Statistical Indexing, Natural Language, Concept Indexing, Hypertext Linkages.

Document and Term Clustering: Introduction to Clustering, Thesaurus Generation, Item Clustering, Hierarchy of Clusters.

UNIT - IV

User Search Techniques: Search Statements and Binding, Similarity Measures and Ranking, Relevance Feedback, Selective Dissemination of Information Search, Weighted Searches of Boolean

Systems, Searching the INTERNET and Hypertext.

Information Visualization: Introduction to Information Visualization, Cognition and Perception, Information Visualization Technologies.

UNIT - V

Text Search Algorithms: Introduction to Text Search Techniques, Software Text Search Algorithms, Hardware Text Search Systems.

Multimedia Information Retrieval: Spoken Language Audio Retrieval, Non-Speech Audio Retrieval, Graph Retrieval, Imagery Retrieval, Video Retrieval,Web search basics. Web crawling and indexes.

TEXT BOOKS:

1. Information Storage and Retrieval Systems – Theory and Implementation, Second Edition, Gerald J. Kowalski, Mark T. Maybury, Springer.

REFERENCES:

1. Frakes, W.B., Ricardo Baeza-Yates: Information Retrieval Data Structures and Algorithms, Prentice Hall, 1992.
2. Information Storage & Retrieval By Robert Korfhage – John Wiley & Sons.
3. Modern Information Retrieval By Yates and Neto Pearson Education.

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21HCS32T5: DISTRIBUTED DATABASES
(Professional Elective - II)

B.Tech III Year II Sem (Honors) **L T P C**
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Prerequisites

- A course on "Database Management Systems"

Course Objectives

- The purpose of the course is to enrich the previous knowledge of database systems and
- Exposing the need for distributed database technology to confront with the deficiencies of the centralized database systems. Introduce basic principles and implementation techniques of distributed database systems.
- Equip students with principles and knowledge of parallel and object-oriented databases.
- Topics include distributed DBMS architecture and design; query processing and optimization;
- Distributed transaction management and reliability; parallel and object database management systems.

Course Outcomes

- Understand theoretical and practical aspects of distributed database systems.
- Study and identify various issues related to the development of distributed database system.
- Understand the design aspects of object-oriented database system and related development.
- Able to Practice Parallel distributed databases.
- Identify the differences between OODBMS and ORDBMS.

UNIT - I

Introduction: Distributed Data Processing, Distributed Database System, Promises of DDBSs, Problem areas. Distributed DBMS Architecture: Architectural Models for Distributed DBMS, DDMBS Architecture.

Distributed Database Design: Alternative Design Strategies, Distribution Design issues, Fragmentation, Allocation.

UNIT - II

Query processing and decomposition: Query processing objectives, characterization of query processors, layers of query processing, query decomposition, localization of distributed data.

Distributed query Optimization: Query optimization, centralized query optimization, distributed query optimization algorithms.

UNIT - III

Transaction Management: Definition, properties of transaction, types of transactions.

Distributed Concurrency Control: serializability, concurrency control mechanisms & algorithms, time - stamped & optimistic concurrency control Algorithms, deadlock Management.

UNIT - IV

Distributed DBMS Reliability: Reliability concepts and measures, fault-tolerance in distributed systems, failures in Distributed DBMS, local & distributed reliability protocols, site failures and network partitioning.

Parallel Database Systems: Parallel database system architectures, parallel data placement, parallel query processing, load balancing, database clusters.

UNIT - V

Distributed object Database Management Systems: Fundamental object concepts and models, object distributed design, architectural issues, object management, distributed object storage, object query Processing.

Object Oriented Data Model: Inheritance, object identity, persistent programming languages, persistence of objects, comparison OODBMS and ORDBMS.

TEXT BOOKS:

1. M. Tamer OZSU and Patuck Valduriez: Principles of Distributed Database Systems, Pearson Edn. Asia, 2001.
2. Stefano Ceri and Giuseppe Pelagatti: Distributed Databases, McGraw Hill.

REFERENCES:

1. Hector Garcia-Molina, Jeffrey D. Ullman, Jennifer Widom: "Database Systems: The Complete Book", Second Edition, Pearson International Edition
2. Chanda Ray (2012), Distributed Database Systems, 1st Edition, Pearson Education India

IV YEAR I SEM

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21HCS41T1: DEEP LEARNING
(Professional Elective- III)

B.Tech IV Year I Sem (Honors)

L	T	P	C
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Prerequisites: None.

Course Objectives:

- Describe the major differences between deep learning and other types of machine learning algorithms.
- To introduce the foundations of Artificial Neural Networks.
- To acquire the knowledge on Deep LearningConcepts.
- To learn various types of Artificial NeuralNetworks.
- To gain knowledge to apply optimizationstrategies.

Course Outcomes:

- Ability to understand the concepts of NeuralNetworks.
- Ability to select the Learning Networks in modeling real worldsystems.
- Ability to use an efficient algorithm for DeepModels.
- Ability to apply optimization strategies for large scaleapplications.

UNIT - I

Deep Feed forward Networks: Example: Learning XOR, Gradient-Based Learning, Hidden Units, Architecture Design, Back-Propagation and Other Differentiation Algorithms, Historical Notes

UNIT - II

Regularization for Deep Learning:

Parameter Norm Penalties, Norm Penalties as Constrained Optimization, Regularization and Under- Constrained Problems, Dataset Augmentation, Noise Robustness, Semi-Supervised Learning, Multi- Task Learning, Early Stopping, Parameter Tying and Parameter Sharing, Sparse Representations, Bagging and Other Ensemble Methods, Dropout, Adversarial Training, Tangent Distance, Tangent Prop, and Manifold Tangent Classifier.

UNIT - III

Optimization for Training Deep Models, How Learning Differs from Pure Optimization, Challenges in Neural Network Optimization, Basic Algorithms, Parameter Initialization Strategies, Algorithms with Adaptive Learning Rates, Approximate Second-Order Methods, Optimization Strategies and Meta- Algorithms

UNIT - IV

Convolutional Networks:

The Convolution Operation, Motivation, Pooling, Convolution and Pooling as an Infinitely Strong Prior, Variants of the Basic Convolution Function, Structured Outputs, Data Types, Efficient Convolution Algorithms,RandomorUnsupervisedFeatures,TheNeuro-scientificBasisforConvolutionalNetworks, Convolutional Networks and the History of DeepLearning

UNIT - V

Applications:

Large-Scale Deep Learning, Computer Vision, Speech Recognition, Natural Language Processing, Other Applications

Text Book:

1. Goodfellow, Yoshua Bengio, Aaron Courville, Deep Learning (Adaptive Computation and Machine Learning series), MIT Press.

Reference Books:

1. Li Deng and Dong Yu, Deep Learning Methods and Applications, Foundations andTrends® in Signal Processing Volume 7 Issues 3-4, ISSN:1932-8346.
2. Dr. N.D. Lewis, Deep Learning Made Easy with R A Gentle Introduction for Data Science. Create Space Independent Publishing Platform (January 10,2016).
3. François Chollet, JJ Allaire, MEAP Edition Manning Early Access Program Deep Learning with R Version 1, Copyright 2017 ManningPublications.

VIGNANA BHARATHI INSTITUTE OF TECHNOLOGY
(AUTONOMOUS)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

21HCS41T2: SOFT COMPUTING
(Professional Elective- III)

B.Tech IV Year I Sem (Honors) **L T P C**
3 - - 3

Course Objectives
- Familiarize with soft computing concepts
- Introduce and use the idea of fuzzy logic and use of heuristics based on human experience
- Familiarize the Neuro-Fuzzy modeling using Classification and Clustering techniques
- Learn the concepts of Genetic algorithm and its applications
- Acquire the knowledge of Rough Sets.

Course Outcomes

On completion of this course, the students will be able to:
- Identify the difference between Conventional Artificial Intelligence to Computational Intelligence.
- Understand fuzzy logic and reasoning to handle and solve engineering problems
- ApplytheClassificationandclusteringtechniquesonvariousapplications.
- Understand the advanced neural networks and its applications
- Perform various operations of genetic algorithms, Rough Sets.
- Comprehend various techniques to build model for various applications

UNIT-I

Introduction to Soft Computing: Evolutionary Computing, "Soft" computing versus "Hard" computing, Soft Computing Methods, Recent Trends in SoftComputing,CharacteristicsofSoftcomputing,ApplicationsofSoftComputing Techniques.

UNIT-II

Fuzzy Systems: Fuzzy Sets, Fuzzy Relations, Fuzzy Logic, Fuzzy Rule-Based Systems

UNIT-III

Fuzzy Decision Making, Particle Swarm Optimization

UNIT-IV

Genetic Algorithms: Basic Concepts, Basic Operators for Genetic Algorithms, Cross over and Mutation Properties, Genetic Algorithm Cycle, Fitness Function, Applications of Genetic Algorithm.

UNIT-V

Rough Sets, Rough Sets, Rule Induction, and Discernibility Matrix, Integration of Soft Computing Techniques.

TEXTBOOK:

1. Soft Computing–Advances and Applications an 2015 by B.K.Tripathy and J.Anuradha – Cengage Learning

REFERENCES:

1. N.Sivanandam & S.N.Deepa, “Principles of Soft Computing”, 2ndedition,Wiley India,2008.
2. DavidE. Goldberg, “Genetic Algorithms- In Search, optimization and Machine learning”, Pearson

Education.
3. J.S.R.Jang,C.T.SunandE.Mizutani,"Neuro-Fuzzy and SoftComputing",Pearson Education,2004.
4. G.J.Klir&B.Yuan, "FuzzySets & Fuzzy Logic",PHI,1995.
5. MelanieMitchell,"An Introduction to Genetic Algorithm",PHI,1998.TimothyJ.Ross,"FuzzyLogic with Engineering Applications", McGraw- HillInternationaleditions,1995.

VIGNANA BHARATHI INSTITUTE OF TECHNOLOGY
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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
21HCS41T3: ADVANCED ALGORITHMS
(Professional Elective- III)

B.Tech IV Year I Sem (Honors)

L	T	P	C
3	-	-	3

Pre-requisites:
- A course on "Computer Programming & Data Structures"
- A course on "Advanced Data Structures & Algorithms"

Course Objectives:
- Introduces the recurrence relations for analyzing the algorithms
- Introduces the graphs and their traversals.
- Describes major algorithmic techniques (divide-and-conquer, greedy, dynamic programming, Brute Force, Transform and Conquer approaches) and mention problems for which each technique is appropriate;
- Describes how to evaluate and compare different algorithms using worst-case, average-case and best-case analysis.

Course Outcomes:
- Ability to analyze the performance of algorithms
- Abilitytochooseappropriatedatastructuresandalgorithmdesignmethodsforaspecifiedapplication
- Abilitytounderstandhowthechoiceofdatastructuresandthealgorithmdesignmethodsimpactthe performance of programs.
- Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering.

UNIT-I

Introduction: Role of Algorithms in computing, Order Notation, Recurrences, Probabilistic Analysis and Randomized Algorithms. Sorting and Order Statistics: Heap sort, Quick sort and Sorting in Linear Time.

Advanced Design and Analysis Techniques: Dynamic Programming- Matrix chain Multiplication, Longest common Subsequence and optimal binary Search trees.

UNIT-II

Greedy Algorithms- Huffman Codes, Activity Selection Problem. Amortized Analysis.

Graph Algorithms: Topological Sorting, Minimum Spanning trees, Single Source Shortest Paths, Maximum Flow algorithms.

UNIT-III

Sorting Networks: Comparison Networks, Zero-one principle, bitonic Sorting Networks, Merging Network, and Sorting Network.

Matrix Operations- Strassen's Matrix Multiplication, Inverting matrices,
Solving system of linear Equations.

UNIT-IV

String Matching: Naive String Matching, Rabin-Karp algorithm, matching with finite Automata, Knuth-Morris-Pratt algorithm.

UNIT-V

NP-Completeness and Approximation Algorithms: Polynomial time, polynomial time verification, NP-Completeness and reducibility, NP-Complete problems. Approximation Algorithms- Vertex cover Problem, Travelling Salesperson problem.

TEXTBOOK:

1. Introduction to Algorithms, "T.H.Cormen, C.E.Leiserson, R.L.Rivest, and C.Stein" ThirdEdition,PHI.

REFERENCES:

1. Fundamentals Of Computer Algorithms, EllisHorowitz, Satraj Sahniand Rajasekharam, Galgotia publications pvt.Ltd.
2. Design and Analysis Algorithms-ParagHimanshuDave, Himanshu Bhalchandra Dave Publisher:Pearson.
3. Algorithm Design: Foundations, Analysis and Internet examples, M.T.Good rich and R.Tomassia, JohnWileyand sons.
4. Data structures and Algorithm Analysis in C++, Allen Weiss, Second edition, Pearson education.

VIGNANA BHARATHI INSTITUTE OF TECHNOLOGY
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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
21HCS41T4: CLOUD COMPUTING
(Professional Elective- III)

B.Tech IV Year I Sem (Honors) **L T P C**
3 - - 3

Pre-requisites:
- A course on "Computer Networks"
- A course on "Operating Systems"

Course Objectives:
- To explain the evolving computer model called cloud computing.
- To introduce the various levels of services that can be achieved by cloud.
- To describe the security aspects in cloud.
- The course provides a unified and fundamental view of the broad field of computer networks.
- To understand and extremely relevant world of Computer Net working is introduced in a top down Approach.

Course Outcomes:
- Ability to understand various service delivery models of a cloud computing architecture.
- Ability to understand the virtualization and cloud computing concepts.
- Able to understand cloud computing architecture and managing cloud infrastructure and its applications.
- Acquire knowledge on cloud service models.
- Acquire knowledge on cloud service providers.

UNIT-I
Computing Paradigms: High-Performance Computing, Parallel Computing, Distributed Computing, Cluster Computing, Grid Computing, Cloud Computing, Bio computing, Mobile Computing, Quantum Computing, Optical Computing, Nano Computing.

UNIT-II
Cloud Computing Fundamentals: Motivation for Cloud Computing, The Need for Cloud Computing, Defining CloudComputing, Definition of Cloud Computing, Cloud Computing Is a Service, Cloud Computing Is a Platform, Principles of Cloud computing, Five Essential Characteristics, and Four Cloud Deployment Models.

UNIT-III
Cloud Computing Architecture and Management: Cloud Architecture, Layer, Anatomy of the Cloud, Network Connectivity in Cloud Computing, Applications, on the Cloud, Managing the Cloud, Managing the Cloud Infrastructure Managing the Cloud Application, Migrating Application to Cloud, Phases of Cloud Migration Approaches for Cloud Migration.

UNIT-IV
Cloud Service Models: Infrastructure as a Service, Characteristics of IaaS. Suitability of IaaS, Pros and Cons of IaaS, Summary of IaaS Providers, Platform as a Service, Characteristicsof PaaS, Suitability of PaaS, Pros and Cons of PaaS, Summary of PaaS Providers, Software as a Service, Characteristics of SaaS, Suitability of SaaS, Pros and Cons of SaaS, Summary of SaaS Providers, Other Cloud Service Models.

UNIT-V
Cloud Service Providers: EMC, EMC IT, Captiva Cloud Toolkit, Google, Cloud Platform, Cloud Storage, Google Cloud Connect, Google Cloud Print, Google App Engine, Amazon Web Services,

Amazon Elastic Compute Cloud, Amazon Simple Storage Service, Amazon Simple Queue ,Service, Microsoft, Windows Azure, Microsoft Assessment and Planning Toolkit, SharePoint, IBM, Cloud Models, IBM Smart Cloud, SAP Labs, SAP HANA Cloud Platform, Virtualization Services Provided by SAP, Sales force, Sales Cloud, Service Cloud: Knowledge as a Service, Rack space, VMware, Manjrasoft, Aneka Platform.

TEXT BOOKS:

1. Essentials of cloud Computing: K. Chandrasekhran,CRC press, 2014 .

REFERENCES:

1. Cloud Computing: Principles and Paradigms by Rajkumar Buyya, James Broberg and Andrzej , M.Goscinski, Wiley, 2011.
2. Distributed and Cloud Computing, Kai Hwang, Geoffery C. Fox, Jack J. Dongarra, Elsevier, 2012.
3. Cloud Security and Privacy: An EnterprisePerspective on Risks and Compliance, Tim Mather, SubraKumaraswamy, ShahedLatif, O'Reilly, SPD,rp2011.

VIGNANA BHARATHI INSTITUTE OF TECHNOLOGY
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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
21HCS41T5: REAL TIME OPERATING SYSTEM
(Professional Elective - IV)

B.Tech IV Year I Sem (Honors)

L	T	P	C
3	-	-	3

Course Objectives:

- To develop an understanding of various Real time system applications
- To introduce the principles shared by many real-time operating systems
- To obtain a broad understanding of the technologies and applications
- To design embedded multi tasking application software
- To understand the architecture of real time operating systems

Course Outcomes:

- Ability to understand the fundamental concepts of real-time operating systems.
- Ability to understand the concepts of real time applications
- Ability to understand the concepts of pipes memory system
- Ability to understand the various real time operating systems
- Ability to understand the concept of thread synchronization

UNIT-I

INTRODUCTION:

Introduction to Operating System: Computer Hardware Organization, BIOS and Boot Process, Multi-threading concepts, Processes, Threads, Scheduling

UNIT-II

BASIC SOFREAL-TIME CONCEPTS:

Terminology: RTOS concepts and definitions, real-time design issues, examples, Hardware Considerations: logic states, CPU, memory, I/O, Architectures, RTOS building blocks, Real-Time Kernel

UNIT-III

PROCESS MANAGEMENT:

Concepts, scheduling, IPC, RPC, CPU Scheduling, scheduling criteria, scheduling algorithms Threads: Multi-threading models, threading issues, thread libraries, synchronization Mutex: creating, deleting, prioritizing mutex, mutex internals

UNIT-IV

INTER-PROCESS COMMUNICATION:

Messages, Buffers, mailboxes, queues, semaphores, deadlock, priority in version,

PIPES MEMORY MANAGEMENT:-

Process stack management, run-time buffer size, swapping, overlays, block/page management, replacement algorithms, real-time garbage collection

UNIT-V

CASE STUDIES:

Case study Linux POSIX system, RTLinux/RTAI, Windows system, Vxworks, uItron Kernel Design Issues: structure, process states, data structures, inter-task communication mechanism, Linux Scheduling

TEXTBOOKS:

1. J.JLabrosse,"MicroC/OS-II:TheReal–TimeKernel",Newnes,2002.
2. JaneW.S.Liu,"Real-timesystems",PrenticeHall,2000.

REFERENCES:

1. W.RichardStevens,"AdvancedProgrammingintheUNIX®Environment",2ndEdition,PearsonEducationIndia,2011.
2. PhilipsA.Laplante,"Real-TimeSystemDesignandAnalysis",3rdEdition,JohnWley&Sons,2004
3. DougAbbott,"LinuxforEmbeddedandReal-TimeApplications",Newnes,2nd Edition,2011.

21HCS41T6: AD-HOC & SENSOR NETWORKS

(Professional Elective - IV)

B.Tech IV Year I Sem (Honors) **L T P C**
3 - - 3

Prerequisites

- A course on "Computer Networks"
- A course on "Mobile Computing"

Course Objectives

- To understand the concepts of sensor networks
- To understand the MAC and transport protocols for ad hoc networks
- To understand the security of sensor networks
- To understand the applications of adhoc and sensor networks
- To Understand the transport layer and security issues possible in Ad hoc and Sensor networks

Course Outcomes

- Ability to understand the state-of-the-art research in the emerging subject of Ad Hoc and Wireless Sensor Networks
- Ability to solve the issues in real-time application development based on ASN.
- Ability to conduct further research in the domain of ASN
- Ability to understand the transport layer and security issues possible in Ad hoc and sensor networks.
- Acquire knowledge on upper layer issues of WSN.

UNIT - I

Introduction to Ad Hoc Networks - Characteristics of MANETs, Applications of MANETs and challenges of MANETs. Routing in MANETs - Criteria for classification, Taxonomy of MANET routing algorithms, Topology based routing algorithms-Proactive: DSDV; Reactive: DSR, AODV; Hybrid: ZRP; Position-based routing algorithms-Location Services-DREAM, Quorum-based; Forwarding Strategies: Greedy Packet, Restricted Directional Flooding-DREAM, LAR.

UNIT - II

Data Transmission - Broadcast Storm Problem, Rebroadcasting Schemes-Simple-flooding, Probability-based Methods, Area-based Methods, Neighbor Knowledge-based: SBA, Multipoint Relaying, AHBP. **Multicasting:** Tree-based: AMRIS, MAODV; Mesh-based: ODMRP, CAMP;Hybrid: AMRoute, MCEDAR.

UNIT - III

Geocasting: Data-transmission Oriented-LBM; Route Creation Oriented-GeoTORA, MGR.TCP over Ad Hoc TCP protocol overview, TCP and MANETs, Solutions for TCP over Ad hoc.

UNIT - IV

Basics of Wireless, Sensors and Lower Layer Issues: Applications, Classification of sensor networks, Architecture of sensor network, Physical layer, MAC layer, Link layer, Routing Layer.

UNIT - V

Upper Layer Issues of WSN: Transport layer, High-level application layer support, Adapting to the inherent dynamic nature of WSNs, Sensor Networks and mobile robots.

TEXT BOOKS:

1. Ad Hoc and Sensor Networks – Theory and Applications, Carlos Corderio Dharma P. Aggarwal, World Scientific Publications, March 2006, ISBN – 981–256–681–3.
2. Wireless Sensor Networks: An Information Processing Approach, Feng Zhao, Leonidas Guibas, Eseview Science, ISBN – 978-1-55860-914-3 (Morgan Kauffman).

Reference Books:

1. C. Siva Ram Murthy and B. S. Manoj, "Ad Hoc Wireless Networks Architectures and Protocols", Prentice
2. Hall, PTR, 2004.
3. Kazem Sohraby, Daniel Minoli, & Taieb Znati, "Wireless Sensor Networks-Technology, Protocols, and
4. Applications", John Wiley, 2007.
5. Carlos De Morais Cordeiro, Dharma Prakash Agrawal "Ad Hoc & Sensor Networks: Theory and
6. Applications", World Scientific Publishing Company, 2006.
7. Holger Karl, Andreas Willig "Protocols and Architecture for Wireless Sensor Networks" John Wiley and Sons, Ltd.

21HCS41T7: HIGH PERFORMANCE COMPUTING

(Professional Elective- IV)

B.Tech IV Year I Sem (Honors)

L	T	P	C
3	-	-	3

Prerequisites:

- Computer networks

Course Objectives

- Knowledge on parallel programming paradigms, HPC platforms with particular reference to Cluster system.
- Understand the means by which to measure, assess and analyse the performance of HPC applications.

Course Outcomes

- Understand the role of HPC in science and engineering.
- Use HPC platforms and parallel programming models.
- Able to measure, analyze and assess the performance of HPC applications and their supporting hardware.
- Able to administration, scheduling, code portability and data management in an HPC environment, with particular reference to Grid Computing.
- Analyze the suitability of different HPC solutions to common problems found in Computational Science.

UNIT I

Introduction: Characteristics and requirements, Review of Computational Complexity, Performance: metrics and measurements, Granularity and Partitioning, Locality: temporal/spatial/stream/kernel, Basic methods for parallel programming, Real-world case studies (drawn from multi scale, multi-discipline applications).

UNIT -II

High-End Computer Systems: Memory Hierarchies, Multi-core Processors: Homogeneous and Heterogeneous, Shared-memory Symmetric Multiprocessors, Vector Computers, Distributed Memory Computers, Supercomputers and Peta scale Systems, Application Accelerators / Reconfigurable Computing, Novel computers: Stream, multithreaded, and purpose-built.

UNIT -III

Parallel Algorithms: Parallel models: ideal and real frameworks, Basic Techniques: Balanced Trees, Pointer Jumping, Divide and Conquer, Partitioning, Regular Algorithms: Matrix operations and Linear Algebra, Irregular Algorithms: Lists, Trees, Graphs, Randomi.

UNIT -IV

Parallel Programming: Revealing concurrency in applications, Task and Functional Parallelism, Task Scheduling, Synchronization Methods, Parallel Primitives (collective operations), SPMD Programming (threads, OpenMP, MPI), I/O and File Systems, Parallel Matlabs (Parallel Matlab, Star-P, Matlab MPI), Partitioning Global Address Space (PGAS) languages (UPC, Titanium, Global Arrays

UNIT -V

Performance: Measuring performance, Identifying performance bottlenecks, restructuring applications for deep memory hierarchies, Partitioning applications for heterogeneous resources, using existing libraries, tools, and frameworks.

TEXT BOOKS:

1. Contemporary High Performance Computing by Jeffrey S. Vetter ,Released November 2017, Publisher(s): Chapman and Hall/CRC , ISBN: 9781466568358.

REFERENCES:

1. High Performance Computing by Charles Severance & Kevin Dowd, Copyright Year: 2010 , Last Update: 2021 ,Publisher: OpenStax CNX.

21HCS41T8: INFORMATION STORAGE MANAGEMENT

(Professional Elective- IV)

B.Tech IV Year I Sem (Honors)

L	T	P	C
3	-	-	3

Course Objectives

- To understand the basic components of Storage System Environment.
- To understand the Storage Area Network Characteristics and Components.
- To examine emerging technologies including IP-SAN.
- To describe the different back up and recovery to pologies and their role in providing disaster recovery and business continuity capabilities.
- To understand the local and remote replication technologies.

Course Outcomes

- To Understand the Concept of Information Storage and Data centre Environment..
- To understand about Data Protection.
- To Know and understand Intelligent Storage System.
- To understand Data centre Environment,DataProtection,FibreChannelSAN
- To Know the Backup and Archive Technologies.

UNITI :

STORAGESYSTEMS

Introduction to Information Storage and Management: Information Storage, Evolution of StorageTechnologyandArchitecture,DataCenterInfrastructure,KeyChallengesinManaging Information, Information Lifecycle. Storage System Environment: Components of the Host. RAID: Implementation of RAID, RAID Array Components, RAID Levels, RAID Comparison, RAID Impact on Disk Performance, Hot Spares. Intelligent Storage System: Components, Intelligent Storage Array.

UNITII :

STORAGENETWORKINGTECHNOLOGIES

Direct-AttachedStorageandIntroductiontoSCSI:TypesofDAS,DASBenefitsandLimitations, Disk Drive Interfaces, Introduction to Parallel SCSI, SCSI Command Model. Storage Area Networks: Fiber Channel, SAN Evolution, SAN Components, Fiber Channel Connectivity, Fiber Channel Ports, Fiber Channel Architecture, Zoning, Fiber Channel Login Types, Fiber Channel Topologies. Network Attached Storage: Benefits of NAS, NAS FileI/ComponentsofNAS,NASImplementations,NAS-Implementations,NASFileSharingProtocols,NAS I/O Operations.

UNITIII:

ADVANCEDSTORAGENETWORKINGANDVIRTUALIZATION

IP SAN: iSCSI, FCIP. Content-Addressed Storage: Fixed Content and Archives, Types of Archives, Features and Benefits of CAS, CAS Architecture, Object Storage and Retrieval in CAS,CAS Examples.StorageVirtualization:FormsofVirtualization,NIAStorageVirtualizationTaxonomy,StorageVirtualization Configurations, Storage Virtualization Challenges, Types of Storage Virtualization.

UNITIV:

BUSINESSCONTINUITY

Introduction to Business Continuity: Information Availability, BC Terminology, BC Planning Lifecycle, Failure Analysis, Business Impact Analysis, BC Technology Solutions. Backup and Recovery: Backup Purpose, Considerations, Granularity, Recovery Considerations, Backup Methods and Process, Backup and Restore Operations, Backup Topologies, Backup in NAS Environments, Backup Technologies.

UNITV:

REPLICATION

Local Replication: Source and Target, Uses of Local Replicas, Data Consistency, Local Replication Technologies, Restore and Restart Considerations, Creating Multiple Replicas, Management Interface. Remote Replication: Modes of Remote Replication and its Technologies, Network Infrastructure.

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TEXTBOOK:

1. EMC Corporation, Information Storage and Management, Wiley, India.

REFERENCES:

1. RobertSpalding,—StorageNetworks:TheCompleteReference—,TataMcGrawHill,Osborne,2003.
2. MarcFarley,—BuildingStorageNetworks‖,TataMcGrawHill,Osborne,2001.
3. Meeta Gupta, Storage Area Networks Fundamentals, Pearson Education Limited, 2002.

IV YEAR II SEM

VIGNANA BHARATHI INSTITUTE OF TECHNOLOGY
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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

21HCS42TP: TECHNICAL PAPER WRITING

B.Tech IV Year II Sem (Honors)

L	T	P	C
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GENERAL INSTRUCTIONS

1. Technical paper writing:

   a) The student shall take up a problem/topic of engineering branches (inter-disciplinary nature) and apply the knowledge which they acquired while pursuing their engineering branch. It is expected to analyse, design and develop an application for the identified problem and write a technical paper/document.

   Alternatively, the student i) shall identify a research topic, analyse the problem, carryout the experiments, write a technical paper and publish in /communicate for a Scopus indexed journal/any journal with decent reputation or ii) Demonstrate a talent/an idea/development of an innovative product.

   b) The evaluation shall be done by the same committee which is constituted for project evaluation, along with the final semester project work.

   c) The students should start exploration for the Technical Paper Writing immediately after the semester exams of III-II semester. Only the evaluation part shall be carried in IV-II semester.

(Professional Elective –V/VI)

B.Tech IV Year II Sem (Honors)

L	T	P	C
3	-	-	3

For the courses selected under MOOCS platform following guidelines may be followed:

a. Prior to registration of MOOCS courses, formal approval of the courses, by the University is essential. University before the issue of approval considers the parameters like the institute / agency which is offering the course, syllabus, credits, duration of the programme and mode of evaluation etc.

b. Minimum credits for a MOOCS course must be equal to or more than the credits specified in the Honors course structure provided by the University.

c. Only Pass-grade/marks or above shall be considered for inclusion of grades in the Honors grade memo.

d. Any expenses incurred for the MOOCS courses are to be met by the students only.

21HCS42T1: COMPUTER VISION

(Professional Elective – V/VI)

B.Tech IV Year II Sem (Honors)

L	T	P	C
3	-	-	3

Course objectives:

- To introduce students the fundamentals of image formation.
- To introduce students the major ideas, methods, and techniques of computer vision and pattern recognition.
- To develop an appreciation for various issues in the design of computer vision and object recognition systems.
- To provide the student with programming experience from implementing computer vision and object recognition applications.

Course Outcomes:

After completing the course you will be able to:

- Identify basic concepts, terminology, theories, models and methods in the field of computer vision,
- Describe known principles of human visual system,
- Describe basic methods of computer vision related to multi-scale representation, edge detection.
- Detection of other primitives, stereo, motion and object recognition,
- Suggest a design of a computer vision system for a specific problem

UNIT I

Image Formation Models: Monocular imaging system, Orthographic& Perspective Projection, Camera model and Camera calibration, Binocular imaging systems.

UNIT II

Image Processing and Feature Extraction: Image representations (continuous and discrete), Edge Detection.

UNIT III

Motion Estimation: Regularization theory, Optical computation, Stereo Vision, Motion estimation, Structure from motion.

UNIT IV

Shape Representation and Segmentation: Deformable curves and surfaces, Snakes and active contours, Level set representations, Fourier and wavelet descriptors, Medial representations, Multi resolution analysis.

UNIT V

Object recognition: Hough transforms and other simple object recognition methods, Shape correspondence and shape matching, Principal Component analysis, Shape priors for recognition.

TEXT BOOKS:

1. Computer Vision - A modern approach, by D. Forsyth and J. Ponce, Prentice Hall Robot Vision, by B. K. P. Horn, McGraw-Hill.

REFERENCE BOOKS:

1. Richard Szeliksy “Computer Vision: Algorithms and Applications” (http://szeliski.org/Book/)
2. Haralick& Shapiro, “Computer and Robot Vision”, Vol II
3. G_erardMedioni and Sing Bing Kang “Emerging topics in computer vision”
4. Emanuele Trucco and AllessandroVerri “Introductory Techniques for 3-D Computer Vision”, Prentice Hall, 1998.
5. Olivier Faugeras, “Three-Dimensional Computer Vision”, The MIT Press, 1993.

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

21HCS42T2: BLOCKCHAIN TECHNOLOGY
(Professional Elective –V/VI)

B.Tech IV Year II Sem (Honors)

L	T	P	C
3	-	-	3

Prerequisites
- Knowledge in security and applied cryptography;
- Knowledge in distributed databases

Course Objectives
- To Introduce block chain technology and Crypto currency

Course Outcomes
- Understand basics of Block Chain Technology and Crypto currency
- Get Exposure on Blockchain Environment and Digital Identity Verification
- Understand BlockChain Science
- Learn Types of Crypto currency
- Learn about research advances related to one of the most popular technological areas today.

UNIT- I
Introduction: Block chain or distributed trust, Protocol, Currency, Crypto currency, How a Crypto currency works, Crowd funding

UNIT- II
Extensibility of Block chain concepts, Digital Identity verification, Block chain Neutrality, Digital art, Block chain Environment

UNIT- III
Block chain Science: Grid coin, Folding coin, Block chain Genomics, Bit coin MOOCs

UNIT - IV
Currency, Token, Tokenizing, Campus coin, Coindrop as a strategy for Public adoption, Currency Multiplicity, Demurrage currency

UNIT - V
Technical challenges, Business model challenges, Scandals and Public perception, Government Regulations

TEXTBOOK:
1. Blockchain Blue print for Economy by Melanie Swan.

REFERENCES:
1. Blockchain Basics: A Non-Technical Introduction in 25 Steps 1st Edition, by Daniel Drescher.

VIGNANA BHARATHI INSTITUTE OF TECHNOLOGY
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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
21HCS42T3: INTERNET OF THINGS
(Professional Elective – V/VI)

B.Tech IV Year II Sem (Honors) **L T P C**
3 - - 3

Prerequisite:
- Computer Networks.

Course Objectives
- To introduce the terminology, technology and its applications
- To introduce the concept of M2M (machine to machine) with necessary protocols
- To introduce the Python Scripting Language which is used in many IoT devices
- To introduce the Raspberry PI platform, that is widely used in IoT applications
- To introduce the implementation of web-based services on IoT devices

Course Outcomes
- Interpret the impact and challenges posed by IoT networks leading to new architectural models.
- Compare and contrast the deployment of smart objects and the technologies to connect them to network.
- Appraise the role of IoT protocols for efficient network communication.
- Elaborate the need for Data Analytics and Security in IoT.
- Illustrate different sensor technologies for sensing real world entities and identify the applications of IoT in Industry.

UNIT - I
Introduction to Internet of Things –Definition and Characteristics of IoT, Physical Design of IoT – IoT Protocols, IoT communication models, IoT Communication APIs IoT enabled Technologies – Wireless Sensor Networks, Cloud Computing, Big data analytics, Communication protocols, Embedded Systems, IoT Levels and Templates Domain Specific IoTs – Home, City, Environment, Energy, Retail, Logistics, Agriculture, Industry, health and Lifestyle

UNIT - II
IoT and M2M – Software defined networks, network function virtualization, difference between SDN and NFV for IoT Basics of IoT System Management with NETCOZF, YANG- NETCONF, YANG, SNMP NETOPEER

UNIT - III
Introduction to Python - Language features of Python, Data types, data structures, Control of flow, functions, modules, packaging, file handling, data/time operations, classes, Exception handling Python packages - JSON, XML, HTTPLib, URLLib, SMTPLib

UNIT - IV
IoT Physical Devices and Endpoints - Introduction to Raspberry PI-Interfaces (serial, SPI, I2C)
Programming – Python program with Raspberry PI with focus of interfacing external gadgets, controlling output, reading input from pins.

UNIT - V
IoT Physical Servers and Cloud Offerings – Introduction to Cloud Storage models and communication

APIs Webserver – Web server for IoT, Cloud for IoT, Python web application framework Designing a RESTful web API

TEXT BOOKS:

1. Internet of Things - A Hands-on Approach, Arshdeep Bahga and Vijay Madisetti, Universities Press, 2015, ISBN: 9788173719547
2. Getting Started with Raspberry Pi, Matt Richardson & Shawn Wallace, O'Reilly (SPD), 2014, ISBN: 9789350239759

REFERENCES:

1. The Internet of Things in the Cloud: A Middleware Perspective - Honbo Zhou – CRC Press –2012
2. Architecting the Internet of Things - Dieter Uckelmann; Mark Harrison; Florian Michahelles-(Eds.) – Springer – 2011
3. Networks, Crowds, and Markets: Reasoning About a Highly Connected World - David Easley and Jon Kleinberg, Cambridge University Press - 2010
4. The Internet of Things: Applications to the Smart Grid and Building Automation by – Olivier Hersent, Omar Elloumi and David Boswarthick - Wiley -2012
5. Olivier Hersent, David Boswarthick, Omar Elloumi , "The Internet of Things – Key applications and Protocols", Wiley, 2012

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
21HCS42T4: SOFTWARE TESTING METHODOLOGIES
(Professional Elective-V/VI)

B.Tech IV Year II Sem (Honors) **L T P C**
3 - - 3

Prerequisites

- A course on "Software Engineering".

Course Objectives

- To provide knowledge of the concepts in software testing such as testing process, criteria, strategies, and methodologies.
- To develop skills in performing manual testing.
- To develop skills in software test automation and management using latest tools.
- To provide knowledge in taking decision of when to use automation testing and manual testing based on the context to be tested.

Course Outcomes

- Acquire knowledge on STLC phases and consequences of bugs.
- Acquire skills to perform various testing techniques.
- Acquire knowledge on logic based testing and regular expressions.
- Demonstrate the test planning and management.
- Ability to develop skills in software test automation and management using latest tools.

UNIT- I

Introduction: Purpose of testing, Dichotomies, model for testing, consequences of bugs, taxonomy of bugs, STLC (software testing life cycle) phases.

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

Integration Testing: Integration Testing as a Type of Testing, Integration Testing as a Phase of Testing, Scenario Testing, Defect Bash.

System and Acceptance Testing: Overview, Functional Versus Non-Functional, Functional System Testing & Non-Functional, Acceptance Testing.

Dataflow Testing:- Basics of data flow testing, strategies in data flow testing, application of dataflow testing.

Regression Testing: Introduction, Types, When to do Regression testing, how to do Regression Testing, Best Practices in Regression Testing.

UNIT- III

White Box Testing: Static Testing, Structural Testing, Challenges, **Black Box Testing, and Logic Based Testing:** Overview, decision tables, path expressions, kv charts, specifications.

Paths, Path products and Regular expressions: Path products & path expression, reduction procedure, applications, regular expressions & flow anomaly detection.

UNIT-IV

State, State Graphs and Transition testing: State graphs, good & bad state graphs, state testing, Testability tips, Automation Testing versus Manual Flow Testing.

Test Planning, Management, Execution and Reporting: Introduction, Planning, Management, Process, and Reporting, Best Practices.

UNIT - V

Software Test Automation: Terms used in Automation, Skills needed for Automation, What to Automate, Scope of Automation, Design and Architecture for Automation, Generic Requirements for Test Tools, Process Model for Automation, Selecting a Test Tool, Automation for Extreme Programming Model, Challenges.

Test Metrics and Measurements: Metrics & Measurements, Types, Project, Progress, Productivity, Release

TEXT BOOKS:

1. Software Testing techniques - BarisBeizer, Dreamtech, second edition.
2. Software Testing Tools – Dr.K.V.K.K.Prasad, Dreamtech.
3. Srinivasa Desikan & Gopalaswamy Ramesh, “Software Testing – Principles and Practices”, Pearson Education, 2007.

REFERENCES:

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.
6. “Software Testing – Effective Methods, Tools and Techniques”, RenuRajani, Pradeep Oak, TMK.
7. Effective methods of Software Testing, Perry, John Wiley.
8. Art of Software Testing – Meyers, John Wiley.

VIGNANA BHARATHI INSTITUTE OF TECHNOLOGY
(AUTONOMOUS)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

21HCS42T5: BIG DATA MANAGEMENT
(Professional Elective- V/VI)

B.Tech IV Year II Sem (Honors) **L T P C**
3 - - 3

Course Objectives:
- To introduce the concepts of Big Data Analytics.
- To introduce the concept of Big Data Architecture
- To introduce tools/algorithms that are available for a variety of analytics.
- To introduce the Database for Modern Web.

Course Outcomes:
- Know about sources of Big Data and Analyzing Tools.
- Map statistical methods to analyze huge data.
- Know the other frameworks in Distributed File Systems.
- Know to create cluster in Hadoop distributed file system.
- Apply Map Reduction in HDFS.

UNIT – I
INTRODUCTION TO BIG DATA: Introduction –distributed file system –Big Data and its importance, Four Vs, Drivers for Big data, Big data analytics, Big data applications. Algorithms using map reduce.

UNIT – II
INTRODUCTION TO HADOOP AND HADOOP ARCHITECTURE: Big Data – Apache Hadoop & Hadoop EcoSystem, Moving Data in and out of Hadoop –Understanding inputs and outputs of MapReduce - Data Serialization.

UNIT – III
HDFS, HIVE AND HIVEQL, HBASE HDFS: Overview, Installation and Shell, Java API; Hive Architecture and Installation, Comparison with Traditional Database, HiveQL, Querying Data, Sorting And Aggregating, Map Reduce Scripts, Joins & Sub queries, HBase concepts, Advanced Usage, Schema Design, Advance Indexing, PIG, Zookeeper , how it helps in monitoring a cluster, how to Build Applications with Zookeeper.

UNIT –IV
SPARK: Introduction to Data Analysis with Spark, Downloading Spark and Getting Started, Programming with RDDs, Machine Learning with MLlib. **NoSQL** What is it?, Where It is Used, Types of NoSQL databases, Why NoSQL?, Advantages of NoSQL, Use of NoSQL in Industry, SQL vs NoSQL, NewSQL.

UNIT –V
DATA BASE FOR THE MODERN WEB: Introduction to MongoDB key features, Core Server tools, MongoDB through the JavaScript's Shell, Creating and Querying through Indexes, Document-Oriented data, principles of schema design, Constructing queries on Databases, collections and Documents , MongoDB Query Language.

TEXT BOOKS:
1. Boris lublinsky, Kevin t. Smith, AlexeyYakubovich, "Professional Hadoop Solutions", Wiley, ISBN: 19788126551071, 2015.

2. Chris Eaton, Dirk derooset al. , "Understanding Big data", McGraw Hill, 2012.
3. BIG Data and Analytics , Sima Acharya, Subhashini Chhellappan, Willey
4. MongoDB in Action, Kyle Banker,Piter Bakkum , Shaun Verch, Dream tech Press
5. Tom White , "HADOOP: The definitive Guide", O Reilly 2012.
6. VigneshPrajapati, "Big Data Analytics with R and Hadoop", Packet Publishing 2013.http://www.bigdatauniversity.com/
7. Learning Spark: Lightning Fast Big Data Analysis Paperback by Holden Karau

REFERENCES:

1. Michael Minelli, Michele Chambers, Ambiga Dhiraj, JimStogdill, "BigData BigAnalytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses", 1stEdition,Wiley Publications,2013.
2. Chris Eaton, Dirk DeRoos, Tom Deutsch, George Lapis, Paul Zikopoulos, "Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data", McGrawHill Publishing, 2012 3. PeteWarden, "Big Data Glossary", O'Reilly, 2011..

21HCS42T6: NATURAL LANGUAGE PROCESSING

(Professional Elective –V/VI)

B.Tech IV Year II Sem (Honors)

L	T	P	C
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Prerequisites:

- Data structures, finite automata and probability theory

Course Objectives

- Introduce to some of the problems and solutions of NLP and their relation to linguistics and statistics.

Course Outcomes

- Show sensitivity to linguistic phenomena and an ability to model them with formal grammars.
- Understand and carry out proper experimental methodology for training and evaluating empirical NLP systems
- Able to manipulate probabilities, construct statistical models over strings and trees, and estimate parameters using supervised and unsupervised training methods.
- Able to design, implement, and analyze NLP algorithms
- Able to design different language modeling Techniques.

UNIT – I

Finding the Structure of Words: Words and Their Components, Issues and Challenges, Morphological Models.

Finding the Structure of Documents: Introduction, Methods, Complexity of the Approaches, and Performances of the Approaches.

UNIT - II

Syntax Analysis: Parsing Natural Language, Tree banks: A Data-Driven Approach to Syntax, Representation of Syntactic Structure, Parsing Algorithms, Models for Ambiguity Resolution in Parsing, Multilingual Issues.

UNIT - III

Semantic Parsing: Introduction, Semantic Interpretation, System Paradigms, Word Sense Systems, Software.

UNIT - IV

Predicate-Argument Structure, Meaning Representation Systems, Software.

UNIT - V

Discourse Processing: Cohesion, Reference Resolution, Discourse Cohesion and Structure

Language Modeling: Introduction, N-Gram Models, Language Model Evaluation, Parameter Estimation, Language Model Adaptation, Types of Language Models, Language-Specific Modeling Problems, Multilingual and Cross lingual Language Modeling.

TEXT BOOKS:

1. Multilingual natural Language Processing Applications: From Theory toPractice– Daniel M. Bikel and Imed Zitouni, PearsonPublication.

2. Natural Language Processing and Information Retrieval: Tanvier Siddiqui, U.S.Tiwary

REFERENCES:

1. Speech and Natural Language Processing - Daniel Jurafsky & James H Martin, Pearson Publications.

21HCS42T7: ROBOTIC PROCESS AUTOMATION

(Professional Elective- V/VI)

B.Tech IV Year II Sem (Honors)

L	T	P	C
3	-	-	3

Prerequisites:

- Programming Concepts Basics ,Understanding the application,
- Basic Web Concepts, Protocols, Email Clients, Data Structures

Course Objectives

- To understand the Basics of Robotic Process Automation
- Identify the intensity of Design Robotic Process Automation
- To comprehend the installation process of RPA Tools
- To understand the control structure to design RPA Application
- To know the way of interaction of Robotic Process Automation with external Applications
- To understand the Exception Handling Mechanism in RPA

Course Outcomes

- knowledge on Robotic Process Automation
- ability to compare RPA with Non Automation process
- Skills to Design RPA with Internal interactions
- Skills to Design RPA with External Application interaction
- Knowledge on implement RPA using Exception Handling mechanism

UNIT - I

Processes, Software Design, SDL C: Programming Concepts Basics – 2 : Scripting, .Net Framework, .Net ,Fundamentals, Control structures and functions, XML, HTML, CSS, Varibles & Arguments.

RPA Basics: History of Automation, What is RPA,RPA vs Automation, Processes & Flowcharts, Programming Constructs in RPA, What Processes can be Automated, Types of Bots, Workloads, which can be automated.

UNIT - II

RPA Advanced Concepts: Standardization of processes, RPA Development methodologies, Difference from SDLC, Robotic control flow architecture, RPA business case, RPA Team. Process Design Document/Solution Design Document, Industries best suited for RPA, Risks, & Challenges with RPA, RPA and emerging ecosystem.

Installation: Installing Studio community edition, The User Interface, Keyboard Shortcuts, About Updating, About Automation Projects, Introduction to Automation Debugging, Managing Activation Packages, Reusing Automations Library, Installing the Chrome Extension, Installing the Firefox Extension, Connecting your project to a source control system, Activities Guide.

Variables : Managing Variables, Naming Best Practices, The Variables Panel, Generic Value Variables, Text Variables, True or False Variables, Number Variables, Array Variables ,Date and Time Variables, Data Table Variables, Managing Arguments, Naming Best Practices, The Arguments Panel, Using Arguments, About Imported Namespaces, Importing New Namespaces.

UNIT - III

Control Flow: Control Flow Introduction, If Else Statements, Loops, Advanced Control Flow, Sequences, Flowcharts, About Control Flow, Control Flow Activities, The Assign Activity, The Delay Activity, The Do While Activity, The If Activity, The Switch Activity, The While Activity, The For Each Activity, The Break Activity.

Data Manipulation :Data Manipulation Introduction, Scalar variables, collections and Tables, Text Manipulation, Data Manipulation, Gathering and Assembling Data.

Recording and Advanced UI Interaction :Recording Introduction, Basic and Desktop Recording, Web Recording, Input / Output Methods, Screen Scraping, Data Scraping, Scraping advanced techniques.

Selectors :Selectors, Defining and Assessing Selectors, Customization, Debugging, Dynamic Selectors, Partial Selectors, RPA Challenge.

UNIT- IV

Advanced Automation concepts and techniques: Image, Text & Advanced Citrix Automation :Introduction to Image & Text , Automation, Image based automation, Keyboard based automation, Information Retrieval, Advanced Citrix Automation challenges, Best Practices, Using tab for Images, Starting Apps.

Excel Data Tables & PDF : Data Tables in RPA, Excel and Data Table basics, Data Manipulation in excel, Extracting Data from PDF, Extracting a single piece of data, Anchors, Using anchors in PDF.

Email Automation :Email Automation, Incoming Email automation, Sending Email automation.

UNIT- V

Exceptional Handling & Best Practice : Debugging and Exception Handling : Debugging Tools, Strategies for solving issues, Catching errors.

Introduction to Orchestrator Orchestrator: Tenants, Authentication, Users, Roles, Robots, Environments, Queues & Transactions, Schedules.

Emerging and Future Trends in IT:Emerging and Future Trends in IT : Artificial Intelligence, Machine Learning, Agent awareness, Natural Language Processing, Computer Vision.

Text Books:

1. Learning Robotic Process Automation by Alok Mani Tripathi, Published by Packt Publishing Ltd.
2. Robotic Process Automation Succinctly By Ed Freitas Foreword by Daniel Jebara
3. Robotic Process Automation by Nividous
4. Robotic Process Automation NICE Special Edition by NICE RPA team with Steve Kaelble, Published by: John Wiley & Sons, Ltd., The Atrium, Southern Gate.

21HCS42T8: SECURITY ANALYSIS

(Professional Elective –V/VI)

B.Tech IV Year II Sem (Honors)

L	T	P	C
3	-	-	3

Prerequisites:

- Should have basic knowledge of computer networks and information security.

Course Objectives:

- To introduce the information security terminology, technology and its applications
- To introduce data leakage threats and its solutions
- To give guidelines for implementing security policies in the organization
- To make familiar with the roles and responsibilities in security domain and information security vulnerabilities and threats

Course Outcomes:

- Able to identify various security attacks and issues
- Able to classify types of data leakage threats and prevention techniques.
- Able to list the information security policies and procedures
- Able to differentiate various information security management roles and responsibilities
- Able to identify various threats, vulnerabilities and appropriate vulnerability management and assessment solutions

UNIT-I

Information Security Management: Information Security Overview, Threats and Attack Vectors, Types of Attacks, Common Vulnerabilities, and Exposures (CVE), Security Attacks, Fundamentals of Information Security, Computer Security Concerns, Information Security Measures etc.

UNIT-II

Fundamentals of Information Security: Key Elements of Networks, Logical Elements of Network, Critical Information Characteristics, Information States etc.

Data Leakage: What is Data Leakage and statistics, Data Leakage Threats, Reducing the Risk of Data Loss, Key Performance Indicators (KPI), Database Security etc.

UNIT-III

Information Security Policies, Procedures, and Audits: Information Security Policies necessity-key elements & characteristics, Security Policy Implementation, Configuration, Security Standards-Guidelines & Frameworks etc.

UNIT-IV

Information Security Management – Roles and Responsibilities: Security Roles & Responsibilities, Accountability, Roles, and Responsibilities of Information Security Management, team-responding to emergency situation-risk analysis process etc.

UNIT-V

Information Security Vulnerabilities-Threats and vulnerabilities, human and computer based social engineering, social media countermeasures, vulnerability management-vulnerability scanning, testing, threat management, remediation etc. Vulnerability assessment, classification, vulnerability assessment phases, characteristics of a good vulnerability assessment solutions, vulnerability assessment reports-tools, information security risk assessment, risk treatment, residual risk, risk

acceptance, risk management feedback Loops etc.

TEXT BOOKS:

1. Information Security Management – A student's Hand Book – NASCOMM
2. Management of Information Security by Michael E. Whitman and Herbert J. Mattord
3. Assessing Information Security (strategies, tactics, logic and framework) by A Vladimirov, K.Gavrilenko, and A.Michajlowski.

REFERENCES:

1. Information Security Management Handbook, Fourth Edition, Volume I-TIPTON HAROLD F.
2. http://www.iso.org/iso/home/standards/management-standards/iso27001.htm2
3. http://csrc.nist.gov/publications/nistpubs/800-55-Rev1/SP800-55-rev1.pdf
4. CISSP (ISC)2 Certified Information Systems Security Professional Official Study Guide Paperback – Import, 8 Oct 2015 by James M. Stewart (Author), Mikehapple(Author), Darril Gibson (Author)
5. The Art of Computer Virus Research and Defense by Peter Szor.

(Professional Elective –V/VI)

For the courses selected under MOOCS platform following guidelines may be followed:

e. Prior to registration of MOOCS courses, formal approval of the courses, by the University is essential. University before the issue of approval considers the parameters like the institute / agency which is offering the course, syllabus, credits, duration of the programme and mode of evaluation etc.

f. Minimum credits for a MOOCS course must be equal to or more than the credits specified in the Honors course structure provided by the University.

g. Only Pass-grade/marks or above shall be considered for inclusion of grades in the Honors grade memo.

h. Any expenses incurred for the MOOCS courses are to be met by the students only.