

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD**  
**B.Tech. in CSE (COMPUTER NETWORKS)**  
**III & IV YEAR COURSE STRUCTURE & TENTATIVE SYLLABUS (R18)**

**Applicable From 2020-21 Admitted Batch**

**III YEAR I SEMESTER**

S. No.	Course Code	Course Title	L	T	P	Credits
1		Internetworking with TCP/IP	3	0	0	3
2		Database Management Systems	3	0	0	3
3		Design and Analysis of Algorithms	3	0	0	3
4		Finite Automata and Compiler Design	3	0	0	3
5		Professional Elective - I	3	0	0	3
6		Professional Elective - II	3	0	0	3
7		Database Management Systems Lab	0	0	3	1.5
8		Internetworking with TCP/IP Lab	0	0	3	1.5
9		Advanced Communication Skills Lab	0	0	2	1
10		Intellectual Property Rights	3	0	0	0
		<b>Total Credits</b>	<b>21</b>	<b>0</b>	<b>8</b>	<b>22</b>

**III YEAR II SEMESTER**

S. No.	Course Code	Course Title	L	T	P	Credits
1		Software Engineering	3	1	0	4
2		Network Programming	3	1	0	4
3		Web Technologies	3	1	0	4
4		Professional Elective – III	3	0	0	3
5		Open Elective - I	3	0	0	3
6		Software Engineering Lab	0	0	3	1.5
7		Network Programming Lab	0	0	3	1.5
8		Web Technologies Lab	0	0	2	1
9		Environmental Science	3	0	0	0
		<b>Total Credits</b>	<b>18</b>	<b>3</b>	<b>8</b>	<b>22</b>

**IV YEAR I SEMESTER**

S. No.	Course Code	Course Title	L	T	P	Credits
1		Cloud Computing	3	0	0	3
2		Cryptography and Network Security	2	0	0	2
3		Professional Elective – IV	3	0	0	3
4		Professional Elective – V	3	0	0	3
5		Open Elective – II	3	0	0	3
6		Cryptography and Network Security Lab	0	0	2	1
7		Industrial Oriented Mini Project/ Summer Internship	0	0	0	2*
8		Seminar	0	0	2	1
9		Project Stage – I	0	0	6	3
		<b>Total Credits</b>	<b>14</b>	<b>0</b>	<b>10</b>	<b>21</b>

**IV YEAR II SEMESTER**

S. No.	Course Code	Course Title	L	T	P	Credits
1		Organizational Behaviour	3	0	0	3
2		Professional Elective –VI	3	0	0	3
3		Open Elective-III	3	0	0	3
4		Project Stage – II	0	0	14	7
		<b>Total Credits</b>	<b>9</b>	<b>0</b>	<b>14</b>	<b>16</b>

**\*Note:** Industrial Oriented Mini Project/ Summer Internship is to be carried out during the summer vacation between 6<sup>th</sup> and 7<sup>th</sup> semesters. Students should submit a report of Industrial Oriented Mini Project/ Summer Internship for evaluation.

MC – Environmental Science – Should be Registered by Lateral Entry Students Only.

MC – Satisfactory/Unsatisfactory.

**Professional Elective-I**

	Advanced Computer Architecture
	Distributed Systems
	Distributed Databases
	Optimization Techniques
	DevOps

**Professional Elective – II**

	Image Processing
	Advanced Computer Networks
	Data Analytics
	Mobile Application Security
	Game Theory

**Professional Elective – III**

	Mobile Application Development
	Network Administration
	Natural Language Processing
	Cyber Forensics
	Machine Learning

**Professional Elective -IV**

	Neural Networks & Deep Learning
	Wireless Networks
	Information Retrieval Systems
	Wireless Security
	Network Management Systems and Operations

**Professional Elective - V**

	Real Time Systems
	Ad-hoc & Sensor Networks
	Distributed Storage Networks
	Blockchain Technology
	Software Process & Project Management

**Professional Elective – VI**

	Parallel and Distributed Computing
	Internet of Things
	5G Technologies
	Cyber Laws & Ethics
	Network Protocols

**SOFTWARE ENGINEERING**

B.Tech. III Year II Sem.

L	T	P	C
3	1	0	4

**Course Objectives**

- The aim of the course is to provide working knowledge of the techniques for estimation, design, testing and quality management of large software development projects.
- Topics include process models, software requirements, software design, software testing, software process/product metrics, risk management, quality management and UML diagrams

**Course Outcomes**

- Ability to translate end-user requirements into system and software requirements, using e.g. UML, and structure the requirements in a Software Requirements Document (SRD).
- Identify and apply appropriate software architectures and patterns to carry out high level design of a system and be able to critically compare alternative choices.
- Will have experience and/or awareness of testing problems and will be able to develop a simple testing report.

**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 patterns, process assessment, personal and team process models. **Process models:** The waterfall model, incremental process models, evolutionary process models, the unified process.

**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. **System models:** Context models, behavioral models, data models, object models, structured methods.

**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, conceptual model of UML, basic structural modeling, class diagrams, sequence diagrams, collaboration diagrams, use case diagrams, component diagrams.

**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.

**Product metrics:** Software quality, metrics for analysis model, metrics for design model, metrics for source code, metrics for testing, metrics for maintenance.

**UNIT - V**

**Metrics for Process and Products:** Software measurement, metrics for software quality.

**Risk management:** Reactive Vs proactive risk strategies, software risks, risk identification, risk projection, risk refinement, RMMM, RMMM plan. **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, 6<sup>th</sup> edition, Mc Graw Hill International Edition.
2. Software Engineering- Sommerville, 7<sup>th</sup> edition, Pearson Education.
3. The unified modeling language user guide Grady Booch, James Rumbaugh, Ivar Jacobson, Pearson Education.

**REFERENCE BOOKS:**

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

## NETWORK PROGRAMMING

**B.Tech. III Year II Sem.**

L	T	P	C
3	1	0	4

**Course Objectives:**

- To understand inter process and inter-system communication
- To understand socket programming in its entirety
- To understand usage of TCP/UDP / Raw sockets
- To understand how to build network applications

**Course Outcomes:**

- To write socket API based programs
- To design and implement client-server applications using TCP and UDP sockets
- To analyze network programs

### UNIT - I

**Introduction to Network Programming:** OSI model, Unix standards, TCP and UDP & TCP connection establishment and Format, Buffer sizes and limitation, standard internet services, Protocol usage by common internet application.

**Sockets:** Address structures, value – result arguments, Byte ordering and manipulation function and related functions Elementary TCP sockets – Socket, connect, bind, listen, accept, fork and exec function, concurrent servers. Close function and related function.

### UNIT - II

**TCP client server:** Introduction, TCP Echo server functions, Normal startup, terminate and signal handling server process termination, Crashing and Rebooting of server host shutdown of server host.

**Elementary UDP sockets:** Introduction UDP Echo server function, lost datagram, summary of UDP example, Lack of flow control with UDP, determining outgoing interface with UDP.

**I/O Multiplexing:** I/O Models, select function, Batch input, shutdown function, poll function, TCP Echo server,

### UNIT - III

**Socket options:** getsockopt and setsockopt functions. Socket states, Generic socket option IPV6 socket option ICMPV6 socket option IPV6 socket option and TCP socket options.

**Advanced I/O Functions-**Introduction, Socket Timeouts, recv and send Functions, readv and writev Functions, recvmsg and sendmsg Functions, Ancillary Data, How Much Data Is Queued?, Sockets and Standard I/O, T/TCP: TCP for Transactions.

### UNIT - IV

**Elementary name and Address conversions:** DNS, gethost by Name function, Resolver option, Function and IPV6 support, uname function, other networking information.

**Daemon Processes and inetd Superserver –** Introduction, syslogd Daemon, syslog Function, daemon\_init Function, inetd Daemon, daemon\_inetd Function

**Broadcasting-** Introduction, Broadcast Addresses, Unicast versus Broadcast, dg\_cli Function Using Broadcasting, Race Conditions

**Multicasting-** Introduction, Multicast Addresses, Multicasting versus Broadcasting on A LAN, Multicasting on a WAN, Multicast Socket Options, mcast\_join and Related Functions, dg\_cli Function Using Multicasting, Receiving Mbone Session Announcements, Sending and Receiving, SNTP: Simple Network Time Protocol, SNTP (Continued)

**UNIT - V**

Raw Sockets-Introduction, Raw Socket Creation, Raw Socket Output, Raw Socket Input, Ping Program, Traceroute Program, An ICMP Message Daemon, Datalink Access- Introduction, BPF: BSD Packet Filter, DLPI: Data Link Provider Interface, Linux:

**SOCK\_PACKET**, **libpcap**: Packet Capture Library, Examining the UDP Checksum Field.

Remote Login: Terminal line disciplines, Pseudo-Terminals, Terminal modes, Control Terminals, rlogin Overview, RPC Transparency Issues.

**TEXT BOOKS:**

1. UNIX Network Programming, by W. Richard Stevens, Bill Fenner, Andrew M. Rudoff, Pearson Education
2. UNIX Network Programming, 1<sup>st</sup> Edition, - W. Richard Stevens. PHI.

**REFERENCE BOOKS:**

1. UNIX Systems Programming using C++ T CHAN, PHI.
2. UNIX for Programmers and Users, 3rd Edition Graham GLASS, King abls, Pearson Education.
3. Advanced UNIX Programming 2nd Edition M. J. ROCHKIND, Pearson Education.

## WEB TECHNOLOGIES

**B.Tech. III Year II Sem.**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>

**Course Objectives:**

1. To introduce PHP language for server-side scripting
2. To introduce XML and processing of XML Data with Java
3. To introduce Server-side programming with Java Servlets and JSP
4. To introduce Client-side scripting with Javascript and AJAX.

**Course Outcomes:**

1. Gain knowledge of client-side scripting, validation of forms and AJAX programming
2. Understand server-side scripting with PHP language
3. Understand what is XML and how to parse and use XML Data with Java
4. To introduce Server-side programming with Java Servlets and JSP

**UNIT- I**

**Introduction to PHP:** Declaring variables, data types, arrays, strings, operators, expressions, control structures, functions, Reading data from web form controls like text boxes, radio buttons, lists etc., Handling File Uploads. Connecting to database (MySQL as reference), executing simple queries, handling results, Handling sessions and cookies

**File Handling in PHP:** File operations like opening, closing, reading, writing, appending, deleting etc. on text and binary files, listing directories.

**UNIT- II**

**HTML Common tags-** List, Tables, images, forms, Frames; Cascading Style sheets;

**XML:** Introduction to XML, Defining XML tags, their attributes and values, Document Type Definition, XML Schemes, Document Object Model, XHTML Parsing XML Data – DOM and SAX Parsers in java.

**UNIT - III**

**Introduction to Servlets:** Common Gateway Interface (CGI), Life cycle of a Servlet, deploying a servlet, The Servlet API, Reading Servlet parameters, Reading Initialization parameters, Handling Http Request & Responses, Using Cookies and Sessions, connecting to a database using JDBC.

**UNIT - IV**

**Introduction to JSP:** The Anatomy of a JSP Page, JSP Processing, Declarations, Directives, Expressions, Code Snippets, implicit objects, Using Beans in JSP Pages, Using Cookies and session for session tracking, connecting to database in JSP.

**UNIT - V**

**Client-side Scripting:** Introduction to Javascript, Javascript language – declaring variables, scope of variables, functions. event handlers (onclick, onsubmit etc.), Document Object Model, Form validation.

**TEXT BOOKS:**

1. Web Technologies, Uttam K Roy, Oxford University Press
2. The Complete Reference PHP — Steven Holzner, Tata McGraw-Hill

**REFERENCE BOOKS:**

1. Web Programming, building internet applications, Chris Bates 2nd" edition, Wiley Dreamtech
2. Java Server Pages —Hans Bergsten, SPD O'Reilly,
3. Java Script, D. Flanagan
4. Beginning Web Programming-Jon Duckett WROX.
5. Programming world wide web, R.W. Sebesta, Fourth Edition, Pearson.
6. Internet and World Wide Web — How to program. Dietel and Nieto, Pearson.

**MOBILE APPLICATION DEVELOPMENT (Professional Elective – III)****B.Tech. III Year II Sem.**

L	T	P	C
3	0	0	3

**Prerequisites:**

1. Acquaintance with JAVA programming
2. A Course on DBMS

**Course Objectives:**

- To demonstrate their understanding of the fundamentals of Android operating systems
- To improve their skills of using Android software development tools
- To demonstrate their ability to develop software with reasonable complexity on mobile platform
- To demonstrate their ability to deploy software to mobile devices
- To demonstrate their ability to debug programs running on mobile devices

**Course Outcomes:**

- Student understands the working of Android OS Practically.
- Student will be able to develop Android user interfaces
- Student will be able to develop, deploy and maintain the Android Applications.

**UNIT - I**

Introduction to Android Operating System: Android OS design and Features – Android development framework, SDK features, Installing and running applications on Android Studio, Creating AVDs, Types of Android applications, Best practices in Android programming, Android tools.

Android application components – Android Manifest file, Externalizing resources like values, themes, layouts, Menus etc, Resources for different devices and languages, Runtime Configuration Changes  
Android Application Lifecycle – Activities, Activity lifecycle, activity states, monitoring state changes

**UNIT - II**

Android User Interface: Measurements – Device and pixel density independent measuring UNIT - s  
Layouts – Linear, Relative, Grid and Table Layouts

User Interface (UI) Components – Editable and non-editable TextViews, Buttons, Radio and Toggle Buttons, Checkboxes, Spinners, Dialog and pickers

Event Handling – Handling clicks or changes of various UI components

Fragments – Creating fragments, Lifecycle of fragments, Fragment states, Adding fragments to Activity, adding, removing and replacing fragments with fragment transactions, interfacing between fragments and Activities, Multi-screen Activities

**UNIT - III**

Intents and Broadcasts: Intent – Using intents to launch Activities, Explicitly starting new Activity, Implicit Intents, Passing data to Intents, Getting results from Activities, Native Actions, using Intent to dial a number or to send SMS

Broadcast Receivers – Using Intent filters to service implicit Intents, Resolving Intent filters, finding and using Intents received within an Activity

Notifications – Creating and Displaying notifications, Displaying Toasts.

**UNIT - IV**

Persistent Storage: Files – Using application specific folders and files, creating files, reading data from files, listing contents of a directory Shared Preferences – Creating shared preferences, saving and retrieving data using Shared Preference.

**UNIT - V**

Database – Introduction to SQLite database, creating and opening a database, creating tables, inserting retrieving and etindelg data, Registering Content Providers, Using content Providers (insert, delete, retrieve and update)

**TEXT BOOKS:**

1. Professional Android 4 Application Development, Reto Meier, Wiley India, (Wrox), 2012.
2. Android Application Development for Java Programmers, James C Sheusi, Cengage, 2013.

**REFERENCE BOOK:**

1. Beginning Android 4 Application Development, Wei-Meng Lee, Wiley India (Wrox), 2013.

**NETWORK ADMINISTRATION (Professional Elective – III)****B.Tech. III Year II Sem.**

L	T	P	C
3	0	0	3

**Course Objectives:**

1. Knowledge on network components, network file systems, network security and network printing.

**Course Outcomes**

1. Install or upgrade a network operating system and understand network basics.
2. Analyze and implement a security policy through various nodes.
3. Understand monitoring system resources and configuring network services.
4. Understand and troubleshoot the networks.

**UNIT - I**

**Setting up Your Environment:** Getting started, Distributions to consider, Physical machines versus virtual machines, Setting up and configuring VirtualBox, Acquiring VirtualBox, Downloading and installing the Extension Pack, Acquiring and installing Debian 8, Acquiring and installing CentOS 7, Revisiting Linux Network Basics: Understanding the TCP/IP protocol suite, Naming the network device, Understanding Linux hostname resolution, Understanding the net-tools and iproute2 suites, Manually managing network interfaces, Managing connections with Network Manager.

**UNIT - II**

**Communicating Between Nodes via SSH:** Using OpenSSH, Installing and configuring OpenSSH , connecting to network hosts via openssh-client, The OpenSSH config file, Understanding and utilizing scp Transferring files to another node via scp, Tunneling traffic via SSH, Generating public keys, Keeping SSH connections alive, Exploring an alternative to SSH – utilizing Mosh (mobile shell), Setting up a File Server: File server considerations, NFS v3 versus NFS v4 , Setting up an NFS server, Learning the basics of Samba Setting up a Samba server, Mounting network shares, Automatically mounting network shares via fstab and systemd, Creating networked filesystems with SSHFS.

**UNIT - III**

**Monitoring System Resources:** Inspecting and managing processes, Understanding load average, Checking available memory, Using shell-based resource monitors, Scanning used storage, Introduction to logging, Maintaining log size with logrotate , Understanding the systemd init system, Understanding the systemd journal, Configuring Network Services: Planning your IP address layout, Installing and configuring a DHCP server, Installing and configuring a DNS server, Setting up an internal NTP server.

**UNIT - IV**

**Hosting HTTP Content via Apache:** Installing Apache, Configuring Apache, Adding modules, Setting up virtual hosts, Understanding Advanced Networking Concepts: Dividing your network into subnets, Understanding the CIDR notation, Implementing Quality of Service, Routing TCP/IP traffic, Creating redundant DHCP and DNS servers.

**UNIT - V**

**Securing Your Network:** Limiting the attack surface , Securing OpenSSH , Configuring the iptables firewall Protecting system services with fail2ban, Understanding SELinux, Configuring Apache to utilize SSL, Deploying security updates, Troubleshooting Network Issues: Tracing routing issues, Troubleshooting DHCP issues, Troubleshooting DNS issues, Displaying connection statistics with netstat, Scanning your network with Nmap and Zenmap, Installing missing firmware on Debian systems, Troubleshooting issues with Network Manager.



**TEXT BOOKS:**

1. Mastering Linux Network Administration, 2015 Packt Publishing, Packt Publishing.
2. Linux Network Administrator's Guide, 2nd Edition by Olaf Kirch & Terry Dawson 2nd Edition June 2000, O'Reilly Publishers.

**REFERENCE BOOKS:**

1. The Complete Reference Linux, Richard Petersen, Mc Graw Hill.
2. Maurice J. Bach, "Design of UNIX Operating System", PHI. 3. Linux system Administration, Tom Adelstein & Bill Lubanovic, O'Reilly.
3. Unix the ultimate guide, sumithabha Das, TMH.
4. Microsoft® Windows Server® 2008 Administration, STEVE SEGUIS, Mc Graw Hill.
5. Red Hat Enterprise Linux 6 Administration, Sander van Vugt, John wiley & sons.

**NATURAL LANGUAGE PROCESSING (Professional Elective – III)****B.Tech. III Year II Sem.**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**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, Performances of the Approaches**UNIT - II****Syntax Analysis:** Parsing Natural Language, Treebanks: 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:** Cohension, Reference Resolution, Discourse Cohension 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 to Practice – Daniel M. Bikel and Imed Zitouni, Pearson Publication.
2. Natural Language Processing and Information Retrieval: Tanvier Siddiqui, U.S. Tiwary.

**REFERENCE BOOK:**

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

**CYBER FORENSICS (Professional Elective – III)****B.Tech. III Year II Sem.**

L	T	P	C
3	0	0	3

**Prerequisites:** Network Security.**Course Objectives:**

- To provide digital evidences which are obtained from digital media.
- In order to understand the objectives of computer forensics, first of all, people have to recognize the different roles computer plays in a certain crime.
- According to a snippet from the United States Security Service, the functions computer has in different kinds of crimes.

**Course Outcomes:**

- Students will understand the usage of computers in forensic, and how to use various forensic tools for a wide variety of investigations.
- It gives an opportunity to students to continue their zeal in research in computer forensics

**UNIT - I**

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.

**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 Prorise, Incident Response and computer forensics, Tata McGraw Hill, 2006.
2. Computer Forensics, Computer Crime Investigation by John R. Vacca, Firewall Media, 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.

**MACHINE LEARNING (Professional Elective – III)****B.Tech. III Year II Sem.**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**Prerequisites**

1. Data Structures
2. Knowledge on statistical methods

**Course Objectives**

- This course explains machine learning techniques such as decision tree learning, Bayesian learning etc.
- To understand computational learning theory.
- To study the pattern comparison techniques.

**Course Outcomes**

- Understand the concepts of computational intelligence like machine learning
- Ability to get the skill to apply machine learning techniques to address the real time problems in different areas
- Understand the Neural Networks and its usage in machine learning application.

**UNIT - I**

Introduction - Well-posed learning problems, designing a learning system, Perspectives and issues in machine learning.

Concept learning and the general to specific ordering – introduction, a concept learning task, concept learning as search, find-S: finding a maximally specific hypothesis, version spaces and the candidate elimination algorithm, remarks on version spaces and candidate elimination, inductive bias.

**Decision Tree Learning** – Introduction, decision tree representation, appropriate problems for decision tree learning, the basic decision tree learning algorithm, hypothesis space search in decision tree learning, inductive bias in decision tree learning, issues in decision tree learning.

**UNIT - II**

**Artificial Neural Networks-1**– Introduction, neural network representation, appropriate problems for neural network learning, perceptions, multilayer networks and the back-propagation algorithm.

**Artificial Neural Networks-2**- Remarks on the Back-Propagation algorithm, An illustrative example: face recognition, advanced topics in artificial neural networks.

**Evaluation Hypotheses** – Motivation, estimation hypothesis accuracy, basics of sampling theory, a general approach for deriving confidence intervals, difference in error of two hypotheses, comparing learning algorithms.

**UNIT - III**

**Bayesian learning** – Introduction, Bayes theorem, Bayes theorem and concept learning, Maximum Likelihood and least squared error hypotheses, maximum likelihood hypotheses for predicting probabilities, minimum description length principle, Bayes optimal classifier, Gibbs algorithm, Naïve Bayes classifier, an example: learning to classify text, Bayesian belief networks, the EM algorithm.

**Computational learning theory** – Introduction, probably learning an approximately correct hypothesis, sample complexity for finite hypothesis space, sample complexity for infinite hypothesis spaces, the mistake bound model of learning.

**Instance-Based Learning**- Introduction,  $k$ -nearest neighbour algorithm, locally weighted regression, radial basis functions, case-based reasoning, remarks on lazy and eager learning.

**UNIT- IV**

**Genetic Algorithms** – Motivation, Genetic algorithms, an illustrative example, hypothesis space search, genetic programming, models of evolution and learning, parallelizing genetic algorithms.

**Learning Sets of Rules** – Introduction, sequential covering algorithms, learning rule sets: summary, learning First-Order rules, learning sets of First-Order rules: FOIL, Induction as inverted deduction, inverting resolution.

**Reinforcement Learning** – Introduction, the learning task, Q-learning, non-deterministic, rewards and actions, temporal difference learning, generalizing from examples, relationship to dynamic programming.

**UNIT - V**

**Analytical Learning-1**- Introduction, learning with perfect domain theories: PROLOG-EBG, remarks on explanation-based learning, explanation-based learning of search control knowledge.

**Analytical Learning-2**-Using prior knowledge to alter the search objective, using prior knowledge to augment search operators.

**Combining Inductive and Analytical Learning** – Motivation, inductive-analytical approaches to learning, using prior knowledge to initialize the hypothesis.

**TEXT BOOK:**

1. Machine Learning – Tom M. Mitchell, - MGH.

**REFERENCE BOOK:**

1. Machine Learning: An Algorithmic Perspective, Stephen Marshland, Taylor & Francis.

**SOFTWARE ENGINEERING LAB****B.Tech. III Year II Sem.****L T P C**  
**0 0 3 1.5****Prerequisites**

1. A course on "Programming for Problem Solving".

**Co-requisite**

1. A Course on "Software Engineering".

**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**

- Ability to translate end-user requirements into system and software requirements.
- Ability to generate a high-level design of the system from the software requirements.
- Will have experience and/or awareness of testing problems and will be able to develop a simple testing report.

**List of Experiments**

**Do the following 8 exercises for any two projects given in the list of sample projects or any other projects:**

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

**Sample Projects:**

1. Passport automation System
2. Book Bank
3. Online Exam Registration
4. Stock Maintenance System
5. Online course reservation system
6. E-ticketing
7. Software Personnel Management System
8. Credit Card Processing
9. E-book management System.
10. Recruitment system

**TEXT BOOKS:**

1. Software Engineering, A practitioner's Approach- Roger S. Pressman, 6<sup>th</sup> edition, Mc Graw Hill International Edition.
2. Software Engineering- Sommerville, 7<sup>th</sup> edition, Pearson Education.
3. The unified modeling language user guide Grady Booch, James Rumbaugh, Ivar Jacobson, Pearson Education.

**NETWORK PROGRAMMING LAB****B.Tech. III Year II Sem.****L T P C**  
**0 0 3 1.5****Course Objectives:**

1. To understand inter process and inter-system communication
2. To understand socket programming in its entirety
3. To understand usage of TCP/UDP / Raw sockets
4. To understand how to build network applications

**Course Outcomes:**

1. To write socket API based programs
2. To design and implement client-server applications using TCP and UDP sockets
3. To analyze network programs

**List of Experiments:**

1. Implement programs for Inter Process Communication using PIPE, Message Queue and Shared Memory.
2. Write a programme to create an integer variable using shared memory concept and increment the variable simultaneously by two processes. Use semaphores to avoid race conditions.
3. Design TCP iterative Client and server application to reverse the given input sentence
4. Design TCP iterative Client and server application to reverse the given input sentence
5. Design TCP client and server application to transfer file
6. Design a TCP concurrent server to convert a given text into upper case using multiplexing system call "select"
7. Design a TCP concurrent server to echo given set of sentences using poll functions
8. Design UDP Client and server application to reverse the given input sentence
9. Design UDP Client server to transfer a file
10. Design using poll client server application to multiplex TCP and UDP requests for converting a given text into upper case.
11. Design a RPC application to add and subtract a given pair of integers

**TEXT BOOKS:**

1. UNIX Network Programming, by W. Richard Stevens, Bill Fenner, Andrew M. Rudoff, Pearson Education.
2. UNIX Network Programming, 1st Edition, - W. Richard Stevens. PHI.

**REFERENCE BOOKS:**

1. UNIX Systems Programming using C++ T CHAN, PHI.
2. UNIX for Programmers and Users, 3rd Edition Graham GLASS, King abls, Pearson Education.
3. Advanced UNIX Programming 2nd Edition M. J. ROCHKIND, Pearson Education.

**WEB TECHNOLOGIES LAB****B.Tech. III Year II Sem.****L T P C**  
**0 0 2 1****Course Objectives:**

1. To introduce PHP language for server-side scripting
2. To introduce XML and processing of XML Data with Java
3. To introduce Server-side programming with Java Servlets and JSP
4. To introduce Client-side scripting with Javascript and AJAX.

**Course Outcomes:**

1. Gain knowledge of client-side scripting, validation of forms and AJAX programming
2. Understand server-side scripting with PHP language
3. Understand what is XML and how to parse and use XML Data with Java
4. To introduce Server-side programming with Java Servlets and JSP

**List of Experiments**

1. Write a PHP script to print prime numbers between 1-50.
2. PHP script to
  - a. Find the length of a string.
  - b. Count the number of words in a string.
  - c. Reverse a string.
  - d. Search for a specific string.
3. Write a PHP script to merge two arrays and sort them as numbers, in descending order.
4. Write a PHP script that reads data from one file and writes into another file.
5. Develop static pages (using Only HTML) of an online book store. The pages should resemble: [www.amazon.com](http://www.amazon.com). The website should consist of the following pages.
  - a) Home page
  - b) Registration and user Login
  - c) User Profile Page
  - d) Books catalog
  - e) Shopping Cart
  - f) Payment By credit card
  - g) Order Confirmation
6. Validate the Registration, user login, user profile and payment by credit card pages using JavaScript.
7. Create and save an XML document on the server, which contains 10 users' information. Write a program, which takes User Id as an input and returns the user details by taking the user information from the XML document.
8. Install TOMCAT web server. Convert the static web pages of assignment 2 into dynamic web pages using servlets and cookies. Hint: Users information (user id, password, credit card number) would be stored in web.xml. Each user should have a separate Shopping Cart.
9. Redo the previous task using JSP by converting the static web pages of assignment 2 into dynamic web pages. Create a database with user information and books information. The books catalog should be dynamically loaded from the database. Follow the MVC architecture while doing the website.

**TEXT BOOK:**

1. WEB TECHNOLOGIES: A Computer Science Perspective, Jeffrey C. Jackson, Pearson Education.

**REFERENCE BOOKS:**

1. Deitel H.M. and Deitel P.J., "Internet and World Wide Web How to program", Pearson International, 2012, 4th Edition.
2. J2EE: The complete Reference By James Keogh, McGraw-Hill.
3. Bai and Ekedhi, The Web Warrior Guide to Web Programming, Thomson.
4. Paul Dietel and Harvey Deitel, "Java How to Program", Prentice Hall of India, 8th Edition.
5. Web technologies, Black Book, Dreamtech press.
6. Gopalan N.P. and Akilandeswari J., "Web Technology", Prentice Hall of India.



## ENVIRONMENTAL SCIENCE

**B.Tech. III Year II Sem.**

L	T	P	C
3	0	0	0

**Course Objectives:**

- Understanding the importance of ecological balance for sustainable development.
- Understanding the impacts of developmental activities and mitigation measures
- Understanding the environmental policies and regulations

**Course Outcomes:** Based on this course, the Engineering graduate will understand /evaluate / develop technologies on the basis of ecological principles and environmental regulations which in turn helps in sustainable development

**UNIT - I**

**Ecosystems:** Definition, Scope and Importance of ecosystem. Classification, structure, and function of an ecosystem, Food chains, food webs, and ecological pyramids. Flow of energy, Biogeochemical cycles, Bioaccumulation, Biomagnification, ecosystem value, services and carrying capacity, Field visits.

**UNIT - II**

**Natural Resources: Classification of Resources:** Living and Non-Living resources, **water resources:** use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problems. **Mineral resources:** use and exploitation, environmental effects of extracting and using mineral resources, **Land resources:** Forest resources, **Energy resources:** growing energy needs, renewable and non-renewable energy sources, use of alternate energy source, case studies.

**UNIT - III**

**Biodiversity And Biotic Resources:** Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity; consumptive use, productive use, social, ethical, aesthetic and optional values. India as a mega diversity nation, Hot spots of biodiversity. Field visit. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; conservation of biodiversity: In-Situ and Ex-situ conservation. National Biodiversity act.

**UNIT - IV**

**Environmental Pollution and Control Technologies: Environmental Pollution:** Classification of pollution, **Air Pollution:** Primary and secondary pollutants, Automobile and Industrial pollution, Ambient air quality standards. **Water pollution:** Sources and types of pollution, drinking water quality standards. **Soil Pollution:** Sources and types, Impacts of modern agriculture, degradation of soil. **Noise Pollution:** Sources and Health hazards, standards, **Solid waste:** Municipal Solid Waste management, composition and characteristics of e-Waste and its management. **Pollution control technologies:** Wastewater Treatment methods: Primary, secondary and Tertiary. Overview of air pollution control technologies, Concepts of bioremediation. **Global Environmental Problems and Global Efforts:** Climate change and impacts on human environment. Ozone depletion and Ozone depleting substances (ODS). Deforestation and desertification. International conventions / Protocols: Earth summit, Kyoto protocol, and Montréal Protocol.

**UNIT - V**

**Environmental Policy, Legislation & EIA:** Environmental Protection act, Legal aspects Air Act- 1981, Water Act, Forest Act, Wild life Act, Municipal solid waste management and handling rules, biomedical waste management and handling rules, hazardous waste management and handling rules. EIA: EIA structure, methods of baseline data acquisition. Overview on Impacts of air, water, biological and Socio-economical aspects. Strategies for risk assessment, Concepts of Environmental Management Plan

(EMP). **Towards Sustainable Future:** Concept of Sustainable Development, Population and its explosion, Crazy Consumerism, Environmental Education, Urban Sprawl, Human health, Environmental Ethics, Concept of Green Building, Ecological Foot Print, Life Cycle assessment (LCA), Low carbon life style.

**TEXT BOOKS:**

1. Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission.
2. Environmental Studies by R. Rajagopalan, Oxford University Press.

**REFERENCE BOOKS:**

1. Environmental Science: towards a sustainable future by Richard T. Wright. 2008 PHL Learning Private Ltd. New Delhi.
2. Environmental Engineering and science by Gilbert M. Masters and Wendell P. Ela. 2008 PHI Learning Pvt. Ltd.
3. Environmental Science by Daniel B. Botkin & Edward A. Keller, Wiley INDIA edition.
4. Environmental Studies by Anubha Kaushik, 4<sup>th</sup> Edition, New age international publishers.
5. Text book of Environmental Science and Technology - Dr. M. Anji Reddy 2007, BS Publications.