



TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

AN AUTONOMOUS INSTITUTION

Accredited by NBA and NAAC with 'A+' Grade.

(Sponsored by TKR Educational Society, Approved by AICTE, Affiliated to JNTU H)

Medbowli, Meerpet, Balapur, Hyderabad, Telangana – 500 097

Phone: 9100377790, email: info@tkrcet.ac.in, web site: www.tkrct.ac.in



DEPARTMENT OF INFORMATION TECHNOLOGY

R22 B.Tech. IT Syllabus

SEMESTER VII

S.No.	Course Classification	Course Code	Name of the subject	L	T	P	C	I	E	Total
1	PC	D67PC23	Software Engineering	3	0	0	3	40	60	100
2	PE	D67PE4	Professional Elective -IV	3	0	0	3	40	60	100
3	PE	D67PE5	Professional Elective -V	3	0	0	3	40	60	100
4	OE	D67OE3	Open Elective - III	3	0	0	3	40	60	100
5	PC	D67PC24	Software Engineering Lab	0	0	2	1	40	60	100
6	PW	DS7PW1	Project Stage - I	0	0	14	7	40	60	100
TOTAL				12	0	16	20	240	360	600

SEMESTER VIII

S.No.	Course Classification	Course Code	Name of the subject	L	T	P	C	I	E	Total
1	PC	D68PC25	Deep Learning	3	0	0	3	40	60	100
2	PC	D68PC26	Cryptography and Network Security	3	0	0	3	40	60	100
3	PE	D68PE6	Professional Elective – VI	3	0	0	3	40	60	100
4	OE	D68OE4	Open Elective – IV	3	0	0	3	40	60	100
5	PW	D68PE2	Project Stage – II	0	0	16	8	40	60	100
TOTAL				11	0	18	20	200	300	500

L-Lecture hours per week; T-Tutorial hours per week; P-Practical hours per week; I-Internal Marks; E-External Marks; S-Satisfactory



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D67PC23 - SOFTWARE ENGINEERING

B.Tech. IV Year VII Sem.

L	T	P	C
3	0	0	3

Course Objectives

- The aim of the course is to provide an understanding of the working knowledge of the techniques for estimation, design, testing and quality management of large software development projects.

Course Outcomes Upon completion of course, the student will be able to

- Selects software process model based on understanding requirements fundamentals.L3
- Implements requirements engineering process for application development effectively.L3
- Constructs application architecture using UML diagrams for effective design. L3
- Executes software testing strategies, measures product metrics for evaluation. L3
- Utilizes risk management for analysis, assesses software quality efficiently. L3

UNIT - I

Introduction to Software Engineering: The evolving role of software, changing nature of software, software myths. A Generic view of process: Software engineering- a layered technology, a process framework, the capability maturity model integration (CMMI). **Process models:** The waterfall model, Spiral model and Agile methodology

UNIT - II

Software Requirements: Functional and non-functional requirements, user requirements, system requirements, interface specification, the software requirements document. **Requirements engineering process:** Feasibility studies, requirements elicitation and analysis, requirements validation, requirements management.

UNIT – III

Design Engineering: Design process and design quality, design concepts, the design model.

Creating an architectural design: software architecture, data design, architectural styles and patterns, architectural design. **Basic Structural and Behavioral modeling:** Conceptual Model of UML, Class diagrams, Interaction diagrams, use case diagrams, Activity diagrams, state chart diagrams, component diagrams.



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R22 B.Tech. IT Syllabus

UNIT - IV

Testing Strategies: A strategic approach to software testing, test strategies for conventional software, black-box and white-box testing, validation testing, system testing, the art of debugging. **Metrics for Process and Products:** Software measurement, metrics for software quality.

UNIT - V

Risk management: Reactive Vs proactive risk strategies, software risks, risk identification, risk projection, risk refinement, RMMM. **Quality Management:** Quality concepts, software quality assurance, software reviews, formal technical reviews, statistical software quality assurance, software reliability, the ISO 9000 quality standards.

TEXT BOOKS:

1. Software Engineering, A practitioner's Approach- Roger S. Pressman, 6th edition, McGraw Hill International Edition.
2. The unified modeling language user guide Grady Booch, James Rumbaugh, Ivar Jacobson, Pearson Education.

REFERENCE BOOKS:

1. Software Engineering- Sommerville, 7th edition, Pearson Education.
2. Software Engineering, an Engineering approach- James F. Peters, Witold Pedrycz, John Wiley.
3. Software Engineering principles and practice- Waman S Jawadekar, The McGraw-Hill Companies.
4. Fundamentals of object-oriented design using UML Meiler page-Jones: Pearson Education.



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R22 B.Tech. IT Syllabus

D67PE4A - HUMAN COMPUTER INTERACTION PROFESSIONAL ELECTIVE - IV

L	T	P	C
3	0	0	3

B.Tech. IV Year VII Sem.

Course Objectives:

To gain an overview of Human-Computer Interaction (HCI)

Course Outcomes: Upon completion of the course the student will be able to

1. Construct effective user interfaces by selecting principles and historical insights. L3
2. Construct user-centric interfaces optimizing human-computer interaction for diverse contexts. L3
3. Select optimal navigation schemes and device interfaces for Windows environments.L3
4. Develop skills in HCI principles, prototyping, evaluation, and multimodal interaction.L3
5. Construct cognitive models for diverse design focuses in human-computer interaction.L3

UNIT - I

Introduction: Importance of user Interface – definition, importance of good design. Benefits of good design, A brief history of Screen design. The graphical user interface – popularity of graphics, the concept of direct manipulation, graphical system, Characteristics, Web user – Interface popularity, characteristics- Principles of user interface.

UNIT - II

Design process – Human interaction with computers, importance of human characteristics, human consideration, Human interaction speeds, understanding business junctions. Screen Designing: Design goals – Screen planning and purpose, organizing screen elements, ordering of screen data and content – screen navigation and flow – Visually pleasing composition – amount of information – focus and emphasis – presentation information simply and meaningfully – information retrieval on web – statistical graphics – Technological consideration in interface design.

UNIT- III

Windows – New and Navigation schemes selection of window, selection of devices based and screenbased controls. Components – text and messages, Icons and increases – Multimedia, colors, uses problems, choosing colors.



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R22 B.Tech. IT Syllabus

UNIT- IV

HCI in the software process- The software life cycle, Usability engineering, Iterative design and prototyping, Design Focus: Prototyping in practice, Design rationale, Design rules, Principles to support usability Standards, Golden rules and heuristics, HCI patterns, Evaluation techniques, Goals of evaluation, Evaluation through expert analysis, Evaluation through user participation, Choosing an evaluation method, Universal design, Universal design principles Multimodal interaction

UNIT- V

Cognitive models Goal and task hierarchies Design Focus: GOMS saves money, Linguistic models, The challenge of display-based systems, Physical and device models, Cognitive architectures, Ubiquitous computing and augmented realities, Ubiquitous computing applications research, Design Focus: Ambient Wood – augmenting the physical, Virtual and augmented reality, Design Focus: Shared experience Design Focus: Applications of augmented reality Information and data visualization

TEXT BOOKS:

1. The essential guide to user interface design, Wilbert O Galitz, Wiley Dream Tech.
2. Human – Computer Interaction. Alan Dix, Janet Finckay, Gregory's, Abowd, Russell Beal, Pearson Education.

REFERENCE BOOKS:

1. Designing the user interface. 3rd Edition Ben Shneidermann, Pearson Education Asia.
2. Interaction Design Prece, Rogers, Sharps. Wiley Dreamtech.
3. User Interface Design, Soren Lauesen, Pearson Education.
4. Human –Computer Interaction, D. R. Olsen, Cengage Learning.
5. Human –Computer Interaction, Smith - Atakan, Cengage Learning.



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R22 B.Tech. IT Syllabus

D67PE4B - ARTIFICIAL INTELLIGENCE

PROFESSIONAL ELECTIVE - IV

L	T	P	C
3	0	0	3

B.Tech. IV Year VII Sem.

Course Objectives:

To understand the concepts of state space representation, exhaustive search, heuristic search together with the time and space complexities.

Course Outcomes: Upon completion of the course the student will be able to

1. Develop proficiency in various AI problem-solving techniques and search strategies.L3
2. Identify optimal solutions using adversarial search and propositional logic. L3
3. Experiment with First-Order Logic for knowledge representation and inference. L3
4. Develop proficiency in knowledge representation and classical planning algorithms.L3
5. Experiment with probabilistic reasoning and uncertainty management in diverse scenarios. L3

UNIT - I

Introduction to AI, Intelligent Agents, problem-Solving Agents, Searching for Solutions, Uninformed Search Strategies: Breadth-first search, Uniform cost search, Depth-first search, Iterative deepening Depth-first search, Bidirectional search, Informed (Heuristic) Search Strategies: Greedy best-first search, A* search, Heuristic Functions, Beyond Classical Search: Hill-climbing search, Simulated annealing search, Local Search in Continuous Spaces

UNIT - II

Problem Solving by Search-II and Propositional Logic Adversarial Search: Games, Optimal Decisions in Games, Alpha-Beta Pruning, Imperfect Real-Time Decisions. Constraint Satisfaction Problems: Defining Constraint Satisfaction Problems, Constraint Propagation, Backtracking Search for CSPs, Local Search for CSPs, The Structure of Problems. Propositional Logic: Knowledge-Based Agents, The Wumpus World, Logic, Propositional Logic, Propositional Theorem Proving: Inference and proofs, Proof by resolution, Horn clauses and definite clauses, Forward and backward chaining, Effective Propositional Model Checking, Agents Based on Propositional Logic.

UNIT - III

Logic and Knowledge Representation First-Order Logic: Representation, Syntax and Semantics of First-Order Logic, Using First-Order Logic, Knowledge Engineering in First-Order Logic. Inference in First-Order Logic: Propositional vs. First-Order Inference, Unification and Lifting,



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R22 B.Tech. IT Syllabus

Forward Chaining, Backward Chaining, Resolution.

UNIT - IV

Knowledge Representation: Ontological Engineering, Categories and Objects, Events. Mental Events and Mental Objects, Reasoning Systems for Categories, Reasoning with Default Information. Classical Planning: Definition of Classical Planning, Algorithms for Planning with State-Space Search, Planning Graphs, other Classical Planning Approaches, Analysis of Planning approaches.

UNIT - V

Uncertain knowledge and Learning Uncertainty: Acting under Uncertainty, Basic Probability Notation, Inference Using Full Joint Distributions, Independence, Bayes' Rule and Its Use Probabilistic Reasoning: Representing Knowledge in an Uncertain Domain, The Semantics of Bayesian Networks, Efficient Representation of Conditional Distributions, Approximate Inference in Bayesian Networks, Relational and First-Order Probability, Other Approaches to Uncertain Reasoning; Dempster-Shafer theory.

TEXT BOOK:

1. Artificial Intelligence: A Modern Approach, Third Edition, Stuart Russell and Peter Norvig, Pearson Education.

REFERENCE BOOKS:

1. Artificial Intelligence, 3rd Edn, E. Rich and K. Knight (TMH)
2. Artificial Intelligence, 3rd Edn., Patrick Henry Winston, Pearson Education.
3. Artificial Intelligence, Shivani Goel, Pearson Education.
4. Artificial Intelligence and Expert systems – Patterson, Pearson Education



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R22 B.Tech. IT Syllabus

D67PE4C - AD-HOC & SENSOR NETWORKS

PROFESSIONAL ELECTIVE - IV

L	T	P	C
3	0	0	3

B.Tech. IV Year VII Sem.

Course Objectives

1. To understand the challenges of routing in ad-hoc and sensor networks, various broadcast, mutlicast and geocasting protocols in ad hoc and sensor networks and basics of Wireless sensors, and Lower Layer Issues and Upper Layer Issues of WSN

Course Outcomes: Upon completion of the course the student will be able to

1. Identify and classify MANET routing algorithms, analyze their characteristics. L3
2. Experiment with various data transmission strategies to mitigate broadcast storms.L3
3. Construct efficient geocaching protocols for data transmission in MANETs. L3
4. Develop proficiency in designing and implementing wireless sensor network layers.L3
5. Develop strategies to address upper layer issues in WSNs. L3

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, WRP; Reactive: DSR, AODV, TORA; Hybrid: ZRP; Position- based routing algorithms Location Services-DREAM, Quorum-based, GLS; Forwarding Strategies, Greedy Packet, Restricted Directional Flooding-DREAM, LAR; Other routing algorithms-QoS Routing, CEDAR.

UNIT – II

Data Transmission Broadcast Storm Problem, Rebroadcasting Schemes-Simple-flooding, Probability-based Methods, Area based Methods, Neighbour 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-GeoTOR A, 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.



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R22 B.Tech. IT Syllabus

UNIT - V

Upper Layer Issues of WSN Transport layer, High-level application layer support, Adapting to the inherent dynamic nature of WSNs.

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, Elsevier Science, ISBN – 978-1-55860-914-3 (Morgan Kaufman)

REFERENCE BOOKS:

1. C. Siva Ram Murthy, B.S. Manoj Ad Hoc Wireless Networks: Architectures and Protocols.
2. Taieb Znati Kazem Sohraby, Daniel Minoli, Wireless Sensor Networks: Technology, Protocols and Applications, Wiley.



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DEPARTMENT OF INFORMATION TECHNOLOGY

R22 B.Tech. IT Syllabus

D67PE5A - BLOCKCHAIN TECHNOLOGY PROFESSIONAL ELECTIVE - V

L T P C
3 0 0 3

B.Tech. IV Year VII Sem.

Course Objectives:

To learn the fundamentals of Blockchain and various types of block chain and mechanisms. public block chain system, Private block chain system and consortium blockchain.

Course Outcomes: Upon completion of the course the student will be able to

1. Make use of consensus mechanism to understand decentralization, distribution process and gain insights on blockchain protocols.. L3
2. Implement smart contracts phenomenon to demonstrate public block chain system .L3
3. Develop private, public and hybrid blockchain systems by analysing the ecommerce site as an example.L3
4. Apply the principle of security in blockchain phenomenon and analyze the security measures in the domains of banking and finance, education, health care, real-estate, supplychain .L3
5. Analyze the concepts of block chain using case studies in Retail marketing, banking and financial services, health care and energy utilities. .L4

UNIT-I

Fundamentals of Blockchain: Introduction, Origin of Blockchain, Blockchain Solution, Components of Blockchain, Block in a Blockchain, The Technology and the Future. Blockchain Types and Consensus Mechanism: Introduction, Decentralization and Distribution, Types of Blockchain, Consensus Protocol. Cryptocurrency – Bitcoin, Altcoin and Token: Introduction, Bitcoin and the Cryptocurrency, Cryptocurrency Basics, Types of Cryptocurrencies, Cryptocurrency Usage.

UNIT-II

Public Blockchain System: Introduction, Public Blockchain, Popular Public Blockchains, The Bitcoin Blockchain, Ethereum Blockchain. Smart Contracts: Introduction, Smart Contract, Characteristics of a Smart Contract, Types of Smart Contracts, Types of Oracles, Smart Contracts in Ethereum, Smart Contracts in Industry.



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R22 B.Tech. IT Syllabus

UNIT-III

Private Blockchain System: Introduction, Key Characteristics of Private Blockchain, Need of Private Blockchain, Private Blockchain Examples, Private Blockchain and Open Source, E-commerce Site Example, Various Commands (Instructions) in E-commerce Blockchain, Smart Contract in Private Environment, State Machine, Different Algorithms of Permissioned Blockchain, Byzantine Fault, Multichain Consortium Blockchain: Introduction, Key Characteristics of Consortium Blockchain, Need of Consortium Blockchain, Hyperledger Platform, Overview of Ripple, Overview of Corda. Initial Coin Offering: Introduction, Blockchain Fundraising Methods, Launching an ICO, Investing in an ICO, Pros and Cons of Initial Coin Offering, Successful Initial Coin Offerings, Evolution of ICO, ICO Platforms.

UNIT-IV

Security in Blockchain: Introduction, Security Aspects in Bitcoin, Security and Privacy Challenges of Blockchain in General, Performance and Scalability, Identity Management and Authentication, Regulatory Compliance and Assurance, Safeguarding Blockchain Smart Contract (DApp), Security Aspects in Hyperledger Fabric. Applications of Blockchain: Introduction, Blockchain in Banking and Finance, Blockchain in Education, Blockchain in Energy, Blockchain in Healthcare, Blockchain in Real-estate, Blockchain In Supply Chain, The Blockchain and IoT. Limitations and Challenges of Blockchain.

UNIT-V

Blockchain Case Studies: Case Study 1 – Retail, Case Study 2 – Banking and Financial Services, Case Study 3 – Healthcare, Case Study 4 – Energy and Utilities. Blockchain Platform using Python: Introduction, Learn How to Use Python Online Editor, Basic Programming Using Python, Python Packages for Blockchain. Blockchain platform using Hyperledger Fabric: Introduction, Components of Hyper ledger Fabric Network, Chain codes from Developer.ibm.com, Blockchain Application Using Fabric Java SDK.

TEXT BOOK:

1. “Blockchain Technology”, Chandramouli Subramanian, Asha A. George, Abhilasj K A and Meena Karthikeyan, Universities Press.

REFERENCE BOOKS:

1. Michael Juntao Yuan, Building Blockchain Apps, Pearson, India.
2. Blockchain Blueprint for Economy, Melanie Swan, SPD O'reilly.
3. Blockchain for Business, Jai Singh Arun, Jerry Cuomo, Nitin Gaur, Pearson.



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DEPARTMENT OF INFORMATION TECHNOLOGY

R22 B.Tech. IT Syllabus

D67PE5B - BIG DATA TECHNOLOGIES PROFESSIONAL ELECTIVE - V

L	T	P	C
3	0	0	3

B.Tech. IV Year VII Sem.

Course Objectives

- The purpose of this course is to provide the students with knowledge of Big data Analytics principles and techniques.

Courses Outcomes: Upon completion of the course the student will be able to

- Identify components and technologies, and build a foundational understanding of Big Data. L3
- Select and apply Hadoop ecosystem components for big data processing. L3
- Construct complex data operations using Hive and Pig in Hadoop. L3
- Construct workflows using Oozie; Develop NoSQL data management strategies effectively. L3
- Develop expertise in Zookeeper installation, group membership, and application integration. L3

UNIT - I

Getting an Overview of Big Data

Big Data, History of Data Management – Evolution of Big Data, Structuring Big Data, Elements of Big Data, Big Data Analytics, Careers in Big Data, Future of Big. **Data Technologies for Handling Big Data** Distributed and Parallel Computing for Big Data, Introducing Hadoop, Cloud Computing and Big Data, In-Memory Computing Technology for Big Data.

UNIT - II

Understanding Hadoop Ecosystem Hadoop Ecosystem, Hadoop Distributed File System, MapReduce, Hadoop YARN, Hbase, Hive, Pig and Pig Latin, Sqoop, ZooKeeper, Flume, Oozie
Understanding MapReduce Fundamentals and HBase The MapReduce Framework, Techniques to Optimize MapReduce Jobs, Uses of MapReduce, Role of HBase in Big Data Processing

UNIT - III

Exploring Hive Introducing Hive, Getting Started with Hive, Data Types in Hive, Built-In Functions in Hive, Hive DDL, Data Manipulation in Hive, Data Retrieval Queries, Using JOINS in Hive **Analyzing Data with Pig** Introducing Pig, Running Pig, Getting Started with Pig Latin, Working with Operators in Pig, Working with Functions in Pig

UNIT - IV



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Using Oozie

Introducing Oozie, Installing and Configuring Oozie, Understanding the Oozie Workflow, Oozie Coordinator, Oozie Bundle, Oozie Parameterization with EL, Oozie Job Execution Model, Accessing Oozie, Oozie SLA. **NoSQL Data Management-** Introduction to NoSQL, Aggregate Data Models, Key Value Data Model, Document Databases, Relationships, Graph Databases, Schema-Less Databases, Materialized Views, Distribution Models, Sharding, MapReduce Partitioning and Combining, Composing MapReduce Calculations

UNIT - V

ZooKeeper: Installing and Running ZooKeeper, An Example, Group Membership in ZooKeeper, Creating the Group, Joining a Group, Listing Members in a Group, The ZooKeeper Service, Data Model, Operations, Implementation, Consistency, Sessions, Building Applications with ZooKeeper, A Configuration, Service, The Resilient ZooKeeper Application, A Lock Service, More Distributed Data Structures and Protocols, ZooKeeper in Production. **Sqoop:** Getting Sqoop, Sqoop Connectors, A Sample Import, Generated Code, Imports: A Deeper Look, Working with Imported Data, Importing Large Objects, Performing an Export, Exports: A Deeper Look.

TEXT BOOKS:

1. Big data, blackbook, DreamTech Press, 2015
2. Hadoop: The Definitive Guide, Tom White, 3rd Edition, O'Reilly Media, 2012.

REFERENCE BOOKS:

1. Big Data Analytics, Seema Acharya, Subhashini Chellappan, Wiley 2015.
2. Simon Walkowiak, Big Data Analytics with R, Packt Publishing, ISBN: 9781786466457
3. Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Business, Michael Minelli, Michehe Chambers, 1st Edition, Ambiga Dhiraj, Wiley CIO Series, 2013.
4. Big Data Analytics: Disruptive Technologies for Changing the Game, Arvind Sathi, 1st Edition, IBM Corporation, 2012.



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R22 B.Tech. IT Syllabus

D67PE5C - SOFTWARE PROJECT MANAGEMENT PROFESSIONAL ELECTIVE - V

L	T	P	C
3	0	0	3

B.Tech. IV Year VII Sem.

Course Objectives:

To acquire knowledge on software process management.

Course Outcomes: Upon completion of the course the student will be able to

1. Identify and apply software process maturity frameworks and principles effectively.L3
2. Construct effective software project management strategies integrating economic principles and methodologies. L3
3. Construct effective software process workflows and pragmatic planning strategies.L3
4. Construct effective project organizations and implement pragmatic software metrics automation. L3
5. Identify modern project management practices for future software development transitions. L3

UNIT - I

Software Process Maturity-Software maturity Framework, Principles of Software Process Change, Software Process Assessment, The Initial Process, The Repeatable Process, The Defined Process, The Managed Process, The Optimizing Process, Process Reference Models Capability Maturity Model (CMM), CMMI, PCMM, PSP, TSP).

UNIT - II

Software Project Management Renaissance- Conventional Software Management, Evolution of Software Economics, Improving Software Economics, Life-Cycle Phases and Process artifacts Engineering and Production stages, inception phase, elaboration phase, construction phase, transition phase, artifact sets, management artifacts, engineering artifacts and pragmatic artifacts, model-based software architectures.

UNIT - III

Workflows and Checkpoints of process- Software process workflows, Iteration workflows, Major milestones, minor milestones, periodic status assessments, Process Planning Work breakdown structures, Planning guidelines, cost and schedule estimating process, iteration planning process, Pragmatic planning.



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UNIT - IV

Project Organizations- Line-of- business organizations, project organizations, evolution of organizations, process automation. Project Control and process instrumentation, The seven-core metrics, management indicators, quality indicators, life-cycle expectations, Pragmatic software metrics, metrics automation.

UNIT - V

CCPDS-R Case Study and Future Software Project Management Practices, Modern Project Profiles, Next-Generation software Economics, Modern Process Transitions.

TEXT BOOKS:

1. Managing the Software Process, Watts S. Humphrey, Pearson Education
2. Software Project Management, Walker Royce, Pearson Education

REFERENCE BOOKS:

1. An Introduction to the Team Software Process, Watts S. Humphrey, Pearson Education, 2000
 2. Process Improvement essentials, James R. Persse, O'Reilly, 2006
 3. Software Project Management, Bob Hughes & Mike Cotterell, fourth edition, TMH, 2006
 4. Applied Software Project Management, Andrew Stellman & Jennifer Greene, O'Reilly, 2006.
 5. Software Engineering Project Management, Richard H. Thayer & Edward Yourdon, 2nd edition, Wiley India, 2004.
- Agile Project Management, Jim Highsmith, Pearson education, 2004.



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DEPARTMENT OF INFORMATION TECHNOLOGY

R22 B.Tech. IT Syllabus

D67PC24 - SOFTWARE ENGINEERING LAB

B.Tech. IV Year VII Sem.

L	T	P	C
0	0	2	1

Course Objectives:

- To have hands-on experience in developing a software project by using various software engineering principles and methods in each of the phases of software development.

Course Outcomes: Upon completion of course, the student will be able to

- Critique problem statements for clarity and relevance. L3
- Assess documentation quality for completeness and accuracy. L3
- Appraise management strategies for effectiveness and adaptability. L3

List of Experiments:

Do the following seven exercises given in the list of sample projects:

- Development of problem statements.
- Preparation of Software Requirement Specification Document, Design Documents and Testing Phase related documents.
- Preparation of Software Configuration Management and Risk Management related documents.
- Study and usage of any Design phase CASE tool
- Performing the Design by using any Design phase CASE tools.
- Develop test cases for unit testing and integration testing
- Develop test cases for various white box and black box testing techniques.

Sample Projects:

- Passport automation System
- Book Bank
- Online Exam Registration
- ATM
- Library Management System

TEXT BOOKS:

- Software Engineering, A practitioner's Approach- Roger S. Pressman, 6th edition, McGraw Hill International Edition.
- The unified modeling language user guide Grady Booch, James Rumbaugh, Ivar Jacobson, Pearson Education.



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REFERENCE BOOKS:

1. Software Engineering- Sommerville, 7th edition, Pearson Education.
2. Software Engineering, an Engineering approach- James F. Peters, Witold Pedrycz, John Wiley.
3. Software Engineering principles and practice- Waman S Jawadekar, The McGraw-Hill Companies.



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R22 B.Tech. IT Syllabus

D68PC25 - DEEP LEARNING

B.Tech. IV Year VIII Sem.

L	T	P	C
3	0	0	3

Course Objectives:

- To understand deep Learning algorithms and their applications in real-world data

Course Outcomes: Upon completion of course, the student will be able to

- Utilize machine learning fundamentals and neural network architectures. L3
- Implement effective data utilization strategies for training deep models. L3
- Employ CNN and RNN models to analyse real-world datasets. L3
- Assess the performance and effectiveness of deep learning models. L3
- Create deep learning solutions tailored to real-world challenges. L3

UNIT -I

Machine Learning Basics - Learning Algorithms, Capacity, Overfitting and Underfitting, Hyperparameters and Validation Sets, Estimators, Bias and Variance, Maximum Likelihood Estimation, Bayesian Statistics, Supervised Learning Algorithms, Unsupervised Learning Algorithms, Stochastic Gradient Descent, Building a Machine Learning Algorithm, Challenges Motivating Deep Learning Deep Feedforward Networks Learning XOR, Gradient-Based Learning, Hidden Units, Architecture Design, Back-Propagation and Other Differentiation Algorithms

UNIT -II

Regularization for Deep Learning - Parameter Norm Penalties, Norm Penalties as Constrained Optimization, Regularization and UnderConstrained Problems, Dataset Augmentation, Noise Robustness, Semi-Supervised Learning, MultiTask 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, Optimization for Training Deep Models, Learning vs Pure Optimization, Challenges in Neural Network Optimization, Basic Algorithms, Parameter Initialization Strategies, Algorithms with Adaptive Learning Rates

UNIT-III

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, Random or Unsupervised Features



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UNIT -IV

Recurrent and Recursive Nets - Unfolding Computational Graphs, Recurrent Neural Networks, Bidirectional RNNs, Encoder-Decoder Sequence-to-Sequence Architectures, Deep Recurrent Networks, Recursive Neural Networks, The Challenge of Long-Term Dependencies, Echo State Networks, Leaky Units and Other Strategies for Multiple Time Scales, The Long Short-Term Memory and Other Gated RNNs, Optimization for LongTerm Dependencies, Explicit Memory

UNIT -V

Practical Methodology: Performance Metrics, Default Baseline Models, Determining Whether to Gather More Data, Selecting Hyperparameters, Debugging Strategies, Example: Multi-Digit Number Recognition Applications: Large-Scale Deep Learning, Computer Vision, Speech Recognition, Natural Language Processing, Other Applications.

TEXT BOOK:

1. Deep Learning by Ian Goodfellow, Yoshua Bengio and Aaron Courville, MIT Press.

REFERENCE BOOKS:

1. The Elements of Statistical Learning. Hastie, R. Tibshirani, and J. Friedman, Springer.
2. Probabilistic Graphical Models. Koller, and N. Friedman, MIT Press.
3. Bishop, C., M., Pattern Recognition and Machine Learning, Springer, 2006.
4. Yegnanarayana, B., Artificial Neural Networks PHI Learning Pvt. Ltd, 2009.
5. Golub, G., H., and Van Loan, C.,F., Matrix Computations, JHU Press, 2013.
6. Satish Kumar, Neural Networks: A Classroom Approach, Tata McGraw-Hill Education, 2004



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R22 B.Tech. IT Syllabus

D68PC26 - CRYPTOGRAPHY AND NETWORK SECURITY

B.Tech. IV Year VIII Sem.

L	T	P	C
3	0	0	3

Course Objectives:

To understand the cryptographic techniques and security measures for wireless networks and mobile devices

Course Outcomes: Upon completion of course, the student will be able to

1. Apply cryptographic techniques for data encryption and decryption. L3
2. Utilize symmetric and asymmetric key ciphers for secure communication. L3
3. Implement message authentication codes and digital signature schemes effectively. L3
4. Secure network communication using transport-level encryption protocols like SSL/TLS.L3
5. Implement security measures for wireless networks and mobile devices. L3

UNIT - I

Security Concepts: Introduction, The need for security, Security approaches, Principles of security, Types of Security attacks, Security services, Security Mechanisms, A model for Network Security Cryptography Concepts and Techniques: Introduction, plain text and cipher text, substitution techniques, transposition techniques, encryption and decryption, symmetric and asymmetric key cryptography, steganography, key range and key size, possible types of attacks.

UNIT - II

Symmetric key Ciphers: Block Cipher principles, DES, AES, Blowfish, RC5, IDEA, Block cipher operation, Stream ciphers, RC4. Asymmetric key Ciphers: Principles of public key cryptosystems, RSA algorithm, Elgamal Cryptography, Diffie-Hellman Key Exchange, Knapsack Algorithm.

UNIT - III

Cryptographic Hash Functions: Message Authentication, Secure Hash Algorithm (SHA-512), Message authentication codes: Authentication requirements, HMAC, CMAC, Digital signatures, Elgamal Digital Signature Scheme. Key Management and Distribution: Symmetric Key Distribution Using Symmetric & Asymmetric Encryption, Distribution of Public Keys, Kerberos, X.509 Authentication Service, Public – Key Infrastructure



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UNIT - IV

Transport-level Security: Web security considerations, Secure Socket Layer and Transport Layer Security, HTTPS, Secure Shell (SSH) Wireless Network Security: Wireless Security, Mobile Device Security, IEEE 802.11 Wireless LAN, IEEE 802.11i Wireless LAN Security

UNIT - V

E-Mail Security: Pretty Good Privacy, S/MIME IP Security: IP Security overview, IP Security architecture, Authentication Header, Encapsulating security payload, Combining security associations, Internet Key Exchange Case Studies on Cryptography and security: Secure Multiparty Calculation, Virtual Elections, Singesign On, Secure Inter-branch Payment Transactions, Cross site Scripting Vulnerability.

TEXT BOOK:

1. Cryptography and Network Security (principles and approaches) by William Stallings Pearson Education, 4th Edition.

REFERENCE BOOKS:

1. Network Security Essentials (Applications and Standards) by William Stallings Pearson Education. Principles of Information Security, Whitman



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R22 B.Tech. IT Syllabus

D68PE6A - NATURAL LANGUAGE PROCESSING PROFESSIONAL ELECTIVE -VI

L	T	P	C
3	0	0	3

B.Tech. IV Year VIII Sem.

Course Objectives:

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

Course Outcomes: Upon completion of the course the student will be able to

1. Identify sensitivity to linguistic phenomena and an ability to model them with formal grammars. L3
2. Choose proper experimental methodology for training and evaluating empirical NLP systems. L3
3. Compare Manipulate probabilities, construct statistical models over strings and trees 4
4. Compare and contrast estimate parameters using supervised and unsupervised training methods. L4
5. Design, implement, and analyze NLP algorithms; and design different language modeling Techniques. L4

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, Performances of the Approaches, Features

UNIT - II

Syntax I: Parsing Natural Language, Treebanks: A Data-Driven Approach to Syntax, Representation of Syntactic Structure, Parsing Algorithms

UNIT – III

Syntax II: Models for Ambiguity Resolution in Parsing, Multilingual Issues **Semantic Parsing I:** Introduction, Semantic Interpretation, System Paradigms, Word Sense

UNIT - IV

Semantic Parsing II: Predicate-Argument Structure, Meaning Representation Systems



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UNIT - V

Language Modeling: Introduction, N-Gram Models, Language Model Evaluation, Bayesian parameter estimation, Language Model Adaptation, Language Models- class based, variable length, Bayesian topic based, Multilingual and Cross Lingual Language Modeling

TEXT BOOK:

1. Multilingual natural Language Processing Applications: From Theory to Practice – Daniel M. Bikel and Imed Zitouni, Pearson Publication.

REFERENCE BOOK:

1. Speech and Natural Language Processing - Daniel Jurafsky & James H Martin, Pearson Publications.
2. Natural Language Processing and Information Retrieval: Tanvier Siddiqui, U.S. Tiwary.



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R22 B.Tech. IT Syllabus

D68PE6B - INFORMATION TECHNOLOGY AUDITING AND ASSURANCE PROFESSIONAL ELECTIVE -VI

L	T	P	C
3	0	0	3

B.Tech. IV Year VIII Sem.

Course Objectives:

- The aim of the course is to provide an understanding Auditing and Internal Control, Auditing IT Governance Controls, Analyze Auditing Operating Systems and Networks, Processing and Financial Reporting Systems, Computer-Assisted Audit Tools and Techniques, Auditing the Revenue Cycle Business Ethics, Fraud, and Fraud Detection

Course Outcomes: Upon completion of the course the student will be able to

- Identify the course's objective to comprehend auditing systems and networks. L3
- Construct knowledge in auditing OS, networks, processing, and financial systems. L3
- Develop proficiency in applying computer-assisted audit tools and techniques. L3
- Experiment with auditing the revenue cycle to acquire practical skills. L3
- Select methods for auditing expenditure cycles and detecting fraud ethically. L3

UNIT-I

Auditing and Internal Control - Overview of Auditing, the Role of the Audit Committee, Financial Audit Components, Audit Risk, the IT Audit, Internal Control Objectives, Principles, and Models. **Auditing IT Governance Controls** - Information Technology Governance, Structure of the Information Technology Function, The Computer Center, Disaster Recovery Planning, Outsourcing the IT Function.

UNIT -II

Auditing Operating Systems and Networks - Auditing Operating Systems, Auditing Networks, Auditing Electronic Data Interchange, Auditing PC-Based Accounting Systems. **Transaction Processing and Financial Reporting Systems Overview** - An Overview of Transaction Processing, Documentation Techniques, Computer-Based Accounting Systems, Data Coding Schemes, The General Ledger System, The Financial Reporting System, XBRL—Reengineering Financial Reporting, Controlling the FRS

UNIT -III

Computer-Assisted Audit Tools and Techniques - Application Controls, Testing Computer Application Controls, Computer-aided Audit Tools and Techniques for Testing Controls. **Data Structures and CAATs for Data Extraction** - Data Structures, Designing Relational Databases, Embedded Audit Module, Generalized Audit Software, ACL Software.



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UNIT -IV

Auditing the Revenue Cycle - Revenue Cycle Activities and Technologies, Revenue Cycle Audit Objectives, Controls, and Tests of Controls, Substantive Tests of Revenue Cycle Accounts, Revenue Cycle Risks and Audit Concerns, Understanding Data, Testing the Accuracy and Completeness Assertions, Testing the Existence Assertion, Testing the Valuation/Allocation Assertion

UNIT-V

Auditing the Expenditure Cycle - Expenditure Cycle Activities and Technologies, Expenditure Cycle Audit Objectives, Controls, and Tests of Controls, Substantive Tests of Expenditure Cycle Accounts. **Business Ethics, Fraud, and Fraud Detection** - Ethical Issues in Business, Fraud and Accountants, Auditor's Responsibility for Detecting Fraud, Fraud Detection Techniques

TEXT BOOK:

1. "Information Technology Auditing" by James A. Hall, Third Edition, South-Western Cengage Learning, 2011, ISBN-13: 9781439079119.

REFERENCE BOOKS:

1. "Principles of Information Security", by Michael E. Whitman and Herbert J. Mattord, Thomson Course Technology, 2003, ISBN: 0619063181
2. Handbook of Information Security Management, by Micki Krause and Harold F. Tipton, ISACA Publication, 1999.
3. Handbook of IT Auditing, D.Warren, L.Edelson, X.Parker, Coopers & Lybrand LLP, Warren, Gorham & Lamont. Boston, 1995 with 1999 supplement.
4. The information audit: an important management tool / Katherine Bertolucci. - Managing Information, June 1996, vol.3, no.6, p.34-35.



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D68PE6C - CYBER FORENSICS PROFESSIONAL ELECTIVE -VI

L	T	P	C
3	0	0	3

B.Tech. IV Year VIII Sem.

Course Objectives:

A brief explanation of the objective is to provide digital evidence which is obtained from digital media. In order to understand the objectives of computer forensics, first of all, people have to recognize the different roles computers play in a certain crime.

Course Outcomes: Upon completion of the course the student will be able to

1. Identify the cyber-crimes and derive response actions after the incidents..L3
2. Demonstrate Initial Response and forensic duplication. L3
3. Apply the Forensics analysis and validation.L3
4. Use the Forensic tools.L3
5. Working with Windows and DOS Systems.L3

UNIT- I

identify the cyber crimes and derive response actions after the incidents.

Introduction of Cybercrime: Types, The Internet spawns crime, Worms versus viruses, Computers' roles in crimes, Introduction to digital forensics, Introduction to Incident - Incident Response Methodology – Steps - Activities in Initial Response, Phase after detection of an incident

UNIT- II

Initial Response and forensic duplication, Initial Response & Volatile Data Collection from Windows system -Initial Response & Volatile Data Collection from Unix system – Forensic Duplication: Forensic duplication: Forensic Duplicates as Admissible Evidence, Forensic Duplication Tool Requirements, Creating a Forensic. Duplicate/Qualified Forensic Duplicate of a Hard Drive

UNIT- III

Forensics analysis and validation: Determining what data to collect and analyze, validating forensic data, addressing data-hiding techniques, performing remote acquisitions. Network Forensics: Network forensics overview, performing live acquisitions, developing standard procedures for network forensics, using network tools, examining the honeynet project.



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UNIT- IV

Current Forensic tools: evaluating computer forensic tool needs, computer forensics software tools, computer forensics hardware tools, validating and testing forensics software E-Mail Investigations: Exploring the role of e-mail in investigation, exploring the roles of the client and server in e-mail, investigating e-mail crimes and violations, understanding e-mail servers, using specialized e-mail forensic tools. Cell phone and mobile device forensics: Understanding mobile device forensics, understanding acquisition procedures for cell phones and mobile devices.

UNIT- V

Working with Windows and DOS Systems: understanding file systems, exploring Microsoft File Structures, Examining NTFS disks, Understanding whole disk encryption, windows registry, Microsoft startup tasks, MS-DOS startup tasks, virtual machines.

TEXT BOOKS:

1. Kevin Mandia, Chris Prosise, “Incident Response and computer forensics”, Tata McGraw Hill, 2006.
2. Computer Forensics, Computer Crime Investigation by John R. Vacca, Firewall Media, New Delhi.
3. Computer Forensics and Investigations by Nelson, Phillips Enfinger, Steuart, CENGAGE Learning

REFERENCE BOOKS:

1. Real Digital Forensics by Keith J. Jones, Richard Bejtich, Curtis W. Rose, Addison-Wesley Pearson Education
2. Forensic Compiling, A Tractitioneris Guide by Tony Sammes and Brian Jenkinson, Springer International edition.