ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, TIRUPATI (AUTONOMOUS)

COMPUTER SCIENCE AND ENGINEERING
(Effective for the batches admitted in 2019-20)

III B. Tech – II Semester (Theory – 7, Lab – 4) – AK19

S. No	Category	Course Code	Course Title	Hours per week			Credits	Scheme of Examination (Max. Marks)		
				L	T	P		CIE	SEE	Total
THEORY										
1	PC	19APC0510	Computer Networks	3	0	0	3	30	70	100
2	PC	19APC0516	Grid and Cloud Computing	3	0	0	3	30	70	100
3	PC	19APC0513	Machine Learning	3	0	0	3	30	70	100
4	PC	19APC0523	Web Programming	3	0	0	3	30	70	100
5	PE	19APE0504 19APE0505 19APE0506	Professional Elective II Object Oriented Analysis and Design Cyber Security Big Data Analytics	3	0	0	3	30	70	100
6	OE	19AHEMB02 19APC0216 19APE0413	Open Elective II (Inter-Disciplinary Elective II) Entrepreneurship Development Neural Networks and Fuzzy Logic Cellular and Mobile Communications	3	0	0	3	30	70	100
7	MC	19AMC9902	Constitution of India	3	0	0	0	30	-	30
PRACTICAL										
8	PR	19APR0503	Socially Relevant Projects (15 Hrs / Sem)	0	0	0	0.5	50	-	50
9	PC	19APC0525	Computer Networks Lab	0	0	2	1	30	70	100
10	PC	19APC0518	Grid and Cloud Computing Lab	0	0	2	1	30	70	100
11	PC	19APC0524	Web Programming Lab	0	0	2	1	30	70	100
12	Internship has to be carried during Summer Break. Evaluation will be done in next semester.									
						TOTAL	21.5	350	630	980

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B.Tech III Year II Semester

COURSE CODE	COURSE TITLE	L	T	P	CREDITS
19APC0510	COMPUTER NETWORKS	3	0	0	3

Course Objectives:
The students will be able to
- run and manage the Internet, part of the Internet, or an organization's network that is connected to the Internet.
- understand the basics of data communications and networking
- the protocols used in the Internet communication

Course Outcomes:
Student will be able to
- understand the basics of data communications and networking
- classify the functionalities of two sub layers of Data link Layer
- know briefly about Network Layer through algorithms and protocols
- distinguish the services provided by Transport Layer
- recognize the services offered by Application Layer to the user

Unit I
Introduction: Data Communications, Networks, Network Types, Internet History, Standards and Administration.
Network Models: Protocol Layering, TCP/IP Protocol Suite, The OSI Model
Introduction to Physical Layer: Data and Signals, Transmission Impairment, Data Rate Limits, Performance.
Transmission Media: Introduction, Guided Media, Unguided Media, Switching: Introduction, Circuit Switched Networks, Packet Switching

Unit II
The Data Link Layer: Introduction, Link layer addressing, Error detection and Correction: Cyclic codes, Checksum, Forward error correction, Data link control: DLC Services, Data link layer protocols, HDLC, Point to Point Protocol.
Media Access control: Random Access, Controlled Access, Channelization, Connecting devices and virtual LANs: Connecting Devices.

Unit III
The Network Layer: Network layer design issues, Routing algorithms, Congestion control algorithms, Quality of service, Internetworking.
The network layer in the Internet: IPV4 Addresses, IPV6, Internet Control protocol, OSPF, BGP, IP, ICMPv4, IGMP.

Unit IV
The Transport Layer: The Transport Service, Elements of Transport Protocols, Congestion Control, The internet transport protocols: UDP, TCP, Performance problems in computer networks, Network performance measurement.

Unit V
The Application Layer: Introduction, Client-Server Programming, WWW and HTTP, FTP, e-mail, TELNET, Secure Shell, Domain Name System, SNMP.

Text Books:
1. "Data communications and networking", Behrouz A. Forouzan, Mc Graw Hill Education, 5th edition, 2012.
2. "Computer Networks", Andrew S. Tanenbaum, Wetherall, Pearson, 5th edition, 2010.

References:
1. Data Communication and Networks, Bhushan Trivedi, Oxford
2. "Internetworking with TCP/IP – Principles, protocols, and architecture - Volume 1, Douglas E. Comer, 5th edition, PHI
3. "Computer Networks", 5E, Peterson, Davie, Elsevier.
4. "Introduction to Computer Networks and Cyber Security", Chawan- Hwa Wu, Irwin, CRC Publications.
5. "Computer Networks and Internets with Internet Applications", Comer.

List of COs	PO no. and keyword	Competency Indicator	Performance Indicator
CO1	PO1. Engineering knowledge	1.3	1.3.1
CO2	PO2. Problem Analysis	2.2	2.2.2
CO3	PO1. Engineering knowledge	1.3	1.3.1
CO4	PO1. Engineering knowledge	1.4	1.4.1
CO5	PO2. Problem Analysis	2.1	2.1.1

B.Tech III Year II Semester

COURSE CODE	COURSE TITLE	L	T	P	CREDITS
19APC0516	GRID AND CLOUD COMPUTING	3	0	0	3

Course Objectives:
- The student should be made to:
- Understand how Grid computing helps in solving large scale scientific problems.
- Gain knowledge on the concept of virtualization that is fundamental to cloud computing. Learn how to program the grid and the cloud.
- Understand the security issues in the grid and the cloud environment.

Course Outcomes:
The student should be able to
- Apply the security models in the grid and the cloud environment.
- Use the grid and cloud tool kits.
- Apply the concept of virtualization.
- Apply grid computing techniques to solve large scale scientific problems

UNIT I
INTRODUCTION: Evolution of Distributed computing: Scalable computing over the Internet – Technologies for network based systems – clusters of cooperative computers - Grid computing Infrastructures – cloud computing - service oriented architecture – Introduction to Grid Architecture and standards – Elements of Grid – Overview of Grid Architecture.

UNIT II
GRID SERVICES: Introduction to Open Grid Services Architecture (OGSA) – Motivation – Functionality Requirements – Practical & Detailed view of OGSA/OGSI – Data intensive grid service models – OGSA services.

UNIT III
VIRTUALIZATION: Cloud deployment models: public, private, hybrid, community – Categories of cloud computing: Everything as a service: Infrastructure, platform, software - Pros and Cons of cloud computing – Implementation levels of virtualization – virtualization structure – virtualization of CPU, Memory and I/O devices – virtual clusters and Resource Management – Virtualization for data center automation.

UNIT IV
PROGRAMMING MODEL: Open source grid middleware packages – Globus Toolkit (GT4) Architecture , Configuration – Usage of Globus – Main components and Programming model - Introduction to Hadoop Framework - MapReduce, Input splitting, map and reduce functions, specifying input and output parameters, configuring and running a job – Design of Hadoop file system, HDFS concepts, command line and java interface, dataflow of File read & File write.

UNIT V
SECURITY: Trust models for Grid security environment – Authentication and Authorization methods – Grid security infrastructure – Cloud Infrastructure security: network, host and application level – aspects of data security, provider data and its security, Identity and access management architecture, IAM practices in the cloud, SaaS, PaaS, IaaS availability in the cloud, Key privacy issues in the cloud.

TEXT BOOK:
1. Kai Hwang, Geoffery C. Fox and Jack J. Dongarra, ―Distributed and Cloud Computing: Clusters, Grids, Clouds and the Future of Internet, First Edition, Morgan Kaufman Publisher, an Imprint of Elsevier, 2012.

REFERENCES:
1. Jason Venner, ―Pro Hadoop- Build Scalable, Distributed Applications in the Cloud, A Press, 2009
2. Tom White, ―Hadoop The Definitive Guide, First Edition. O‗Reilly, 2009.
3. Bart Jacob (Editor), ―Introduction to Grid Computing, IBM Red Books, Vervante, 2005
4. Ian Foster, Carl Kesselman, ―The Grid: Blueprint for a New Computing Infrastructure, 2nd Edition, Morgan Kaufmann.
5. Frederic Magoules and Jie Pan, ―Introduction to Grid Computing CRC Press, 2009.
6. Daniel Minoli, ―A Networking Approach to Grid Computing, John Wiley Publication, 2005.
7. Barry Wilkinson, ―Grid Computing: Techniques and Applications, Chapman and Hall, CRC, Taylor and Francis Group, 2010.

List of COs	PO no. and keyword	Competency Indicator	Performance Indicator
CO1	PO1. Engineering knowledge	1.4	1.4.1
CO2	PO5. Modern tool usage	5.1	5.1.1
CO3	PO6. The engineer and Society	6.1	6.1.1
CO4	PO4. Conduct investigations of complex problems	4.2	4.2.1

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B.Tech III Year II Semester

COURSE CODE	COURSE TITLE	L	T	P	CREDITS
19APC0513	MACHINE LEARNING	3	0	0	3

Course Objectives

- To understand the basic theory underlying machine learning.
- To be able to formulate machine learning problems corresponding to different applications.
- To understand a range of machine learning algorithms along with their strengths and weaknesses.
- To be able to apply machine learning algorithms to solve problems of moderate complexity.

Course Outcomes

- Ability to understand what is learning and why it is essential to the design of intelligent machines.
- Ability to design and implement various machine learning algorithms in a wide range of real-world applications.
- Acquire knowledge deep learning and be able to implement deep learning models for language, vision, speech, decision making, and more

UNIT - I

What is Machine Learning?, Examples of machine learning applications, **supervised Learning:** learning a class from examples, Vapnik- Chervonenkis dimension, probably approximately correct learning, noise, learning multiple classes, regression, model selection and generalization, dimensions of a supervised machine learning algorithm. **Decision Tree Learning:** Introduction, Decisions 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, **Artificial Neural Networks:** Introduction, Neural Network Representation – Problems – Perceptrons – Multilayer Networks and Back Propagation Algorithm, Remarks on the BACKPROPAGATION Algorithm, An illustrative Example: Face Recognition, Advanced Topics in Artificial Neural Networks.

UNIT - II

Evaluating Hypotheses: Motivation, Estimating hypothesis accuracy, basics of sampling theory, a general approach for deriving confidence intervals, differences in error of two hypothesis, comparing learning algorithms, **Bayesian Learning:** Introduction, Bayes Theorem, Bayes Theorem and Concept Learning, Maximum Likelihood and least squared error hypothesis, Maximum Likelihood hypothesis for predicting probabilities, Minimum Description Length Principle, Bayes Optimal Classifier, Gibbs Algorithm , Naïve Bayes Classifier , Bayesian Belief Network, EM Algorithm

UNIT - III

Dimensionality Reduction: Introduction, Subset selection, principle component analysis, feature embedding, factor analysis, singular value decomposition and matrix factorization, multidimensional scaling, linear discriminant analysis, canonical correlation analysis, Isomap, Locally linear embedding, laplacian eigenmaps, **Clustering:** Introduction, Mixture densities, K- Means clustering, Expectations- Maximization algorithm, Mixture of latent variable models, supervised learning after clustering, spectral clustering, Hierarchal clustering, Choosing the number of clusters, **Nonparametric Methods:** Introduction, Non Parametric density estimation, generalization to multivariate data, nonparametric classification, condensed nearest neighbor, Distance based classification, outlier detection, Nonparametric regression: smoothing models, how to choose the smoothing parameter

UNIT- IV

Linear Discrimination: Introduction, Generalizing the linear model, geometry of the linear discrimination, pair wise separation, parametric discrimination revisited, gradient descent, logistic discrimination, discrimination by regression, learning to rank, **Multilayer Perceptrons:** Introduction, the perceptron, training a perceptron, learning Boolean functions, multilayer perceptrons, MLP as a universal approximator, Back propagation algorithm, Training procedures, Tuning the network size, Bayesian view of learning, dimensionality reduction, learning time, deep learning

UNIT - V

Kernel Machines: Introduction, Optimal separating hyperplane, the non separable case: Soft Margin Hyperplane, v-SVM, kernel Trick, Vectorial kernels, defining kernels, multiple kernel learning, multicast kernel machines, kernel machines for regression, kernel machines for ranking, one-class kernel machines, large margin nearest neighbor classifier, kernel dimensionality reduction, **Graphical models:** Introduction, Canonical cases for conditional independence, generative models, d separation, belief propagation, undirected Graphs: Markov Random files, Learning the structure of a graphical model, influence diagrams.

TEXT BOOKS:

1. Machine Learning – Tom M. Mitchell - McGraw Hill Education, 2017
2. Introduction to Machine learning, Ethem Alpaydin, PHI, 3rd Edition, 2014

REFERENCES:

1. Machine Learning: An Algorithmic Perspective, Stephen Marshland, Taylor & Francis Chapman and Hall/CRC; 2nd edition, 2014
2. Machine Learning For Beginners: A Comprehensive Guide To Understand Machine Learning. How It Works And How Is Correlated To Artificial Intelligence And Deep Learning, Chris Neil, Alicex Ltd, 2020

List of COs	PO no. and keyword	Competency Indicator	Performance Indicator
CO1	PO2. Problem Analysis	2.4	2.4.2
CO2	PO6. The engineer and Society	6.1	6.1.1
CO3	PO1. Engineering knowledge	1.3	1.3.1

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COURSE CODE	COURSE TITLE	L	T	P	CREDITS
19APC0523	WEB PROGRAMMING	3	0	0	3

Course Objectives:
- To introduce client side scripting with JavaScript and DHTML
- To introduce server side programming with Java Servlets, JSP and PHP.
- To learn the basic web concepts and Internet protocols

Course Outcomes:
- Demonstrate knowledge on web page design elements, dynamic content and database Interaction,
- Demonstrate understanding of what is XML and how to parse and use XML data.
- Use HTML, CSS, JavaScript, JQuery, Bootstrap and PHP technologies for web application development
- Design client-server applications using web technologies.
- Able to do server side programming with Java Servelets, JSP and PHP.

UNIT I
Introduction : Fundamentals of HTML, Working with text, Organizing text in HTML, Working with links and URLS, Creating tables, Working with images, Canvas, Forms, Frames and Multimedia.
HTML5: Introduction, HTML5 Document Structure, Creating editable content, checking spelling mistakes, Exploring custom data attributes, Client-Side storage, Drag and drop feature, offline web application, Web communications, Cross-Document messaging and desktop notifications.

UNIT II
CSS: Introduction, CSS Selectors, Inserting CSS in an HTML document, Backgrounds, Fonts and Text Styles, Creating boxes, Displaying, Positioning and floating elements, Features of CSS3, Media Queries.
XML: Basic XML- Document Type Definition XML Schema DOM and Presenting XML, XML Parsers and Validation, XSL and XSLT Transformation, News Feed (RSS and ATOM).

UNIT III
Java Script: An introduction to JavaScript–JavaScript DOM Model-Date and Objects,- Regular Expressions- Exception Handling-Validation-Built-in objects-Event Handling- DHTML with JavaScript. Servlets: Java Servlet Architecture - Servlet Life Cycle- Form GET and POST actions- Session Handling- Understanding Cookies.
JSP Application Development: The Anatomy of a JSP Page, JSP Processing. JSP Application Design and JSP Environment, JSP Declarations, Directives, Expressions, Scripting Elements, implicit objects. Java Beans: Introduction to Beans, Deploying java Beans in a JSP page.
JQuery: Introduction, JQuery selectors, Events, Methods to access HTML elements and attributes, Introduction to AJAX

UNIT IV
Bootstrap: Getting started with Bootstrap, Creating responsive layouts using Bootstrap CSS – Basic HTML Structure for Boostrap, Responsive classes, Rendering images, the grid system, Construing data entry forms.
Introduction to PHP : Variables and data types, Operators, Expressions and Statements, Strings, Arrays and Functions.

UNIT V
PHP Advanced Concepts: Using cookies, Using HTTP Headers, Using sessions, Authenticating Users, Using Environment and configuration variables, Working with date and time.
PHP with MySQL : Interacting with database, Prepared statement, Database Transactions.

Text Books:
1. Deitel and Deitel and Nieto, "Internet and World Wide Web - How to Program", Prentice Hall, 5th Edition, 2011.
2. W.Jason Gilmore, Beginning PHP & MySql, APress, Fourth Edition, 2011.

Reference Books
1. Herbert Schildt, "Java-The Complete Reference", Eighth Edition, Mc Graw Hill Professional, 2011.
2. Core Servlets AND Java Server Pages VOLUME 1: CORE TECHNOLOGIES By Marty Hall and Larry Brown Pearson
3. Snig Bahumik, Bootstrap Essentials, PACKT Publishing, 2015.
4. PHP 5 Recipes A problem Solution Approach Lee Babin, Nathan A Good, Frank M.Kromann and Jon Stephens.

List of COs	PO no. and keyword	Competency Indicator	Performance Indicator
CO1	PO1. Engineering knowledge	1.3	1.3.1
CO2	PO1. Engineering knowledge	1.3	1.3.1
CO3	PO3. Design/development of solutions	3.3	3.3.2
CO4	PO5. Modern tool usage	5.1	5.1.1
CO5	PO5. Modern tool usage	5.1	5.1.1

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COURSE CODE	COURSE TITLE	L	T	P	CREDITS
19APE0504	OBJECT-ORIENTED ANALYSIS AND DESIGN	3	0	0	3

Course Objectives:
This course is designed to:
- Understand the basic concepts of object-oriented techniques
- Build the Model of the software system using UML diagrams
- Elucidate design patterns as templates for good design
- Learn the object-oriented methodology in software design
- Explore testing techniques for object-oriented software

Course outcomes:
Upon completion of the course, the students should be able to:
- Analyze the problem from object oriented perspective
- Model complex systems using UML Diagrams
- Choose the suitable design patterns in software design
- Adapt Object-Oriented Design Principles
- Identify the challenges in testing object-oriented software

Unit – 1: Basic concepts
Basic concepts: objects, classes, abstract classes, data types, ADT, encapsulation and information hiding, inheritance, association, aggregation, composition, polymorphism, dynamic binding, object-oriented principles.

Unit – 2: Modeling Using UML
UML Diagrams: Use case diagrams, class diagrams, various relationships among classes: generalization, association, aggregation, composition, inheritance, dependency etc., object diagram, UML packages, activity diagram, state machine diagram, sequence diagram, communication diagram, interaction overview diagram, component diagram, deployment diagram, UML 2 diagrams.

Unit – 3: Design Patterns
Basic pattern concepts, Types of patterns, some common design patterns such as Expert, Creator, Façade, MVS, MVC, Publish-Subscribe, Observer, Proxy etc.

Unit – 4: Designing using UML
Overview of OOAD methodology, Use case model development, Domain modeling, Identification of entity objects, Brooch's object identification method, Interaction modeling, CRC cards, Applications of the analysis and design process, object-oriented design principles. OOD goodness criteria, CK Metrics, LK Metrics, MOOD Metrics, Code Refactoring

Unit – 5 : Testing Object Oriented Software
Challenges in testing object-oriented software, Implications of object-oriented Features in testing object-oriented software, Importance of grey-box testing of object-oriented software, Coverage analysis, State-based testing, Class testing, Fault-Based Testing, Scenario-Based Test Design, Integration Testing: Thread-based integration Strategies, Use-based integration Strategies, Cluster Testing, Validation Testing, System Testing, Testing tools.

Text Book:
1. "Object- Oriented Analysis And Design with Applications", Grady BOOCH, Robert A. Maksimchuk, Michael W. ENGLE, Bobbi J. Young, Jim Conallen, Kellia Houston, PEARSON, 3rd edition, 2013.
2. "The Unified Modeling Language User Guide", Grady Booch, James Rumbaugh, Ivar Jacobson, PEARSON 12th Impression, 2012.

Reference Books:
1. Rumbaugh and Blaha, Object-oriented Modeling and design with UML, Pearson, 2007
2. Bernd Bruegge and, Allen H. Dutoit, Object-Oriented Software Engineering Using UML, Patterns, and Java, Pearson, 2009

List of COs	PO no. and keyword	Competency Indicator	Performance Indicator
CO1	PO2. Problem Analysis	2.1	2.1.1
CO2	PO3. Design/development of solutions	3.1	3.1.1
CO3	PO3. Design/development of solutions	3.3	3.3.1
CO4	PO4. Conduct investigations of complex problems	4.1	4.1.1
CO5	PO4. Conduct investigations of complex problems	4.2	4.2.1

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COURSE CODE	COURSE TITLE	L	T	P	CREDITS
19APE0505	CYBER SECURITY	3	0	0	3

Course Objectives:
- Appraise the current structure of cyber security roles across the DoD enterprise, including the roles and responsibilities of the relevant organizations.
- Evaluate the trends and patterns that will determine the future state of cyber security

Course Outcomes:
- Analyze threats and risks within context of the cyber security architecture
- Appraise cyber security incidents to apply appropriate response
- Evaluate decision making outcomes of cyber security scenarios

Unit-I
Cyber crime: Mobile and Wireless devices-Trend mobility-authentication service security-Attacks on mobile phones-mobile phone security Implications for organizations- Organizational measurement for Handling mobile-Security policies and measures in mobile computing era. Cases.

Unit-II
Tools and methods used in cyber crime-Proxy servers and Anonymizers – Phishing Password cracking-Key loggers and Spy wares-Virus and worms-Trojan Horse and Backdoors-Steganography-SQL Injection-Buffer overflow-Attacks on wireless network. Cases.

Unit-III
Understanding computer forensic-Historical background of cyber forensic, Forensic analysis of e-mail-Digital forensic life cycle-Network forensic-Setting up a computer forensic Laboratory-Relevance of the OSI 7 Layer model to computer Forensic- Computer forensic from compliance perspectives. Cases.

Unit-IV
Forensic of Hand –Held Devices-Understanding cell phone working characteristics- Hand-Held devices and digital forensic- Toolkits for Hand-Held device-Forensic of i-pod and digital music devices-Techno legal Challenges with evidence from hand-held Devices. Cases.

Unit-V
Cyber Security –Organizational implications-cost of cybercrimes and IPR issues Web threats for organizations: the evils and Perils-Social media marketing Security and privacy Implications-Protecting people privacy in the organizations Forensic best practices for organizations. Cases.

Text book:
1. Nina Godbole & Sunit Belapure "Cyber Security", Wiley India, 2012.

REFERENCES:
1. Harish Chander, "cyber laws & IT protection", PHI learning pvt.ltd, 2012.
2. Dhiren R Patel, "Information security theory & practice",PHI learning pvt ltd,2010.
3. MS.M.K.Geetha & Ms.Swapne Raman"Cyber Crimes and Fraud Management, "MACMILLAN,2012. Pankaj Agarwal : Information Security & Cyber Laws (Acme Learning), Excel, 2013.
4. Vivek Sood, Cyber Law Simplified, TMH, 2012.

List of COs	PO no. and keyword	Competency Indicator	Performance Indicator
CO1	PO2. Problem Analysis	2.1	2.1.1
CO2	PO2. Problem Analysis	2.3	2.3.1
CO3	PO4. Conduct investigations of complex problems	4.3	4.3.4

B.Tech III Year II Semester

COURSE CODE	COURSE TITLE	L	T	P	CREDITS
19APE0506	BIG DATA ANALYTICS	3	0	0	3

Course Objectives

- Understand the basic concepts and importance of Big Data
- Familiarize with the installation of Hadoop and how to analyze the Big Data
- Understand the design concepts of HDFS
- Provide good insight for developing a MapReduce applications
- Understand Hadoop environment.
- Explore the concepts of Pig, Hive, Spark and HBase

Course Outcomes:

Upon completion of the course, the students should be able to:

- Explain the concepts and challenges of big data
- Determine why existing technologies are inadequate to analyze the large data.
- Outline the operations viz. Collect, manage, store, query, and analyze various forms ofbig data.
- Apply large-scale analytic tools to solve some of the open big data problems.
- Analyze the impact of big data for business decisions and strategies.
- Design different big data applications.

UNIT-I
Introduction to Big Data: What is Big Data? Why Big Data is Important? Meet Hadoop, Data, Data Storage and Analysis, Comparison with other systems, History of Apache Hadoop, Hadoop Ecosystem, VMWare Installation of Hadoop. Analyzing the Data with Hadoop, Scaling Out.

UNIT- II
HDFS: The Design of HDFS, HDFS Concepts, The Command-Line Interface, Hadoop File systems, The Java Interface, Data flow.
MapReduce: Developing a MapReduce application, The Configuration API, Setting up theDevelopment Environment, Running Locally on Test Data, Running on a Cluster

UNIT-III
How MapReduce Works: Anatomy of a MapReduce, Job Run, Failures, Shuffle and Sort, TaskExecution.
MapReduce Types and Formats: MapReduce Types, Input formats, output formats.

UNIT-IV
Hadoop Environment: Setting up a Hadoop Cluster, Cluster specification, Cluster Setup andInstallation, Hadoop Configuration, Security.
Pig: Installing and Running Pig, an Example, Comparison with Databases, Pig Latin, User-Defined Functions, Data Processing Operators.

UNIT-V
Hive: Installing Hive, Running Hive, Comparison with traditional Databases, HiveQL, Tables,Querying Data.
Spark: Installing Spark, Resilient Distributed Datasets, Shared Variables, Anatomy of a SparkJob Run.
HBase: HBasics, Installation, clients, Building an Online Query Application.

Text Books:
1. Tom White, "Hadoop: The Definitive Guide"Fourth Edition, O'reilly Media, 2015.
2. Big Data, Big Analytics: Emerging business intelligence and analytic trends for today's businesses, Michael Minnelli, Michelle Chambers, and Ambiga Dhiraj, Wiley Cio Series

Reference Books:
1. Glenn J. Myatt, Making Sense of Data , John Wiley & Sons, 2007 Pete Warden,Big DataGlossary, O'Reilly, 2011.
2. Michael Berthold, David J.Hand, Intelligent Data Analysis, Spingers, 2007.
3. Chris Eaton, Dirk DeRoos, Tom Deutsch, George Lapis, Paul Zikopoulos,Uderstanding BigData : Analytics for Enterprise Class Hadoop and Streaming Data, McGraw Hill Publishing,2012.
4. Anand Rajaraman and Jeffrey David UIIman, Mining of Massive Datasets CambridgeUniversity Press, 2012.

List of COs	PO no. and keyword	Competency Indicator	Performance Indicator
CO1	PO1. Engineering knowledge	1.3	1.3.1
CO2	PO2. Problem Analysis	2.2	2.2.2
CO3	PO1. Engineering knowledge	1.3	1.3.1

CO4	PO5. Modern tool usage	5.3	5.3.2
CO5	PO7. Environment and sustainability	7.1	7.1.1
CO6	PO3. Design/development of solutions	3.4	3.4.3

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COURSE CODE	COURSE TITLE	L	T	P	CREDITS
19AHEMB02	ENTREPRENEURSHIP DEVELOPMENT	3	0	0	3

Course Outcomes:

- Understand the concept of Entrepreneurship and challenges in the world of Competition.
- Apply the Knowledge in generating ideas for New Ventures and design business plan structure.
- Analyze various sources of finance and subsidies to entrepreneurs.
- Evaluate the role of central government and state government in promoting women Entrepreneurship.
- Study the role of incubations in fostering startups.

UNIT-I : Introduction to Entrepreneurship
Entrepreneurship - Concept, knowledge and skills requirement - Characteristics of successful entrepreneurs - Entrepreneurship process - Factors impacting emergence of entrepreneurship - Differences between Entrepreneur and Intrapreneur - Understanding individual entrepreneurial mindset and personality - Recent trends in Entrepreneurship.

UNIT – II: Formulation of Business Idea
Starting the New Venture - Generating business idea – Sources of new ideas & methods of generating ideas - Opportunity recognition - Feasibility study - Market feasibility, technical/operational feasibility - Financial feasibility - Drawing business plan - Preparing project report - Presenting business plan to investors.

UNIT – III: Financial Aspects of Promotion
Sources of finance - Various sources of Finance available - Long term sources - Short term sources - Institutional Finance – Commercial Banks, SFC's in India - NBFC's in India - their wayof financing in India for small and medium business - Entrepreneurship development programs in India - The entrepreneurial journey- Institutions in aid of entrepreneurship development.

UNIT – IV: Women Entrepreneurship
Women Entrepreneurship - Entrepreneurship Development and Government - Role of Central Government and State Government in promoting women Entrepreneurship - Introduction to various incentives, subsidies and grants – Export- oriented Units - Fiscal and Tax concessions available - Women entrepreneurship - Role and importance - Growth of women entrepreneurshipin India - Issues & Challenges - Entrepreneurial motivations.

UNIT – V: Startups and Incubation
Startups – Definition, Role of startups in India, Governmental initiatives to foster entrepreneurship across sectors. Funding opportunities for startups. Business Incubation and its benefits, Pre-Incubation and Post - Incubation process.

Textbooks:
1. D F Kuratko and T V Rao, "Entrepreneurship" - A South-Asian Perspective – Cengage Learning, 2012. (For PPT, Case Solutions Faculty may visit : login.cengage.com)
2. Nandan H, " Fundamentals of Entrepreneurship", PHI, 2013.

Reference Books:
1. Vasant Desai, "Small Scale Industries and Entrepreneurship", HimalayaPublishing 2012.
2. Rajeev Roy "Entrepreneurship", 2nd Edition, Oxford, 2012.
3. B.Janakiram and M.Rizwana‖ "Entrepreneurship Development: Text &Cases", Excel Books, 2011.
4. Stuart Read, Effectual "Entrepreneurship", Routledge, 2013.

Online Learning Resources:
1. Entrepreneurship-Through-the-Lens-of-enture Capital
2. http://www.onlinevideolecture.com/?course=mba-programs&subject=entrepreneurship
3. http://nptel.ac.in/courses/122106032/Pdf/7_4.pd
4. http://freevideolectures.com/Course/3514/Economics-/-Management-/- Entrepreneurship/50

List of Cos	PO no. and keyword	Competency Indicator	Performance Indicator
CO1	PO1: Engineering Knowledge	1.2 1.3	1.2.1 1.3.1
CO2	PO3: Design/Development of Solutions	3.2	3.2.1 3.2.2
CO3	PO11: Project management and finance	11.2	11.2.1
CO4	PO6: The engineer and society	6.2	6.2.1
CO5	PO3: Design/Development of Solutions	3.3	3.2.2

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COURSE CODE	COURSE TITLE	L	T	P	CREDITS
19APC0216	NEURAL NETWORKS AND FUZZY LOGIC	3	0	0	3

Course Outcomes:

1. Understand the basic architecture of artificial neural network terminologies and techniques.
2. Understand approaches and architectures of Artificial Intelligence.
3. Perform the training of neural networks using various learning rules.
4. Create different neural networks of various architectures both feed forward and feed backward.
5. Application of ANN to System Identification and Pattern recognition.

UNIT – I ARTIFICIAL NEURAL NETWORKS
Approaches to AI – Architectures of AI – Symbolic Reasoning System – Rule based Systems – Knowledge Representation – Expert Systems. Introduction and motivation: Neural Network, Human Brain, Structure of biological neuron, Memory, Comparison between Artificial and Biological Neural Networks – Basic Building Blocks of ANN – Artificial Neural Network Terminologies, Artificial Intelligence and Neural Networks.

UNIT – II
Learning Process: Layers, activation functions, learning methods: Error Correction Learning, Memory Based Learning, Hebbian Learning, Competitive, Boltzmann Learning, Memory, Adaption, Back Propagation and Differentiation, Supervised Learning, unsupervised learning.

UNIT – III NETWORKS
Basic Building Blocks of ANN – Artificial Neural Network Terminologies – McCulloch Pitts Neuron Model – Learning Rules – ADALINE and MADALINE Models – Perceptron Networks – Back Propagation Neural Networks – Associative Memories - Self-Organization Map – Hopfield models – ART networks.

UNIT – IV UNIT – IV FUZZYLOGC
Classical Sets – Fuzzy Sets – Fuzzy Properties and Operations – Fuzzy Logic System
– Fuzzification – Defuzzification – Membership Functions – Fuzzy Rule base – Fuzzy Logic Controller Design.

UNIT – V FUZZY LOGIC APPLICATIONS
Fuzzy pattern recognition – Fuzzy control system – Aircraft landing control problem - Statistical process control- Fuzzy cognitive mapping – Probability measures – Possibility and necessity measures.

TEXT BOOKS:
1. S. N. Sivanandam, S. Sumathi and S. N. Deepa, "Introduction to Neural Networks using MATLAB", McGraw Hill Edition, 2006.
2. Timothy J. Ross, "Fuzzy Logic with Engineering Applications", Third Edition, WILEY India Edition, 2012.

REFERENCES:

1. S. N. Sivanandam, S. Sumathi and S. N. Deepa, "Introduction to Fuzzy Logic using MATLAB", Springer International Edition, 2013.
2. Laurene V. Fausett "Fundamentals of Neural Networks: Architectures, Algorithms and Applications" United States Edition.
3. Yung C. Shin and Chengying Xu, "Intelligent System – Modeling, Optimization & Control, CRC Press, 2009.

List of COs	PO no. and keyword	Competency Indicator	Performance Indicator
CO1	PO1. Engineering knowledge	1.3	1.3.1
CO2	PO1. Engineering knowledge	1.3	1.3.1
CO3	PO5. Modern tool usage	5.1	5.1.2
CO4	PO3. Design/development of solutions	3.3	3.3.1
CO5	PO6. The engineer and Society	6.1	6.1.1

B.Tech III Year II Semester

COURSE CODE	COURSE TITLE	L	T	P	CREDITS
19APE0413	CELLLULAR AND MOBILE COMMUNICATIONS	3	0	0	3

Course Outcomes:
Upon completion of the course students will be able to
CO1: understand impairments due to multipath fading channel..
CO2: Understand the fundamental techniques to overcome the different fading effects.
CO3: To understand Co-channel and Non Co-channel interferences
CO4: Able to familiar with cell coverage for signal and traffic, diversity techniques and mobile antennas.
CO5: Understanding of frequency management, channel assignment and types of handoff

UNIT I:
CELLULAR MOBILE RADIO SYSTEMS: Introduction to Cellular Mobile system, performance criteria, uniqueness of mobile radio environment, operation of cellular systems, Hexagonal shaped cells, Analog and Digital Cellular systems.
ELEMENTS OF CELLULAR RADIO SYSTEM DESIGN: General description of the problem, concept of frequency channels, Co-channel Interference Reduction Factor, desired C/I from a normal case in a Omni directional Antenna system, Cell splitting, consideration of the components of cellular system.

UNIT II:
INTERFERENCE: Introduction to Co-channel interference, real time co-channel interference, Co-channel measurement, design of Antenna system, Antenna parameters and their effects, diversity receiver, non-co-channel interference-different types.

UNIT III:
CELL COVERAGE FOR SIGNAL AND TRAFFIC: Signal reflections in flat and hilly terrain, effect of human made structures, phase difference between direct and reflected paths, constant standard deviation, straight line path loss slope, general formula for mobile propagation over water and flat open area, near and long distance propagation antenna height gain, form of a point to point model.

UNIT IV:
CELL SITE AND MOBILE ANTENNAS: Sum and difference patterns and their synthesis, Omni directional antennas, directional antennas for interference reduction, space diversity antennas, umbrella pattern antennas, minimum separation of cell site antennas, high gain antennas.
FREQUENCY MANAGEMENT AND CHANNEL ASSIGNMENT: Numbering and grouping, setup access and paging channels channel assignments to cell sites and mobile units, channel sharing and borrowing, sectorization, overlaid cells, non-fixed channel assignment.

UNIT V:
HANDOFF: Handoff, dropped calls and cell splitting, types of handoff, handoff invitation, delaying handoff, forced handoff, mobile assigned handoff. Intersystem handoff, cell splitting, micro cells, vehicle locating methods, dropped call rates and their evaluation.
DIGITAL CELLULAR NETWORKS: GSM architecture, GSM channels, multiplex access scheme, TDMA, CDMA.

TEXT BOOKS:
1. Mobile cellular telecommunications-W .C. Y. Lee, Tata Mc-Graw Hill, 2nd Edition, 2006.
2. Wireless communications-Theodore. S. Rapport, Pearson Education,2nd Edn., 2002.

REFERENCES:
1. Principles of Mobile Communications – Gordon L. Stuber, Springer International 2nd Edition, 2001.
2. Modern Wireless Communication –Simon Haykin Michael Moher, Persons Eduction, 2005.
3. Wireless Communication theory and Techniques, Asrar U.H .Sheikh ,Springer, 2004.

List of COs	PO no. and keyword	Competency Indicator	Performance Indicator
CO1	PO1. Engineering knowledge	1.3	1.3.1
CO2	PO2. Problem Analysis	2.2	2.2.2
CO3	PO2. Problem Analysis	2.2	2.2.2
CO4	PO1. Engineering knowledge	1.4	1.4.1
CO5	PO5. Modern tool usage	5.1	5.1.1

B.Tech III Year II Semester

COURSE CODE	COURSE TITLE	L	T	P	CREDITS
19APC0525	COMPUTER NETWORKS LAB	0	0	2	1

Course Outcomes:
After the completion of the course the student can able to:
CO1: Deal with Error detection/ correction techniques
CO2: Learn about Data link layer protocols
CO3: Learn about network layer protocols
CO4: Able to get knowledge about simulator

List of Experiments
1. Implementation of Error Detection / Error Correction Techniques
2. Implementation of Stop and Wait Protocol and sliding window
3. Implementation and study of Goback-N and selective repeat protocols
4. Implementation of High Level Data Link Control
5. Write a socket Program for Echo/Ping/Talk commands.
6. To create scenario and study the performance of network with CSMA / CA protocol and compare with CSMA/CD protocols.
7. Implementation of Link state routing algorithm
8. Implement the data link layer framing methods such as character, character-stuffing and bitstuffing.
9. Write a program to compute CRC code for the polynomials CRC-12, CRC-16 and CRC CCIP
10. Develop a simple data link layer that performs the flow control using the sliding window protocol,and loss recovery using the Go-Back-N mechanism.
11. Implement Dijsktra's algorithm to compute the shortest path through a network
12. Take an example subnet of hosts and obtain a broadcast tree for the subnet.
13. Implement distance vector routing algorithm for obtaining routing tables at each node.
14. Write a program for congestion control using Leaky bucket algorithm.
15. Do the following using NS2 Simulator
    a. NS2 Simulator-Introduction
    b. Simulate to Find the Number of Packets Dropped
    c. Simulate to Find the Number of Packets Dropped by TCP/UDP
    d. Simulate to Find the Number of Packets Dropped due to Congestion
    e. Simulate to Compare Data Rate& Throughput.
    f. Simulate to Plot Congestion for Different Source/Destination
    g. Simulate to Determine the Performance with respect to Transmission of Packets

Reference Books:

1. Shivendra S.Panwar, Shiwen Mao, Jeong-dong Ryoo, and Yihan Li, ─TCP/IP Essentials A Lab-Based Approach‖, Cambridge University Press, 2004.
2. Cisco Networking Academy, ─CCNA1 and CCNA2 Companion Guide‖, Cisco Networking Academy Program, 3rd edition, 2003.
3. Ns Manual, Available at: https://www.isi.edu/nsnam/ns/ns-documentation.html, 2011.
4. Elloitte Rusty Harold, ─Java Network Programming‖, 3rd edition, O‘REILLY, 2011.

List of Cos	PO no. and keyword	Competency Indicator	Performance Indicator
CO1	PO4. Conduct investigations of complex problems	4.1	4.1.1
CO2	PO 1: Engineering knowledge	1.3	1.3.1
CO3	PO 1: Engineering knowledge	1.3	1.3.1
CO4	PO 1: Engineering knowledge	1.3	1.3.1

B.Tech III Year II Semester

COURSE CODE	COURSE TITLE	L	T	P	CREDITS
19APC0518	GRID AND CLOUD COMPUTING LAB	0	0	2	1

Course Objectives:

The student should be made to:

- Be familiar with developing web services/Applications in grid framework.
- Be exposed to tool kits for grid and cloud environment.
- Learn to use Hadoop
- Learn to run virtual machines of different configuration.

Course Outcomes:

The student should be able to

- Design and Implement applications on the Cloud.
- Design and implement applications on the Grid.
- Use the grid and cloud tool kits.

GRID COMPUTING PROGRAMS USING GRIDSIM

1. Program to creates one Grid resource with three machines
2. Program to to create one or more Grid users. A Grid user contains one or more Gridlets
3. Program to shows how two GridSim entities interact with each other ; main(i.e. example3 class) creates Gridlets and sends them to the other GridSim entities, i.e. Test class
4. Program shows how a grid user submits its Gridlets or tasks to one grid resource entity
5. Program to show how a grid user submits its Gridlets or task to many grid resource entities
6. Program to show how to create one or more grid users and submits its Gridlets or task to many grid resource entities
7. Program to creates one Grid resource with three machines

Grid computing programs using Use Globus Toolkit or equivalent:

- Develop a new Web Service for Calculator.
- Develop new OGSA-compliant Web Service.
- Using Apache Axis develop a Grid Service.
- Develop applications using Java or C/C++ Grid APIs
- Develop secured applications using basic security mechanisms available in Globus Toolkit.
- Develop a Grid portal, where user can submit a job and get the result. Implement it with and without GRAM concept.

CLOUD COMPUTING
Programs on SaaS

1. Create a word document of your class time table and store locally and on the cloud with doc, and pdf format. (use www.zoho.com and docs.google.com)
2. Create a spread sheet which contains employee salary information and calculate gross and total sal using the formula
   DA=10% OF BASIC HRA=30% OF BASIC
   PF=10% OF BASIC IF BASIC<=3000 12% OF BASIC IF BASIC>3000 TAX=10% OF BASIC IF BASIC<=1500
   =11% OF BASIC IF BASIC>1500 AND BASIC<=2500
   =12% OF BASIC IF BASIC>2500
   NET_SALARY=BASIC_SALARY+DA+HRA-PF-TAX
3. Prepare a ppt on cloud computing –introduction , models, services ,and architecture
4. Create your resume in a neat format using google and zoho cloud

Programs on PaaS

1. Write a Google app engine program to generate n even numbers and deploy it to google cloud
2. Google app engine program multiply two matrices
3. Google app engine program to validate user ; create a database login(username, password) in mysql and deploy to cloud
4. Write a Google app engine program to display nth largest no from the given list of numbers and deploy it into google cloud
5. Google app engine program to validate the user Use mysql to store user info and deploy on to the cloud
6. Implement Prog 1-5 using Microsoft Azure

List of COs	PO no. and keyword	Competency Indicator	Performance Indicator
CO1	PO3. Design/development of solutions	3.3	3.3.1
CO2	PO3. Design/development of solutions	3.3	3.3.1
CO3	PO5. Modern tool usage	5.1	5.1.1

B.Tech III Year II Semester

COURSE CODE	COURSE TITLE	L	T	P	CREDITS
19APC0524	WEB PROGRAMMING LAB	0	0	2	1

Course Objectives:
- To introduce client side scripting with JavaScript and DHTML
- To introduce server side programming with Java Servlets, JSP and PHP.
- To learn the basic web concepts, protocols and frameworks for web development.

Course Outcomes:
- Demonstrate knowledge on web page design elements, dynamic content and database Interaction,
- Demonstrate understanding of XML and how to parse and use XML data.
- Use HTML, CSS, JavaScript, JQuery, Bootstrap and PHP technologies for web application development
- Design client-server applications using web technologies.
- Able to do server side programming with Java Servlets, JSP and PHP.
- Able to do bootstrap programming on WebPages.

1. To create a simple student bio-data form using html5. It should contain the following name (text box), address (multiline text box), gender (radio button male, female), skill sets known (check boxes – c, c++, java, C# etc), extra-curricular activities (text box), nationality (combo box), submit and reset button.
2. To create an html page with different types of frames such as floating frame, navigation frame & mixed frame.
3. Design the webpage by applying the different styles using inline, external & internal style sheets.
4. Write an HTML page that contains a selection box with a list of 5 countries. When the user selects a country, its capital should be printed next to the list. Add CSS to customize the properties of the font of the capital (color, bold and font size).
5. Design a webpage with Header, unequal columns and footer and give background colors and images through external CSS.
6. Create and save an XML document at the server, which contains 10 users information. Write a program which takes User Id as input and returns the user details by taking the user information from the XML document.
7. Write an XML file which will display the Book information which includes the following:
1) Title of the book   2) Author Name   3) ISBN number   4) Publisher name 5) Edition   6) Price
Write a Document Type Definition (DTD) to validate the above XML file.
8. To write a JavaScript program to define a user defined function for sorting the values in an array. Use HTML5 for user interface.
9. Write a JSP Servlet program to implement the single text field calculator.
10. To create an html page to demonstrate exception handling in JavaScript, Create an html page named as ─exception.html and do the following.
i. within the script tag write code to handle exception
a) Define a method RunTest() to get any string values (str) from the user and call the method Areletters(str).
b) In Areletters(str) method check whether str contain only alphabets (a-z, AZ), if not throw exception.
c) Define a exception method Input Exception (str) to handle the exception thrown by the above method.
11. Write a JSP Servlet program to demonstrate session handling using
a) url rewriting   b) hidden form field   c) cookies   d) sessions
12. Assume four users user1, user2, user3 and user4 having the passwords pwd1, pwd2, pwd3 and, pwd4 respectively. Write a Servlet for doing the following.
a) Create a Cookie and add these four user id's and passwords to this Cookie.
b) Read the user id and passwords entered in the Login form (week1) and authenticate with the values (user id and passwords) available in the cookies.
If he is a valid user(i.e., user-name and password match) you should welcome him by name(user-name) else you should display " You are not an authenticated user "
13. Design a program for embedding the bootstrap images in to a web pages in following ways
a) Rounded Corners   b) Circle   c) Thumbnail
14. Design a program for displaying various alerts in bootstrap as following
i) Success message ii) Danger message iii) Info message iv) Warning message.
15. Write a program in PHP for a simple email processing with attachment using forms
16. Design PHP codes for the following queries:
a) Find out area of a triangle, rectangle, hexagon.
b) Reverse a number, string & swap numbers.
c) Find out palindrome of a number & string.

List of COs	PO no. and keyword	Competency Indicator	Performance Indicator
CO1	PO1. Engineering knowledge	1.3	1.3.1
CO2	PO1. Engineering knowledge	1.4	1.4.1
CO3	PO3. Design/development of solutions	3.3	3.3.1
CO4	PO3. Design/development of solutions	3.3	3.3.2
CO5	PO5. Modern tool usage	5.1	5.1.1
CO6	PO5. Modern tool usage	5.1	5.1.1

B.Tech III Year II Semester

COURSE CODE	COURSE TITLE	L	T	P	CREDITS
19AMC9902	Constitution Of India	2	0	0	0

Course Outcome:

Students will be able to:

1. Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.
2. Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.
3. Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution.
4. Discuss the Powers and functions of Governor, President, and Judiciary.
5. Discuss the functions of local administration bodies

UNIT - I

History of Making of the Indian Constitution - History Drafting Committee, (Composition & Working).

UNIT - II

Philosophy of the Indian Constitution - Preamble Salient Features

UNIT – III

Contours of Constitutional Rights & Duties **-** Fundamental Rights **-** Right to Equality**-** Right to Freedom **-** Right against Exploitation **-** Right to Freedom of Religion **-** Cultural and Educational Rights **-** Right to Constitutional Remedies **-** Directive Principles of State Policy **-** Fundamental Duties.

UNIT – IV

Organs of Governance - Parliament - Composition - Qualifications and Disqualifications - Powers and Functions - Executive •President •Governor - Council of Ministers - Judiciary, Appointment and Transfer of Judges, Qualifications - Powers and Functions

UNIT – V

Local Administration - District's Administration head: Role and Importance - Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation- Panchayati raj: Introduction, PRI: Zilla Panchayat - Elected officials and their roles, CEO Zilla Panchayat: Position and role - Block level: Organizational Hierarchy (Different departments) - Village level: Role of Elected and Appointed officials - Importance of grass root democracy.

Suggested books for reading:

1. The Constitution of India, 1950 (Bare Act), Government Publication.
2. Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015.
3. M. P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014.
4. D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015.

List of COs	PO no. and keyword	Competency Indicator	Performance Indicator
CO1		6.2	6.2.1
CO2		6.2	6.2.1
CO3		6.2	6.2.1
CO4		6.2	6.2.1
CO5		6.2	6.1.1