JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA
KAKINADA – 533 003, Andhra Pradesh, India
DEPARTMENT OF CSE - COMPUTER SCIENCE & BUSINESS SYSTEMS

COURSE STRUCTURE AND SYLLABUS

For UG – R20

B. Tech - COMPUTER SCIENCE & ENGINEERING with Specialization

Common to

(i) CSE (COMPUTER SCIENCE & BUSINESS SYSTEMS) – Branch Code: 48
(ii) COMPUTER SCIENCE & BUSINESS SYSTEMS - Branch Code: 57

(Applicable for batches admitted from 2020-2021)

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DEPARTMENT OF CSE - COMPUTER SCIENCE & BUSINESS SYSTEMS

IV Year – I SEMESTER

S.No.	Course Code	Course Title	L	T	P	C
1	PEC4101	**Professional Elective courses – III** 1.Business Strategy 2. Business Environment 3. Internet of Things 4 Machine Learning 5. Social & Web Analytics	3	0	0	3
2.	PEC4102	**Professional Elective courses – IV** 1. Financial Management 2. Cloud Computing 3. Mean Stack Technologies 4. Business Intelligence 5. IT Project Management	3	0	0	3
3.	PEC4103	**Professional Elective courses - V** 1.Deep Learning 2.Services Science and Service Operational Management 3. Block chain Technologies 4.Human Resource Management 5.Consumer Buying behaviour	3	0	0	3
4.	OEC4101	**Open Elective-III** Open Electives offered by other departments/ DevOps (Job Oriented Course)	3	0	0	3
5.	OEC4102	**Open Elective-IV** Open Electives offered by other departments/ Multimedia And Rich Internet Applications (Job Oriented Course)	3	0	0	3
6.	HSMC4101	**Humanities and Social Science Elective** 1.Universal Human Values 2. Human Resources Development 3. Innovation And Entrepreneurship 4. Management And Organisational Behaviour 5. Strategic Management	3	0	0	3
7.	SC4101	Multimedia Application Development	0	0	4	2
8.	Industrial/Research Internship 2 Months (Mandatory) after third year (to be evaluated during VII semester)		0	0	0	3
	Total credits					**23**
		Minor courses	4	0	0	4
		Minor courses through SWAYAM	0	0	0	2

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IV Year – II SEMESTER

Sl. No.	Category	Code	Course Title	Hours per week			Credits
1	Major Project	PROJ	Project Project work, seminar and internship in industry	-	-	-	12
	INTERNSHIP (6 MONTHS)						
			Total credits				**12**

Open Electives to be offered by CSBS for Other Branches:

Open Elective I: 1. Data Structures 2. Fundamentals of Management 3. Data Base Management Systems 4.Problem Solving using python	**Open Elective II:** 1. Java programming 2. Web Technologies 3. Machine Learning 4. Business Strategy
Open Elective III: 1. Big Data Analytics 2. IT Project Management 3. Data Science 4. Mean Stack Technologies	**Open Elective IV:** 1. Internet of things 2. Marketing Research and Marketing Management 3. Human Resource Management 4.Cloud Computing

Minor Degree in CSBS offered to other branches

S.No	Year and Sem	Subject Title	L	T	P	C
1	II Year II Sem	Business Statistics	3	1	0	4
2	III Year I Sem	Financial & Cost Accounting	3	1	0	4
3	III Year II Sem	Human Resource Management	3	1	0	4
4	IV Year I Sem	Entrepreneurship	3	1	0	4
5		02 MOOCS courses @ 2credits each ** 1. Managerial Skills for Interpersonal Dynamics 2. Business Analytics and Data mining modelling using R 3. Web based Technologies and Multimedia Applications 4. Consumer Behaviour				4
		Grand Total				20

Note: Out of the 20 Credits, 16 credits shall be earned by specified courses listed above. In addition to the 16 credits, students must pursue at least 2 courses through MOOCs. The courses must be of minimum 8 weeks in duration. Student can register at any time after the completion of II B.Tech. I Sem.

****Choose 02 MOOCS courses @ 2credits each from SWAYAM/NPTEL.**

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IV Year–I Semester		L	T	P	C
		3	0	0	3
BUSINESS STRATEGY					

Course Objectives:

- *To familiarize the students the concepts of Strategic Management and its process.*
- *To learn the Core competencies available within the firm to gain sustainable competitive advantage.*
- *To understand the forces of industry attractiveness and industry life cycle stages.*
- *To identify the strategic alternatives for growth of a firm, their evaluation and implementation.*

Course Outcomes:

- *Students are able to learn the fundamental concepts of strategic management to analyze business*

  situations and apply these concepts to solve business problems.
- *The Course will helps the students to understand the fundamental principles of and interrelationships among business functions such as: R&D, Production, Marketing, Finance, HR and Information technology.*
- *Students are able to understand the inter-relationships of business to Individuals, other Organizations, Government and Society.*
- *Course helps the students to analyze Complex, Unstructured Qualitative and Quantitative Problems by using appropriate Tools.*

UNITI

Strategic Management Introduction: Importance of Strategic Management, Vision, Mission and Objectives, Schools of thought in Strategic Management, Strategy Content, Process, and Practice, Fit Concept and Configuration Perspective in Strategic Management.

UNITII

Internal Environment of Firm- Recognizing a Firm's Intellectual Assets: Core Competence as the Root of Competitive Advantage, Sources of Sustained Competitive Advantage, Business Processes and Capabilities-based Approach to Strategy.

UNITIII

External Environments of Firm- Competitive Strategy: Five Forces of Industry Attractiveness that Shape Strategy, The concept of Strategic Groups, and Industry Life Cycle, Generic Strategies, Generic Strategies and the Value Chain.

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UNITIV

Corporate Strategy, Growth Strategies, Strategy Implementation: The Motive for Diversification, Related and Unrelated Diversification, Business Portfolio Analysis, Expansion, Integration and Diversification, Strategic Alliances, Joint Ventures, and Mergers & Acquisitions,

UNITV

Structure and Systems: The 7S Framework, Strategic Control and Corporate Governance

Text Books:

1. Robert M. Grant (2012). Contemporary Strategic Management, Blackwell, 7th Edition.
2. Azhar Kazmi (2008) Strategic Management and Business Policy, McGraw Hill Publications, 3rd Edition.
3.Michael E. Porter, Competitive Strategy, 1980.

Reference Books:

1. M.E. Porter, Competitive Advantage, 1985
2. Richard Rumelt (2011) Good Strategy Bad Strategy: The Difference and Why It Matters.

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IV Year–I Semester		L	T	P	C
		3	0	0	3
BUSINESS ENVIRONMENT					

Course Objectives:

1. To enable students, understand the opportunities and challenges of prevailing and desirable Global business environment in which business has to operate.
2. Provide an understanding of the role of business in society.
3. To enable students read, research and discuss the issues through written papers, presentations, Industrial visits and role plays in class seminars.

Course Outcomes:

At the end of the course, the student will be able to:

1. Understand the opportunities and challenges of prevailing and desirable Global business environment in which business has to operate.
2. Provide an understanding of the role of business in society.
3. To enable students read, research and discuss the issues through written papers, presentations, Industrial visits and role plays in class seminars

UNIT-I: Micro Economic Environment

Relevance of demand analysis in Business Decision-making: Law of Demand; Elasticity of Demand; Determinants of Demand; Individual, firm and Market demand; Demand Curve and its nature; Demand Forecasting Techniques; Different Market Structures and Pricing under each structure; Cost concepts: Types of cost; Relationship between Average and Marginal Cost in Short run and long run; Production functions in short and long run; Wages and wage differentials.

Unit II: Macro Economic Environment

Inflation, poverty, unemployment and GDP3. Role of government in business-Fiscal and Monetary Policies; Liberalization, Privatization and Globalization of Economy and its consequences; MNCs; World Trade Organization; FDI, FPI, Special Economic Zone - Environmental Issues Outsourcing and Collaboration - Inclusive and Sustainable Development

UNIT-III: Political and Legal Environment

Bureaucracy, Corruption Level, Societal Outlook and Orientation; Introduction to Companies Act, 1956: Definition, Characteristics and types of Companies; Formation and winding-up of Company; Appointment, powers and duties of Directors; Introduction to Consumer Protection Act, 1986: Rights of Consumers; Redressal Machinery under the Act. Introduction to Competition Act 2002: Anti-Competitive Agreements, Regulation of Combinations, Competition Commission of India. Introduction to Goods and Service Tax (GST): Registration under GST; Supply under GST and Valuation of Supply; Input Tax Credit under GST & Returns.

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UNIT-IV: Socio-Cultural Environment

Population & its Growth Rate, Education Levels, Age Distribution and Life Expectancy Rates Family Size and Structures, Gender Distribution, Religion, Nationality and Beliefs and Minorities Social classes and Lifestyle, Average Disposable Income - Attitude towards Product Quality and Customer Service, Buying Habits, Environmental Consciousness, Work and Leisure, Health Consciousness, Risk Taking Ability.

UNIT-V: Technological Environment

Basic Infrastructure Level - Energy, Transport, Communication, Science and Technology. Research and Development, Product and Process Innovation, Rate of Technological Change and Penetration Levels, Protection of Intellectual Property Rights - Technological Leadership and Followers, Technology and Competitive Advantage, Time Lags in Technology Introduction, Adaptation, Transfer of Technology - Internet Infrastructure

TEXT BOOKS:

1. Francis Cherunilam: Business Environment – Text and Cases, Himalaya Publishing House, New Delhi.
2. A.C. Fernando, Business Environment, Pearson.
3. Ian Worthington and Chris Britton: The Business Environment, Prentice Hall
4. Shaikh Saleem, Business Environment, Pearson

REFERENCE BOOKS:

1. Rudder Dutt and Sundharam, K.P.M.: Indian Economy, S. Chand & Company Limited, New Delhi.
2. Managerial Economics and Business Strategy by Michael R Baye and Jeff Prince (2017); Mc Graw Hill Education, Eighth Edition.
3. Managerial Economics: Principles and Worldwide Applications by Dominick Salvatore and Siddartha k rastogi (2016); Oxford Higher Education.
4. Managerial Economics by D N Dwivedi (2015); Vikas Publishing House.
5. Principles of Macroeconomics (7th Edition) by Karl E. Case, Ray C. Fair, Publisher: Prentice Hall
6. Macroeconomics: Principles and Tools (3rd Edition) by Arthur O'Sullivan, Steven M. Sheffrin, Publisher: Prentice Hall
7. Peterson, HC and W.C.Lewis, MANAGERIAL ECONOMICS, Prentice-Hall of India, New Delhi.

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IV Year–I Semester		L	T	P	C
		3	0	0	3
INTERNET OF THINGS					

Course Objectives:

- *Identify problems that are amenable to solution by AI methods, and which AI methods may be suited to solving a given problem*
- *Formalize a given problem in the language/framework of different AI methods (e.g., as a search problem, as a constraint satisfaction problem, as a planning problem, as a Markov decision process, etc)*
- *Implement basic AI algorithms (e.g., standard search algorithms or dynamic programming)*
- *Design and carry out an empirical evaluation of different algorithms on problem formalization, and state the conclusions that the evaluation supports*

Course Outcomes:

- *Describe the usage of the term 'the internet of things' in different contexts*
- *Discover the various network protocols used in IoT and familiar with the key wireless technologies used in IoT systems, such as Wi-Fi, 6LoWPAN, Bluetooth and ZigBee*
- *Define the role of big data, cloud computing and data analytics in a typical IoT system Design a simple IoT system made up of sensors, wireless network connection, data analytics and display/actuators, and write the necessary control software*
- *Build and test a complete working IoT system*

UNITI

The Internet of Things: An Overview of Internet of Things, Internet of Things Technology, behind IoTs Sources of the IoTs, M2M Communication, Examples of IoTs, Design Principles For Connected Devices.

UNITII

Modified OSI Stack for the IoT/M2M Systems, ETSI M2M domains and High-level capabilities, Communication Technologies, Data Enrichment and Consolidation and Device Management Gateway Ease of designing and affordability.

UNITIII

Design Principles for the Web Connectivity for connected-Devices, Web Communication protocols for Connected Devices, Message Communication protocols for Connected Devices, Web Connectivity for connected-Devices.

UNITIV

Data link layer of IoT, Wireless Communication Technologies, Wired Communication Technologies, Manet Networks: Network Layer of IoT, 6lowPAN adaptation layer for devices with limited resources, Dynamic routing protocols for wireless adhoc networks Communication protocols for IoT, Service oriented protocol(COAP), Communication protocols based on the exchange of messages(MQTT), Service discovery protocols.

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UNITV

Data Acquiring, Organizing and Analytics in IoT/M2M, Applications/ Services/ Business Processes, IOT/M2M Data Acquiring and Storage, Business Models for Business Processes in the Internet Of Things, Organizing Data, Transactions, Business Processes, Integration and Enterprise Systems.

Text Books:

1) Internet of Things: Architecture, Design Principles And Applications, Rajkamal, McGraw Hill Higher Education.

2) Internet of Things, A.Bahgya and V.Madisetti, Univesity Press, 2015.

Reference Books:

1) An Introduction to Internet of Things, Connecting devices, Edge Gateway and Cloud with Applications, Rahul Dubey, Cengage, 2019.

2) IoT Fundamentals, Networking Technologies, Protocols and Use Cases for the Internet of Things, David Hanes, Gonzalo Salgueiro, Patrick Grossetette, rob Barton, Jerome Henry, CISCO, Pearson, 2018.

3) Designing the Internet of Things, Adrian McEwen and Hakim Cassimally, Wiley.

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IV Year – I Semester		L	T	P	C
		3	0	0	3
MACHINE LEARNING					

Course Objectives:

- Gain knowledge about basic concepts of Machine Learning
- Study about different learning algorithms
- Learn about of evaluation of learning algorithms
- Learn about Dimensionality reduction

Course Outcomes: At the end of the course, the students will be able to:

- Identify machine learning techniques suitable for a given problem
- Solve the problems using various machine learning techniques
- Apply Dimensionality reduction techniques
- Design application using machine learning techniques

UNIT I:Introduction

Definition of learning systems, Goals and applications of machine learning, Aspects of developing a learning system: training data, concept representation, function approximation. Inductive Classification: The concept learning task, Concept learning as search through a hypothesis space, General-to-specific ordering of hypotheses, Finding maximally specific hypotheses, Version spaces and the candidate elimination algorithm, Learning conjunctive concepts, The importance of inductive bias.

UNIT II :Decision Tree Learning

Representing concepts as decision trees, Recursive induction of decision trees, Picking the best splitting attribute: entropy and information gain, Searching for simple trees and computational complexity, Occam's razor, Overfitting, noisy data, and pruning. Experimental Evaluation of Learning Algorithms: Measuring the accuracy of learned hypotheses. Comparing learning algorithms: cross-validation, learning curves, and statistical hypothesis testing.

UNIT III :Computational Learning Theory

Models of learnability: learning in the limit; probably approximately correct (PAC) learning. Sample complexity for infinite hypothesis spaces, Vapnik-Chervonenkis dimension. Rule Learning: Propositional and First-Order, Translating decision trees into rules, Heuristic rule induction using separate and conquer and information gain, First-order Horn-clause induction (Inductive Logic Programming) and Foil, Learning recursive rules, Inverse resolution, Golem, and Progol.

UNIT IV:Artificial Neural Networks

Neurons and biological motivation, Linear threshold units. Perceptrons: representational limitation and gradient descent training, Multilayer networks and backpropagation, Hidden layers and constructing intermediate, distributed representations. Overfitting, learning network structure, recurrent networks. Support Vector Machines: Maximum margin linear separators. Quadractic programming solution to finding maximum margin separators. Kernels for learning non-linear functions.

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UNIT V:Bayesian Learning

Probability theory and Bayes rule. Naive Bayes learning algorithm. Parameter smoothing. Generative vs. discriminative training. Logisitic regression. Bayes nets and Markov nets for representing dependencies. Instance-Based Learning: Constructing explicit generalizations versus comparing to past specific examples. k-Nearest-neighbor algorithm. Case-based learning.

Text Books:

1) T.M. Mitchell, “Machine Learning”, McGraw-Hill, 1997.
2) Machine Learning, Saikat Dutt, Subramanian Chandramouli, Amit Kumar Das, Pearson, 2019.

Reference Books:

1) Ethern Alpaydin, “Introduction to Machine Learning”, MIT Press, 2004.
2) Stephen Marsland, “Machine Learning -An Algorithmic Perspective”, Second Edition, Chapman and Hall/CRC Machine Learning and Pattern Recognition Series, 2014.
3) Andreas C. Müller and Sarah Guido “Introduction to Machine Learning with Python: A Guide for Data Scientists”, Oreilly.

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IV Year–I Semester		L	T	P	C
		3	0	0	3
SOCIAL and WEB ANALYTICS					

Familiarize the learners with the concept of Social and Web Analytics and understand its significance.

- Familiarize the learners with the tools of social media analytics.
- Enable the learners to develop skills required for analyzing the effectiveness of social
- media for business purposes

UNIT:I
Introduction to Social Media Analytics (SMA):
Social media landscape, Need for SMA; SMA in Small organizations; SMA in large organizations; Application of SMA in different areas Network fundamentals and models:
The social networks perspective - nodes, ties and influencers, Social network and web data and methods.
Graphs and Matrices- Basic measures for individuals and networks. Information visualization

UNIT:II
Making connections: Link analysis. Random graphs and network evolution. Social contexts: Affiliation and identity.
Web analytics tools: Clickstream analysis, A/B testing, online surveys, Web crawling and Indexing. Natural Language Processing Techniques for Micro-text Analysis

UNIT:III
Facebook Analytics:
Introduction, parameters, demographics. Analyzing page audience. Reach and Engagement analysis. Post- performance on FB. Social campaigns. Measuring and
Analyzing social campaigns, defining goals and evaluating outcomes, Network Analysis. (LinkedIn, Instagram, YouTube Twitter etc. Google analytics. Introduction. (Websites)

UNIT:IV
Processing and Visualizing Data, Influence Maximization, Link Prediction, Collective Classification, Applications in Advertising and Game Analytics
Introduction to Python Programming, Collecting and analyzing social media data; visualization and exploration

UNIT:V
Students should analyze the social media of any ongoing campaigns and present the findings.

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TEXT BOOKS:

1.Matthew Ganis,Avinash Kohirkar Social Media Analytics: Techniques and Insights for Extracting Business Value Out of Social Media
2.Jim Sterne,Social Media Metrics:How to Measure and Optimize Your Marketing Investment
3.Oliver Blanchard,Social Media ROI: Managing and Measuring Social Que Publishing Latest edition Media Efforts in Your Organization (Que Biz-Tech)

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IV Year–I Semester		L	T	P	C
		3	0	0	3
FINANCIAL MANAGEMENT					

Course Objectives:

- *To identify the basic nature and sources of finance.*
- *To analyze the concept of time value of money and its impact on cost and budget preparation*
- *To gain awareness on capital structure and its factors, relevant for dividend decisions.*
- *To analyze the day to day business funds requirements.*
- *To examine various factors that determines the working capital and operating cycles.*

Course Outcomes:

- *Analyze the financial position of a business for implementing better decisions.*
- *Measure cost of capital and consider better project implementation through budgeting methods.*
- *Apply theories of capital structure and understand its impact on dividend decisions.*
- *Estimate the fund requirements of an organization.*
- *Recognize the factors that determine the working capital and operating cycles.*

UNITI

INTRODUCTION TO FINANCIAL MANAGEMENT: Nature and scope- Finance functions- Roles and responsibilities of the Finance Manager; OBJECTIVE: Profit or Wealth Maximization and EPS Maximization – Sources of Finance – Equity capital – Debenture – Preference capital and term loans.

UNITII

COST OF CAPITAL: Concept - Components of Cost of Capital – Cost of Debt Cost of Equity – Cost of preference capital – Cost of retained earnings - WACC and MCC Valuation of stocks and bonds - Concept of Risk and Return- Time value of money. CAPITAL BUDGETING: Meaning – Importance; TECHNIQUES: Traditional Methods (Payback period and Accounting Rate of Return) - Discounted Cash Flow Methods (NPV, IRR, and PI).

UNITIII

CAPITAL STRUCTURE DECISIONS: Capital Structure vs. Financial Structure – Capitalization- Leverage – Concept of Leverage – Operating Leverage – Financial Leverage– Combined Leverage - EBIT – EPS analysis- Indifference Point / Break Even Analysis of Financial Leverage; CAPITAL STRUCTURE THEORIES: Net Income approach – Net operating income approach – Traditional view – MM Hypothesis.

UNITIV

DIVIDEND DECISIONS: Major Forms of Dividends – Factors determining Dividend Policy - Value of the firm – Dividend Theories - Relevance of dividends (Walter Page 37 of 133 Model and Gordon Model) – Irrelevance of Dividends (Modigliani and Miller approach) - Declaration and payment of dividends - Bonus shares - Rights issue. CORPORATE RESTRUCTURES: Corporate

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Mergers - Types of mergers, Acquisitions and Take Over –Amalgamations.

UNITV

WORKING CAPITAL MANAGEMENT-: Concepts and Components of Working Capital- Factors determining the working capital- Operating cycle approaches; MANAGEMENT OF CASH: Nature-Motives-Objectives of cash management- Cash budget Cash Management techniques/processes; MANAGEMENT OF RECEIVABLES: Objectives Credit policies-Credit terms-Collection policies; MANAGEMENT OF INVENTORY: Meaning Objectives- Components- Techniques of Inventory Management.

Text Books:

1. I.M. Pandey. Financial Management. Vikas Publishers.
2. MY Khan and PK Jain (2007). Financial Management-Text and Problems. Tata McGrawHill.

Reference Books:

1. Gitman L.J.(2006). Managerial Finance (11th Edition). Pearson Education.
2. Richard A Brealey etal.(2007). Principles of Corporate Finance. Tata McGraw Hill.
3. Chandra Bose D(2006). Fundamentals of Financial Management. PHI.

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IV Year–I Semester		L	T	P	C
		3	0	0	3
CLOUD COMPUTING					

Course Objectives:

- *To implement Virtualization*
- *To implement Task Scheduling algorithms*
- *Apply Map-Reduce concept to applications*
- *To build Private Cloud*
- *Broadly educate to know the impact of engineering on legal and societal issues involved*

Course Outcomes:

- *Interpret the key dimensions of the challenge of Cloud Computing*
- *Examine the economics, financial, and technological implications for selecting cloud computing for own organization*
- *Assessing the financial, technological, and organizational capacity of employer's for actively initiating and installing cloud-based applications*
- *Evaluate own organizations' needs for capacity building and training in cloud computing related IT areas*

UNIT I

Introduction: Network centric computing, Network centric content, peer-to –peer systems, cloud computing delivery models and services, Ethical issues, Vulnerabilities, Major challenges for cloud computing. Parallel and Distributed Systems: introduction, architecture, distributed systems, communication protocols, logical clocks, message delivery rules, concurrency, and model concurrency with Petri Nets.

UNIT II

Cloud Infrastructure: At Amazon, The Google Perspective, Microsoft Windows Azure, Open Source Software Platforms, Cloud storage diversity, Inter cloud, energy use and ecological impact, responsibility sharing, user experience, Software licensing, Cloud Computing : Applications and Paradigms: Challenges for cloud, existing cloud applications and new opportunities, architectural styles, workflows, The Zookeeper, HPC on cloud.

UNIT III

Cloud Resource virtualization: Virtualization, layering and virtualization, virtual machine monitors, virtual machines, virtualization- full and para, performance and security isolation, hardware support for virtualization, Case Study: Xen, vBlades, Cloud Resource Management and Scheduling: Policies and Mechanisms, Applications of control theory to task scheduling, Stability of a two-level resource allocation architecture, feedback control based on dynamic thresholds, coordination, resource bundling, scheduling algorithms, fair queuing, start time fair queuing, cloud scheduling subject to deadlines, Scheduling Map Reduce applications, Resource management and dynamic application scaling.

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UNIT IV

Storage Systems: Evolution of storage technology, storage models, file systems and database, distributed file systems, general parallel file systems. Google file system. Apache Hadoop, Big Table, Megastore (text book 1), Amazon Simple Storage Service(S3) (Text book 2), Cloud Security: Cloud security risks, security – a top concern for cloud users, privacy and privacy impact assessment, trust, OS security, Virtual machine security, Security risks.

UNIT V

Cloud Application Development: Amazon Web Services : EC2 – instances, connecting clients, security rules, launching, usage of S3 in Java, Cloud based simulation of a Distributed trust algorithm, Cloud service for adaptive data streaming (Text Book 1), Google: Google App Engine, Google Web Toolkit (Text Book 2), Microsoft: Azure Services Platform, Windows live, Exchange Online, Share Point Services, Microsoft Dynamics CRM (Text Book 2)

Text Books:

1) *Cloud Computing, Theory and Practice,1st Edition, Dan C Marinescu, MK Elsevier publisher ,2013*
2) *Cloud Computing, A Practical Approach, 1st Edition, Anthony T Velte, Toby J Velte, Robert Elsenpeter, TMH,2017*

Reference Books:

1) Mastering Cloud Computing, Foundations and Application Programming,1st Edition, Raj Kumar Buyya, Christen vecctiola, S Tammarai selvi, TMH,2013

2) Essential of Cloud Computing, 1st Edition, K Chandrasekharan, CRC Press, 2014.

3) Cloud Computing, A Hands on Approach, Arshdeep Bahga, Vijay Madisetti, Universities Press, 2014.

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IV Year – I Semester		L	T	P	C
		3	0	0	3
MEAN STACK TECHNOLOGIES					

Course Objectives:

- Translate user requirements into the overall architecture and implementation of new systems and Manage Project and coordinate with the Client
- Writing optimized front end code HTML and JavaScript
- Monitor the performance of web applications & infrastructure and Troubleshooting web application with a fast and accurate a resolution
- Design and implementation of Robust and Scalable Front End Applications

Course Outcomes: At the end of the course, the students will be able to:

- Enumerate the Basic Concepts of Web & Markup Languages
- Develop web Applications using Scripting Languages & Frameworks
- Make use of Express JS and Node JS frameworks
- Illustrate the uses of web services concepts like restful, react js
- Apply Deployment Techniques & Working with cloud platform

UNIT I:

Introduction to Web: Internet and World Wide Web, Domain name service, Protocols: HTTP, FTP, SMTP. Html5 concepts, CSS3, Anatomy of a web page. XML: Document type Definition, XML schemas, Document object model, XSLT, DOM and SAX Approaches.

UNIT II :

JavaScript: The Basic of JavaScript: Objects, Primitives Operations and Expressions, Control Statements, Arrays, Functions, Constructors, Pattern Matching using Regular Expressions. Angular Java Script Angular JS Expressions: ARRAY, Objects, $eval, Strings, Angular JS Form Validation & Form Submission, Single Page Application development using Angular JS.

UNIT III :

Node.js: Introduction, Advantages, Node.js Process Model, Node JS Modules. Express.js: Introduction to Express Framework, Introduction to Nodejs , What is Nodejs, Getting Started with Express, Your first Express App, Express Routing, Implementing MVC in Express, Middleware, Using Template Engines, Error Handling , API Handling , Debugging, Developing Template Engines, Using Process Managers, Security & Deployment.

UNIT IV:

RESTful Web Services: Using the Uniform Interface, Designing URIs, Web Linking, Conditional Requests. React Js: Welcome to React, Obstacles and Roadblocks, React's Future, Keeping Up with the Changes, Working with the Files, Pure React, Page Setup, The Virtual DOM, React Elements, ReactDOM, Children, Constructing Elements with Data, React Components, DOM Rendering, Factories.

UNIT V:

Mongo DB: Introduction, Architecture, Features, Examples, Database Creation & Collection in Mongo DB. Deploying Applications: Web hosting & Domains, Deployment Using Cloud Platforms.

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Text Books:

1) Programming the World Wide Web, Robet W Sebesta, 7ed, Pearson.
2) Web Technologies, Uttam K Roy, Oxford
3) Pro Mean Stack Development, ELadElrom, Apress
4) Restful Web Services Cookbook, Subbu Allamraju, O'Reilly
5) JavaScript & jQuery the missing manual, David sawyer mcfarland, O'Reilly
6) Web Hosting for Dummies, Peter Pollock, John Wiley Brand

Reference Books:

1) Ruby on Rails up and Running, Lightning fast Web development, Bruce Tate, Curt Hibbs, Oreilly (2006).
2) Programming Perl, 4ed, Tom Christiansen, Jonathan Orwant, Oreilly (2012).
3) Web Technologies, HTML, JavaScript, PHP, Java, JSP, XML and AJAX, Black book, Dream Tech.
4) An Introduction to Web Design, Programming, Paul S Wang, Sanda S Katila, Cengage Learning.
5) Express.JS Guide,The Comprehensive Book on Express.js, Azat Mardan, Lean Publishing.

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IV Year – I Semester		L	T	P	C
		3	0	0	3
BUSINESS INTELLIGENCE					

Course Objectives:

- To create an awareness on Engineering Ethics and Human Values.
- To understand social responsibility of an engineer.
- To appreciate ethical dilemma while discharging duties in professional life.

Course Outcomes: On completion of this course, the students will be able to

- Understand the significance of value inputs in a classroom and start applying them in their life and profession
- Distinguish between values and skills, happiness and accumulation of physical facilities, the Self and the Body, Intention and Competence of an individual, etc.
- Understand the role of a human being in ensuring harmony in society and nature.

UNIT I:

Introduction to Business Intelligence: The Business pressure-Responses and support model Definition of BI- Architecture of BI- Styles of BI-vent-Driven alerts-A cyclic process of Intelligence Creation. The value of Business intelligence-Value driven and Information use Performance metrics and key performance indicators-horizontal use cases for BI.

UNIT II :

Data Ware Housing: Definitions and concepts-DW process an Innovation-Data Warehousing Implementation-Data warehousing Administration-Security Issues and future trends. Business Performance Management-Overview Strategic plan, monitor, performance measurement, BPM methodologies-BPM Techniques-Performance dashboard and scorecards

UNIT III :

Data Mining for Business Intelligence: Data mining concepts and definitions-Data mining applications - Artificial neural Networks for data mining - Text and web mining-Natural language processing-Text mining applications-Text mining process-tools-Web mining overviewWeb content overview-Web structure mining-Web usage mining.

UNIT IV:

Business Rules: The Value Preposition of Business Rules - Business rules approach-Business rule system - Sources of business rules and management approach.

UNIT V:

Business Intelligence Implementation: Business Intelligence and integration - Implementation - connecting in BI systems- Issues of legality- Privacy and ethics- Social networking and BI. Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

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Text Books:

1. Amit Johri "Business Intelligence" Himalaya, 2012
2. Rajiv Sabherwal "Business Intelligence" Wiley Publications, 2012

Reference Books:

1. Carlo Vercellis "Business Intelligence" Wiley Publications, 2012
2. Nina Godbole & Sunit Belapure " Cyber Security" Wiley india 2012.
3. Jawadekar, MIS Text and Cases, TMH, 2012 6. Efraim Turban et al. "Business Intelligence" 2e, Pearson Education, 2012

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IV Year – I Semester		L	T	P	C
		3	0	0	3
IT PROJECT MANAGEMENT					

Course Objectives:

- To effectively plan, manage, execute, and control projects within the stipulated time
- To effectively manage cost targets with a focus on Information Technology and Service Sector
- To understand various agile project management techniques such as Scrum and DevOps.

Course Outcomes: At the end of the course, the students will be able to:

- To understand Project Management activities and to identify basic project management skills with a strong emphasis on issues and problems associated with delivering successful IT projects.
- To Develop activity network to use PERT and to manage project risks such as Resource scheduling and cost control.
- To understand the concept of Agile Project Management and IT Service Management.
- To understand the various terminologies and best practices followed in scrum.
- To learn the concept of Devops and its Working, Automated testing and test driven methods and continuous deployment.
- To demonstrate the working of IT Project Management with various tools and technologies.

UNIT I:

Project Overview and Feasibility Studies :
Project Identification, Market and Demand Analysis, Project Cost Estimate, FinancialAppraisal

UNIT II :

Project Scheduling:
Project Scheduling, Introduction to PERT and CPM, Critical Path Calculation, Precedence Relationship, Difference between PERT and CPM, Float Calculation and its importance, Cost reduction by Crashing of activity.

UNIT III :

Cost Control and Scheduling:
Project Cost Control (PERT/Cost), Resource Scheduling & Resource Levelling
Project Management Features:
Risk Analysis, Project Control, Project Audit and Project Termination

UNIT IV:

Agile Project Management
Introduction, Agile Principles, Agile methodologies, Relationship between Agile Scrum, Lean, DevOps and IT Service Management (ITIL).
Scrum: Various terminologies used in Scrum (Sprint, product backlog, sprint backlog, sprint review, retro perspective), various roles (Roles in Scrum), Best practices of Scrum.

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UNIT V:

DevOps

Overview and its Components, Containerization Using Docker, Managing Source Code and Automating Builds, Automated Testing and Test-Driven Development, Continuous Integration, Configuration Management, Continuous Deployment, Automated Monitoring, Other Agile Methodologies: Introduction to XP, FDD, DSDM, Crystal.

Contemporary issues:Industry expert Lecture

Text Books:

1) Mike Cohn, Succeeding with Agile: Software Development Using Scrum, 2015, 1stEdition AddisonWesley Professional.

Reference Books:

1. Roman Pichler, Agile Product Management with Scrum: Creating Products that Customers Love, 2011, First edition , Addison-Wesley.
2. Ken Schwaber, Agile Project Management with Scrum, 2014,1 st edition, Microsoft Press US.

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3.

IV Year – I Semester		L	T	P	C
		3	0	0	3
DEEP LEARNING					

Course Objectives:

- Demonstrate the major technology trends driving Deep Learning
- Build, train and apply fully connected deep neural networks
- Implement efficient (vectorized) neural networks
- Analyze the key parameters and hyper parameters in a neural network's architecture

Course Outcomes: At the end of the course, the students will be able to:

- Demonstrate the mathematical foundation of neural network
- Describe the machine learning basics
- Differentiate architecture of deep neural network
- Build a convolutional neural network
- Build and train RNN and LSTMs

UNIT I:

Linear Algebra: Scalars, Vectors, Matrices and Tensors, Matrix operations, types of matrices, Norms, Eigen decomposition, Singular Value Decomposition, Principal Components Analysis. Probability and Information Theory: Random Variables, Probability Distributions, Marginal Probability, Conditional Probability, Expectation, Variance and Covariance, Bayes' Rule, Information Theory. Numerical Computation: Overflow and Underflow, Gradient-Based Optimization, Constrained Optimization, Linear Least Squares.

UNIT II :

Machine Learning: Basics and Underfitting, Hyper parameters and Validation Sets, Estimators, Bias and Variance, Maximum Likelihood, Bayesian Statistics, Supervised and Unsupervised Learning, Stochastic Gradient Descent, Challenges Motivating Deep Learning. Deep Feedforward Networks: Learning XOR, Gradient-Based Learning, Hidden Units, Architecture Design, Back-Propagation and other Differentiation Algorithms.

UNIT III :

Regularization for Deep Learning: Parameter Norm Penalties, Norm Penalties as Constrained Optimization, Regularization and Under-Constrained Problems, Dataset Augmentation, Noise Robustness, Semi-Supervised Learning, Multi-Task Learning, Early Stopping, Parameter Tying and Parameter Sharing, Sparse Representations, Bagging and Other Ensemble Methods, Dropout, Adversarial Training, Tangent Distance, Tangent Prop and Manifold Tangent Classifier. Optimization for Training Deep Models: Pure Optimization, Challenges in Neural Network Optimization, Basic Algorithms, Parameter Initialization Strategies, Algorithms with Adaptive Learning Rates, Approximate Second-Order Methods, Optimization Strategies and Meta-Algorithms.

UNIT IV:

Convolutional Networks: The Convolution Operation, Pooling, Convolution, Basic Convolution Functions, Structured Outputs, Data Types, Efficient Convolution Algorithms, Random or

Unsupervised Features, Basis for Convolutional Networks.

UNIT V:

Sequence Modelling: Recurrent and Recursive Nets: Unfolding Computational Graphs, Recurrent Neural Networks, Bidirectional RNNs, Encoder-Decoder Sequence-to-Sequence Architectures, Deep Recurrent Networks, Recursive Neural Networks, Echo State Networks, LSTM, Gated RNNs, Optimization for Long-Term Dependencies, Auto encoders, Deep Generative Models.

Text Books:

1) Ian Goodfellow, Yoshua Bengio, Aaron Courville, “Deep Learning”, MIT Press,2016.
2) Josh Patterson and Adam Gibson, “Deep learning: A practitioner's approach”, O'Reilly Media, First Edition, 2017.

Reference Books:

1) Fundamentals of Deep Learning, Designing next-generation machine intelligence algorithms, Nikhil Buduma, O’Reilly, Shroff Publishers, 2019.
2) Deep learning Cook Book, Practical recipes to get started Quickly, Douwe Osinga, O’Reilly, Shroff Publishers, 2019.

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IV Year – I Semester		L	T	P	C
		3	0	0	3
SERVICES SCIENCE AND SERVICE OPERATIONAL MANAGEMENT					

Course Objectives:

- This course examines the management of services focusing on both the strategic and operational aspects of designing new services
- Helps in assessing and improving service quality, improving the efficiency and effectiveness of service processes
- Helps in understanding the integration of new technologies into service operations.

Course Outcomes: At the end of the course, the students will be able to:

- To understand concepts about Services and distinguish it from Goods
- To identify characteristics and nature of Services
- Comprehend ways to design Services and evaluate them using Service qualities
- To be able to understand various methods to be used to operate and manage Service businesses
- To understand how innovation can be approached from Services point of view

UNIT I:Introduction to services

Introduction to the course, introduction to service operations, role of service in economy and society, introduction to Indian service sector, differences between services and operations, service package, characteristics, various frameworks to design service operation system, kind of service encounter, importance of encounters

UNIT II :Service Design

Service-Dominant Logic, Goods-Dominant logic to Service-Dominant logic, Value Co-creation, Customer Journey and Service Design, Design Thinking methods to aid Service Design, Development of Strategic Service Vision (SSV), Data Envelopment Analysis, NSD cycle, Service Blueprinting, Elements of service delivery system

UNIT III :Quality and Yield Management

Models of facility locations (Huff's retail model), role of service-scape in layout design, SERVQUAL, walk through audit, dimensions of service quality & other quality toolsService Guarantee & Service Recovery, Service guarantee, benefits, types, design of service of guarantees, service failure, service recovery, strategy, customer response analysis.

UNIT IV:Forecasting, Managing Capacity and facilities

Forecasting Demand for Services, review of different types of forecasting methods, managing capacity and demand: Strategies for matching capacity and demand, psychology of waiting, application of various tools used in managing waiting line in services, managing facilitating Goods, review of inventory models, role of inventory in services

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UNIT V:Service Supply, Queuing Models

Managing service supply relationship: Understanding the supply chain/hub of service, Strategies for managing suppliers of service, Vehicle Routing Problem: Managing after sales service, Understanding services that involve transportation of people and vehicle, Techniques for optimizing vehicle routes

Service Innovation: Services Productivity, Need for Services Innovation, Case studies,

Contemporary issues: Expert lecture on recent trends

Text Books:

1. Fitzsimmons & Fitzsimmons, Service Management: Operations, Strategy, Information Technology, 2019, 9th edition, McGraw Hill publications.

Reference Books:

1. Wilson, A., Zeithaml, V. A., Bitner, M. J., &Gremler, D. D. Services marketing: Integrating customer focus across the firm. 2012. McGraw Hill publications.
2. Reason, Ben, and Lovlie, Lavrans, Service Design for Business: A Practical Guide to Optimizing the Customer Experience, 2016, Pan Macmillan India.

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IV Year – I Semester		L	T	P	C
		3	0	0	3
BLOCKCHAIN TECHNOLOGIES					

Course Objectives:

- Understand how block chain systems (mainly Bit coin and Ethereum) work and to securely interact with them,
- Design, build, and deploy smart contracts and distributed applications,
- Integrate ideas from block chain technology into their own projects.

Course Outcomes: At the end of the course, the students will be able to:

- Demonstrate the foundation of the Block chain technology and understand the processes in payment and funding.
- Identify the risks involved in building Block chain applications.
- Review of legal implications using smart contracts.
- Choose the present landscape of Block chain implementations and Understand Crypto currency markets
- Examine how to profit from trading crypto currencies.

UNIT I:

Introduction, Scenarios, Challenges Articulated, Block chain, Block chain Characteristics, Opportunities Using Block chain, History of Block chain. Evolution of Block chain : Evolution of Computer Applications, Centralized Applications, Decentralized Applications, Stages in Block chain Evolution, Consortia, Forks, Public Block chain Environments, Type of Players in Block chain Ecosystem, Players in Market.

UNIT II :

Block chain Concepts: Introduction, Changing of Blocks, Hashing, Merkle-Tree, Consensus, Mining and Finalizing Blocks, Currency aka tokens, security on block chain, data storage on block chain, wallets, coding on block chain: smart contracts, peer-to-peer network, types of block chain nodes, risk associated with block chain solutions, life cycle of block chain transaction.

UNIT III :

Architecting Block chain solutions: Introduction, Obstacles for Use of Block chain, Block chain Relevance Evaluation Framework, Block chain Solutions Reference Architecture, Types of Block chain Applications. Cryptographic Tokens, Typical Solution Architecture for Enterprise Use Cases, Types of Block chain Solutions, Architecture Considerations, Architecture with Block chain Platforms, Approach for Designing Block chain Applications.

UNIT IV:

Ethereum Block chain Implementation: Introduction, Tuna Fish Tracking Use Case, Ethereum Ecosystem, Ethereum Development, Ethereum Tool Stack, Ethereum Virtual Machine, Smart Contract Programming, Integrated Development Environment, Truffle Framework, Ganache, Unit Testing, Ethereum Accounts, My Ether Wallet, Ethereum Networks/Environments, Infura, Ether scan, Ethereum Clients, Decentralized Application, Meta mask, Tuna Fish Use Case Implementation, Open Zeppelin Contracts

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UNIT V:

Hyper ledger Block chain Implementation, Introduction, Use Case – Car Ownership Tracking, Hyper ledger Fabric, Hyper ledger Fabric Transaction Flow, Fab Car Use Case Implementation, Invoking Chain code Functions Using Client Application.

Advanced Concepts in Block chain: Introduction, Inter Planetary File System (IPFS), Zero-Knowledge Proofs, Oracles, Self-Sovereign Identity, Block chain with IoT and AI/ML Quantum Computing and Block chain, Initial Coin Offering, Block chain Cloud Offerings, Block chain and its Future Potential.

Text Books:

1) Ambadas, Arshad Sarfarz Ariff, Sham "Block chain for Enterprise Application Developers", Wiley
2) Andreas M. Antonpoulos, "Mastering Bitcoin: Programming the Open Block chain" , O'Reilly

Reference Books:

1) Block chain: A Practical Guide to Developing Business, Law, and Technology Solutions, Joseph Bambara, Paul R. Allen, Mc Graw Hill.
2) Block chain: Blueprint for a New Economy, Melanie Swan, O'Reilly

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IV Year – I Semester		L	T	P	C
		3	0	0	3
HUMAN RESOURCE MANAGEMENT					

Course Objectives:

- Appreciate the importance of human resource management as a field of study and as a central management function;
- Understand the implications for human resource management of the behavioral sciences, government regulations, and court decisions;
- Know the elements of the HR function (e.g. – recruitment, selection, training and development, etc.) and be familiar with each element's key concepts & terminology; and
- Apply the principles and techniques of human resource management gained through this course to the discussion of major personnel issues and the solution of typical case problems.

Course Outcomes: At the end of the course, the students will be able to:

UNIT I:Introduction to Human Resource Management

The focus of the first unit is on identifying what the personnel and human resource function is all about. It explores the typical responsibilities of HR departments and how they are affected by the corporate culture, environmental forces, and government regulations. It also introduces the topics of strategic and employment planning.

UNIT II :Staffing

Once the organization has determined its strategic and human resource objectives and analyzes the jobs to be filled, it is ready to fill them. Unit 2 reviews the two steps in the staffing process: recruitment and selection. Recruitment aims at identifying and attracting the largest possible number of qualified applicants to hire for each job.

UNIT III :Performance Management

This unit discusses and examines performance evaluation as a system including process and procedures used in developing reliable and valid standards, criteria, and evaluation mechanisms. A good performance management system is fair to the employee while also serving the goals and interests of the organization.

UNIT IV:Human Resource Development

Employee training and development is another important HR function. More specifically, Unit 4 focuses on deciding who is to be trained, in what and how they are to be trained, and how effective was the training for the employee and her/his organizational component. To be effective, training and development programs must be matched to types of employees with specific skill deficiencies and to new skills anticipated to be needed by the organization.

UNIT V:Global Human Resource Management & Future Issues

Declining productivity, substantial demographic shifts, changing employee attitudes and expectations, innovation technologies, and government regulations will continue to affect human resource management into the 21st century. This final unit deals with the most significant trends in human resource management and how they can be addressed through innovative and effective organizational strategies.

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Text Books:
Dessler, G. Fundamentals of Human Resource Management (4th Edition, Pearson)

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DEPARTMENT OF COMPUTER SCIENCE &ENGINEERING

IV Year – I Semester		L	T	P	C
		3	0	0	3
CONSUMER BUYING BEHAVIOUR					

Course Objectives:

- Foundations of consumer behaviour
- Internal influences on consumer behaviour
- External Influences on consumer buying behaviour

Course Outcomes: On completion of this course, the students will be able to

- Understand the basics of consumer behaviour
- Understand Internal influences on consumer behaviour
- Understand External Influences on consumer buying behaviour

UNIT I:
Introduction to consumer behaviour, Decision making and consumer behaviour models, Cultural influences on consumer decision making, Consumer and Social wellbeing
UNIT II:
Motivation and Perception, learning and memory, Self, Attitudes and persuasion
UNIT III:
Group and Situational effects on consumer behaviour, Gender roles and subculture
UNIT IV:
Social class and lifestyles, Media habits, Social media, word of mouth, and fashion
UNIT V:
Consumer Decision-Making and Diffusion of Innovations, Marketers' Ethics and Social Responsibility

Text Books:
Consumer Behaviour by Schiff man , 11/e, Pearson
Consumer Behaviour: Building Marketing Strategy by Hawkins and Mother Baugh, 12/e, McGraw-Hill
Reference books:
Consumer Behaviour by David Loudon and Albert Della Bitter 4/e
Consumer Behaviour : Building Marketing Strategy by Del I Hawkins, David L Mother Baugh and Amity Mukherjee, 11/e, McGraw-Hill- Special Indian Edition
Shopper, Buyer and Consumer Behaviour: Theory and Marketing Applications by Jay D Lindquist and Joseph M Sergey , 2/e, Biztantra

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IV Year – I Semester		L	T	P	C
		3	0	0	3
UNIVERSAL HUMAN VALUES					

Course Objectives:

- To create an awareness on Engineering Ethics and Human Values.
- To understand social responsibility of an engineer.
- To appreciate ethical dilemma while discharging duties in professional life.

Course Outcomes: On completion of this course, the students will be able to

- Understand the significance of value inputs in a classroom and start applying them in their life and profession
- Distinguish between values and skills, happiness and accumulation of physical facilities, the Self and the Body, Intention and Competence of an individual, etc.
- Understand the role of a human being in ensuring harmony in society and nature.
- Distinguish between ethical and unethical practices, and start working out the strategy to actualize a harmonious environment wherever they work.

UNIT I: Introduction to Value Education

1. Value Education, Definition, Concept and Need for Value Education.
2. The Content and Process of Value Education.
3. Basic Guidelines for Value Education.
4. Self-exploration as a means of Value Education.
5. Happiness and Prosperity as parts of Value Education.

UNIT II : Harmony in the Human Being

1. Human Being is more than just the Body.
2. Harmony of the Self ('I') with the Body.
3. Understanding Myself as Co-existence of the Self and the Body.
4. Understanding Needs of the Self and the needs of the Body.
5. Understanding the activities in the Self and the activities in the Body.

UNIT III : Harmony in the Family and Society and Harmony in the Nature

1. Family as a basic unit of Human Interaction and Values in Relationships.
2. The Basics for Respect and today's Crisis: Affection, Guidance, Reverence, Glory, Gratitude and Love.
3. Comprehensive Human Goal: The Five Dimensions of Human Endeavour.
4. Harmony in Nature: The Four Orders in Nature.
5. The Holistic Perception of Harmony in Existence.

UNIT IV: Social Ethics

1. The Basics for Ethical Human Conduct.
2. Defects in Ethical Human Conduct.
3. Holistic Alternative and Universal Order.
4. Universal Human Order and Ethical Conduct.
5. Human Rights violation and Social Disparities.

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UNIT V:Professional Ethics

1. Value based Life and Profession.
2. Professional Ethics and Right Understanding.
3. Competence in Professional Ethics.
4. Issues in Professional Ethics – The Current Scenario.
5. Vision for Holistic Technologies, Production System and Management Models.

Text Books:

1.A.N Tripathy, New Age International Publishers, 2003.
2.Bajpai. B. L , , New Royal Book Co, Lucknow, Reprinted, 2004
3.Bertrand Russell Human Society in Ethics & Politics

Reference Books:

1.Corliss Lamont, Philosophy of Humanism
2.Gaur. R.R. , Sangal. R, Bagaria. G.P, A Foundation Course in Value Education, Excel Books, 2009.
3.Gaur. R.R. , Sangal. R , Bagaria. G.P, Teachers Manual Excel Books, 2009.
4.I.C. Sharma . Ethical Philosophy of India Nagin & co Julundhar
5.Mortimer. J. Adler, – Whatman has made of man
6.William Lilly Introduction to Ethic Allied Publisher

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DEPARTMENT OF CSE - COMPUTER SCIENCE & BUSINESS SYSTEMS

IV Year – I Semester		L	T	P	C
		3	0	0	3
HUMAN RESOURCE DEVELOPMENT					

Course Objectives:

- To create an awareness on Engineering Ethics and Human Values.
- To understand social responsibility of an engineer.
- To appreciate ethical dilemma while discharging duties in professional life.

Course Outcomes: On completion of this course, the students will be able to

- Understand the significance of value inputs in a classroom and start applying them in their life and profession
- Distinguish between values and skills, happiness and accumulation of physical facilities, the Self and the Body, Intention and Competence of an individual, etc.

UNIT I:

Macro Perspective: HRD Concept, Origin and Need, HRD as a Total System; Approaches to HRD; Human Development and HRD; HRD at Macro and Micro Climate.

UNIT II :

Micro Perspective: Areas of HRD; HRD Interventions Performance Appraisal, Potential Appraisal, Feedback and Performance Coaching, Training, Career Planning, OD or Systems Development, Rewards, Employee Welfare and Quality of Work Life and Human Resource Information; Staffing for HRD: Roles of HR Developer; Physical and Financial Resources for HRD; HR Accounting; HRD Audit, Strategic HRD.

UNIT III :

Instructional Technology for HRD : Learning and HRD; Models and Curriculum; Principles of Learning; Group and Individual Learning; Transactional Analysis; Assessment Centre; Behaviour Modeling and Self Directed Learning; Evaluating the HRD

UNIT IV:

Human Resource Training and Development : Concept and Importance; Assessing Training Needs; Designing and Evaluating T&D Programmes; Role, Responsibilities and challenges to Training Managers.

UNIT V:

Training Methods: Training with in Industry (TWI): On the Job & Off the Job Training; Management Development: Lecture Method; Role Play; In-basket Exercise; Simulation; Vestibule Training; Management Games; Case Study; Programmed Instruction; Team Development; Sensitivity Training; Globalization challenges and Strategies of Training Program, Review on T&D Programmes in India.

Text Books:

1. Nadler, Leonard : Corporat Human Resource Development, Van Nostrand Reinhold, ASTD, New York .
2. Rao, T.V and Pareek, Udai: Designing and Managing Human Resource Systems, Oxford IBH Pub. Pvt.Ltd., New Delhi , 2005.

Reference Books:

1) Rao, T.V: Readings in HRD, Oxford IBH Pub. Pvt. Ltd., New Delhi , 2004.
2) Viramani, B.R and Seth, Parmila: Evaluating Management Development, Vision Books, NewDelhi . 5. Rao, T.V.(et.al): HRD in the New Economic Environment, Tata McGraw-Hill Pub.Pvt, Ltd., New Delhi , 2003.
3) Rao, T.V: HRD Audit, Sage Publications, New Delhi .

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IV Year – I Semester		L	T	P	C
		3	1	0	4
INNOVATION AND ENTREPRENEURSHIP					

Course Objectives:
The aim of this course is to have a comprehensive perspective of inclusive learning, ability to learn and implement the Fundamentals of Entrepreneurship.

Course Outcomes: It enables students to learn the basics of Entrepreneurship and entrepreneurial development which will help them to provide vision for their own Start-up.

UNIT I:
Entrepreneurial Perspectives
Introduction to Entrepreneurship – Evolution - Concept of Entrepreneurship - Types of Entrepreneurs -Entrepreneurial Competencies, Capacity Building for Entrepreneurs. Entrepreneurial Training Methods- Entrepreneurial Motivations - Models for Entrepreneurial Development - The process of Entrepreneurial Development.

UNIT II :
New Venture Creation
Introduction, Mobility of Entrepreneurs, Models for Opportunity Evaluation; Business plans – Purpose, Contents, Presenting Business Plan, Procedure for setting up Enterprises, Central level – Start up and State level - T Hub, Other Institutions initiatives.

UNIT III :
Management of MSMEs and Sick Enterprises
Challenges of MSMEs, Preventing Sickness in Enterprises – Specific Management Problems; Industrial Sickness; Industrial Sickness in India – Symptoms, process and Rehabilitation of Sick Units.

UNIT IV:
Managing Marketing and Growth of Enterprises
Essential Marketing Mix of Services, Key Success Factors in Service Marketing, Cost and Pricing, Branding, New Techniques in Marketing, International Trade.

UNIT V:
Strategic perspectives in Entrepreneurship
Strategic Growth in Entrepreneurship, The Valuation Challenge in Entrepreneurship, The Final Harvest of New Ventures, Technology, Business Incubation, India way – Entrepreneurship; Women Entrepreneurs – Strategies to develop Women Entrepreneurs, Institutions supporting Women Entrepreneurship in India.

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Text Books:

1.Entrepreneurship Development and Small Business Enterprises, Poornima M. Charantimath, 2e, Pearson, 2014.

2. Entrepreneurship, a South – Asian Perspective, D.F. Kuratko and T. V. Rao, 3e, Cengage,2012.

3. Entrepreneurship, Arya Kumar, 4 e, Pearson 2015.

4. The Dynamics of Entrepreneurial Development and Management, Vasant Desai, Himalaya Publishing House, 2015.

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IV Year – I Semester		L	T	P	C
		3	0	0	3
MANAGEMENT AND ORGANIZATIONAL BEHAVIOR					

Course Objectives:

- To create an awareness on Engineering Ethics and Human Values.
- To understand social responsibility of an engineer.
- To appreciate ethical dilemma while discharging duties in professional life.

Course Outcomes: On completion of this course, the students will be able to

- Understand the significance of value inputs in a classroom and start applying them in their life and profession
- Distinguish between values and skills, happiness and accumulation of physical facilities, the Self and the Body, Intention and Competence of an individual, etc.
- Understand the role of a human being in ensuring harmony in society and nature.

UNIT I:

Nature of Management - Social Responsibilities of Business - Manager and Environment Levels in Management - Managerial Skills - Planning - Steps in Planning Process - Scope and Limitations - Short Range and Long Range Planning - Flexibility in Planning ¬Characteristics of a sound Plan - Management by Objectives (MBO) - Policies and Strategies - Scope and Formulation - Decision Making - Techniques and Processes.

UNIT II :

Organising - Organisation Structure and Design - Authority and Responsibility Relationships - Delegation of Authority and Decentralisation - Interdepartmental Coordination - Emerging Trends in Corporate Structure, Strategy and Culture - Impact of Technology on Organisational design - Mechanistic vs Adoptive Structures - Formal and Informal Organisation.

UNIT III :

Perception and Learning - Personality and Individual Differences - Motivation and Job Performance - Values, Attitudes and Beliefs - Stress Management - Communication Types-Process - Barriers - Making Communication Effective.

UNIT IV:

Group Dynamics - Leadership - Styles - Approaches - Power and Politics - Organizational Structure - Organizational Climate and Culture - Organizational Change and Development.

UNIT V:

Comparative Management Styles and approaches - Japanese Management Practices Organisational Creativity and Innovation - Management of Innovation - Entrepreneurial Management - Benchmarking - Best Management Practices across the world - Select cases of Domestic & International Corporations - Management of Diversity.

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Text Books:

1. Stephen P. Robbins, Timothy A. Judge, Neharika Vohra, Organizational Behaviour, Pearson, 16e, 2017.
2. Richard L. Daft, New Era of Management, Cengage Learning, 11e, 2017.
3. Afsaneh Nahavandi, Robert B. Denhardt, Janet V. Denhardt, Maris P. Aristigueta, Organizational Behaviour, Sage Publications, 2015.
4. Ricky W Griffin, Management Principles and Practices, Cengage Learning, 11e, 2017.
5. Laurie J. Mullins, Management and Organizational Behaviour, Pearson Publications, 9e, 2017
6. Ramesh B. Rudani, Management and Organizational Behaviour Tata McGraw hill, 2011.

Reference Books:

1. Schermerhorn, Hunt and Osborn, Organisational behavior, John Wiley, 9th Edition, 2008.
2. Udai Pareek, Understanding Organisational Behaviour, 2nd Edition, Oxford Higher Education, 2004.
3. Mc Shane & Von Glinov, Organisational Behaviour, 4th Edition, Tata Mc Graw Hill, 2007.

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IV Year – I Semester		L	T	P	C
		3	0	0	3
STRATEGIC MANAGEMENT					

Course Objectives:

- To create an awareness on Engineering Ethics and Human Values.
- To understand social responsibility of an engineer.
- To appreciate ethical dilemma while discharging duties in professional life.

Course Outcomes: On completion of this course, the students will be able to

- Understand the significance of value inputs in a classroom and start applying them in their life and profession
- Distinguish between values and skills, happiness and accumulation of physical facilities, the Self and the Body, Intention and Competence of an individual, etc.
- Understand the role of a human being in ensuring harmony in society and nature.

UNIT I:Introduction

Meaning, Scope and Importance of Strategic Management, Nature of Strategic Management, Characteristics, Strategic Management Process, Strategic Management Model, Dimension and Levels of Strategy, Role of strategists in business Policy.

UNIT II :Strategy Formulation

Corporate Planning, Concept of Planning, Planning Process, Types of Planning ,Strategic Planning, Strategic Decision Making, Vision, mission, and purpose, objectives and goals of a business organization-Types of strategies –Guidelines for crafting successful business strategies.

UNIT III :

Environmental Appraisal, External Analysis: Industry analysis, remote environment analysis, competitive analysis, global environmental analysis, Internal Analysis: Resource-based view of the firm, Capabilities, core competence, value chain analysis, VRHN analysis ,distinctive competency, sustainable competitive advantage and profitability, SWOT Analysis, Synergy.

UNIT IV:

Strategic Analysis and Choice, Environmental Threat and Opportunity Profile (ETOP);BCG,TOWS, GE, Directional Policy Matrix-Organizational Capability Profile –Strategic Advantage Profile Corporate Level strategies-growth, stability, renewal, corporate portfolio analysis, grand strategies,McKinsey's7s Framework. Business Level Strategies-Michael Porter's Generic strategies, Functional level strategies.

UNIT V:

Strategy Implementation and Evaluation, Strategy Implementation: Structure, Systems and People ,issues in implementation, Model of Strategic Implementation, Project implementation, Procedural implementation, Resource Allocation, Budgets, Organization Structure, Strategy and Organisation Structure, Different Types of Organisational Structure, Social responsibilities and Ethics-Building a capable organization-Functional issues. Symptoms of malfunctioning of strategy-Operations Control and Strategic Control, An overview of Strategic Evaluation and Control-Measurement of performance-Analyzing variances-Role of organizational systems in evaluation. Strategic Management for non-profit organizations.

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DEPARTMENT OF CSE - COMPUTER SCIENCE & BUSINESS SYSTEMS

Text Books:

1. Strategic Management, Fred R. David, Pearson Education
2. Strategic Management and Business Policy, Thomas L Wheelen, J. David Hunger and Krish Rangarajan, Pearson Education

Reference Books:

1. Strategic Management: An Integrated approach, Hill W.L. Charles & Jones R. Gareth
2. Business Policy and Strategic Management, Azhar Kazmi, Tata McGraw Hill
3. Strategic Management -The Indian Context, R.Srinivasan, Prentice Hall of India, 2012

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IV Year – I Semester		L	T	P	C
		3	0	0	3
MULTIMEDIA APPLICATION DEVELOPMENT					

Basic Multimedia programs using PHOTOSHOP

01. Write a program to visualize a given image in different forms using features like brightness, contrast, blur etc.
02. Write a program to design a visiting card containing at least one Graphic and Text information.
03. Write a program to prepare a cover page for any book in your subject area.
04. Write a program to use appropriate tools from the tool box to cut the objects from three files (F1.jpg, F2.jpg, F3.jpg) ; Organize them in a single file and apply feather effects.

Multimedia Programs developed using FLASH

05. Write a Program to perform motion twinning operation using flash
06. Write a Program to create a 24 spokes on a wheel using flash.
07. Write a Program to change and object shape using a shape twinning concept.
08. Write a program to create an animated e-card using adobe Flash.
09. Write a Program to create an animation to represent the Growing Moon.
10. Write a Program to create an animation to indicate a ball bouncing on Steps
11. Write a Program to simulate a ball hitting another ball.
12. Write a Program to change a circle into a square using Flash.

Rich Internet Applications (RIA) using Adobe Flex and Ajax

13. Write an MXML code to display HelloWorld using Flex.
14. Create a Flex Project using Flash Builder IDE to run HelloWorld Application.
15. Implement an AJAX program to fetch RSS feeds from a well-known RSS feed site. Provide a scrolling display of latest news on your page. You can use xparser.js if you like.
16. Implement an RSS-based search feature. Have a text box and a button in your page for the same. Show the results in a separate which has the results as hyperlinks, which the user can click.
17. Use the Reverse AJAX technique to build a web-based chat application. The application is one-way browser-based. That is, we have a window in which one user types his messages. From other other side, the second user directly updates a file on the server(instead of a browser area).
18. A file on a server has information about cricket players. The fields represent name, country, matches, runs and centuries. The fields are separated by colons (:). The front end screen has a text field in which the user can enter a country. The server returns details of all players belonging to that country in the form of one big JSON object. The client parses the JSON object and builds an HTML table to print the results. Implement the server side script and the client code.
19. Write an Ajax enabled address book web application that interacts with a web service to obtain data and to modify data in a server-side database.
20. Write a Calendar web application built using Dojo toolkit

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DEPARTMENT OF CSE - COMPUTER SCIENCE & BUSINESS SYSTEMS

Minor		**L**	**T**	**P**	**C**
Financial & Cost Accounting					

Course Objectives:

- *To create an awareness about the importance and usefulness of the accounting concepts and their managerial implications*
- *To develop an understanding of the financial statements and the underlying principles and learn to interpret financial statements*
- *To create an awareness about cost accounting, different types of costing and cost management*

Course Outcomes: *After completion of the course, student should be able to*

- *Enable the budding Technocrat Managers to understand the Financial Accounting Concepts*
- *Process the accounting transactions leading to final statement of accounts*
- *Analyze the Annual Reports*
- *Prepare the FFS and CFS*
- *Understand the Costing concepts and make decisions using Marginal costing concepts and budgets*

UNITI : Introduction

Accounting Concept: Introduction, Techniques and Conventions, Financial Statements-Understanding & Interpreting Financial Statements

Accounting Process

Book Keeping and Record Maintenance, Fundamental Principles and Double Entry, Journal, Ledger, Trial Balance, Cash Book and Subsidiary Books, Rectification of Errors.

UNITII : Financial Statements

Form and Contents of Financial Statements- Trading and Profit and Loss Account, Balance Sheet – Final Accounts-analyzing and Interpreting Financial Statements, Accounting Standards.

UNITIII : Company Accounts

Audit Reports and Statutory Requirements (in the context of Annual Reports), Directors Report, Notes to Accounts, Pitfalls.

Class Discussion: Corporate Accounting Fraud A Case Study of Satyam

UNITIV : Cash and Fund Flow

Introduction, How to prepare, Difference between them

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UNITV : Costing Systems

Elements of Cost, Cost Behavior, Cost Allocation, OH Allocation, Unit Costing, Process Costing, JobCostin, Absorption Costing, ABC Analysis.

Class Discussion: Application of costing concepts in the Service Sector

Text Books:

1. *Robert N Anthony, David Hawkins, Kenneth Marchant, Accounting: Texts and Cases, Mc Graw-Hill*
2. *Case Study Materials: To be distributed for class discussion*

Reference Books:

1. *Advanced Accounting by RL Gupta and Radhaswamy*
2. *Advanced Accounting by MC Shukla and Grewal*

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DEPARTMENT OF CSE - COMPUTER SCIENCE & BUSINESS SYSTEMS

III Year – II Semester		L	T	P	C
		3	1	0	4
HUMAN RESOURCE MANAGEMENT					

Course Objectives:

- Appreciate the importance of human resource management as a field of study and as a central management function;
- Understand the implications for human resource management of the behavioral sciences, government regulations, and court decisions;
- Know the elements of the HR function (e.g. – recruitment, selection, training and development, etc.) and be familiar with each element's key concepts & terminology; and
- Apply the principles and techniques of human resource management gained through this course to the discussion of major personnel issues and the solution of typical case problems.

Course Outcomes: At the end of the course, the students will be able to:

UNIT I:Introduction to Human Resource Management

The focus of the first unit is on identifying what the personnel and human resource function is all about. It explores the typical responsibilities of HR departments and how they are affected by the corporate culture, environmental forces, and government regulations. It also introduces the topics of strategic and employment planning.

UNIT II :Staffing

Once the organization has determined its strategic and human resource objectives and analyzes the jobs to be filled, it is ready to fill them. Unit 2 reviews the two steps in the staffing process: recruitment and selection. Recruitment aims at identifying and attracting the largest possible number of qualified applicants to hire for each job.

UNIT III :Performance Management

This unit discusses and examines performance evaluation as a system including process and procedures used in developing reliable and valid standards, criteria, and evaluation mechanisms. A good performance management system is fair to the employee while also serving the goals and interests of the organization.

UNIT IV: Human Resource Development

Employee training and development is another important HR function. More specifically, Unit 4 focuses on deciding who is to be trained, in what and how they are to be trained, and how effective was the training for the employee and her/his organizational component. To be effective, training and development programs must be matched to types of employees with specific skill deficiencies and to new skills anticipated to be needed by the organization.

UNIT V:Global Human Resource Management & Future Issues

Declining productivity, substantial demographic shifts, changing employee attitudes and expectations, innovation technologies, and government regulations will continue to affect human resource management into the 21st century. This final unit deals with the most significant trends in human resource management and how they can be addressed through innovative and effective organizational strategies.

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Text Books:

1. Dessler, G. Fundamentals of Human Resource Management (4th Edition, Pearson)

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IV Year – I Semester		L	T	P	C
		3	1	0	4
ENTREPRENEURSHIP					

Course Objectives:
The aim of this course is to have a comprehensive perspective of inclusive learning, ability to learn and implement the Fundamentals of Entrepreneurship.

Course Outcomes: It enables students to learn the basics of Entrepreneurship and entrepreneurial development which will help them to provide vision for their own Start-up.

UNIT I:
Entrepreneurial Perspectives
Introduction to Entrepreneurship – Evolution - Concept of Entrepreneurship - Types of Entrepreneurs -Entrepreneurial Competencies, Capacity Building for Entrepreneurs. Entrepreneurial Training Methods- Entrepreneurial Motivations - Models for Entrepreneurial Development - The process of Entrepreneurial Development.

UNIT II :
New Venture Creation
Introduction, Mobility of Entrepreneurs, Models for Opportunity Evaluation; Business plans – Purpose, Contents, Presenting Business Plan, Procedure for setting up Enterprises, Central level - Startup and State level - T Hub, Other Institutions initiatives.

UNIT III :
Management of MSMEs and Sick Enterprises
Challenges of MSMEs, Preventing Sickness in Enterprises – Specific Management Problems; Industrial Sickness; Industrial Sickness in India – Symptoms, process and Rehabilitation of Sick Units.

UNIT IV:
Managing Marketing and Growth of Enterprises
Essential Marketing Mix of Services, Key Success Factors in Service Marketing, Cost and Pricing, Branding, New Techniques in Marketing, International Trade.

UNIT V:
Strategic perspectives in Entrepreneurship
Strategic Growth in Entrepreneurship, The Valuation Challenge in Entrepreneurship, The Final Harvest of New Ventures, Technology, Business Incubation, India way – Entrepreneurship; Women Entrepreneurs – Strategies to develop Women Entrepreneurs, Institutions supporting Women Entrepreneurship in India.

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Text Books:

1.Entrepreneurship Development and Small Business Enterprises, Poornima M. Charantimath, 2e, Pearson, 2014.

2. Entrepreneurship, a South – Asian Perspective, D.F. Kuratko and T. V. Rao, 3e, Cengage,2012.

3. Entrepreneurship, Arya Kumar, 4 e, Pearson 2015.

4. The Dynamics of Entrepreneurial Development and Management, Vasant Desai, Himalaya Publishing House, 2015.

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IV Year – I Semester		L	T	P	C
		3	0	0	3
DEVOPS					

Course Objectives:
DevOps improves collaboration and productivity by automating infrastructure and• workflows and continuously measuring applications performance

Course Outcomes: On completion of this course, the students will be able to

- Enumerate the principles of continuous development and deployment
- Automation of configuration management, inter-team collaboration, and IT service agility
- Describe DevOps• & Dev Sec Ops methodologies and their key concepts
- Illustrate the types of version control systems, continuous integration tools
- Continuous monitoring tools, and cloud models
- Set up complete private infrastructure using version control systems and CI/CD tools

UNIT I:
Phases of Software Development life cycle. Values and principles of agile software development.

UNIT II :
Fundamentals of DevOps: Architecture, Deployments, Orchestration, Need, Instance of applications, DevOps delivery pipeline, DevOps eco system.

UNIT III :
DevOps adoption in projects: Technology aspects, Agiling capabilities, Tool stack implementation, People aspect, processes

UNIT IV:
Introduction to Continuous Integration, Continuous Delivery and Deployment , Benefits of CI/CD, Metrics to track CICD practices

UNIT V:
Devops Maturity Model: Key factors of DevOps maturity model, stages of Devops maturity model, DevOps maturity Assessment

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Text Books:

1) The DevOps Handbook: How to Create World-Class Agility, Reliability, and Security in Technology Organizations, Gene Kim , John Willis , Patrick Debois , Jez Humb,1st Edition, O'Reilly publications, 2016.
2) What is Devops? Infrastructure as code, 1st Edition, Mike Loukides ,O'Reilly publications, 2012.

Reference Books:

1) Building a DevOps Culture, 1st Edition, Mandi Walls, O'Reilly publications, 2013.

2) The DevOps 2.0 Toolkit: Automating the Continuous Deployment Pipeline With Containerized Microservices, 1st Edition, Viktor Farcic, CreateSpace Independent Publishing Platform publications, 2016

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IV Year – I Semester		L	T	P	C
		3	0	0	3
MULTIMEDIA AND RICH INTERNET APPLICATIONS					

Course Objectives:
This course aims to further develop students' competency in producing dynamic and creative graphic solutions for multimedia productions. It provides students with the basic concepts and techniques of interactive authoring. Artistic visual style and layout design are stressed, as well as the editing and integration of graphic images, animation, video and audio files. The course allows students to master industry-wide software and technologies to create highly interactive, rich internet applications.

Course Outcomes: On completion of this course, the students will be able to

- Ability to design a short films and teaching material for better understanding.
- Ability to apply different multimedia development tools to produce web based and
- Stand-alone user interfaces.

UNIT I:
Fundamental concepts in Text and Image: Multimedia and hypermedia, World Wide Web, overview of multimedia software tools. Graphics and image data representation graphics/image data types, file formats, Color in image and video: color science, color models in images, color models in video.

UNIT II :
Fundamental concepts in video and digital audio: Types of video signals, analog video, digital video, digitization of sound, MIDI, quantization and transmission of audio.
Multimedia Data Compression: Lossless compression algorithms, Lossy compression algorithms, Image compression standards.

UNIT III :
Basic Video compression techniques, Case study: MPEG Video Coding I, Basic Audio compression techniques, Case study: MPEG Audio compression.
Web 2.0
What is web 2.0, Search, Content Networks, User Generated Content, Blogging, Social Networking, Social Media, Tagging, Social Marking, Rich Internet Applications, Web Services, Mash ups, Location Based Services, XML, RSS, Atom, JSON, and VoIP, Web 2.0Monetization and Business Models, Future of the Web.

UNIT IV:
Rich Internet Applications(RIAs) with Adobe Flash : Adobe Flash- Introduction, Flash Movie Development, Learning Flash with Hands-on Examples, Publish your flash movie, Creating special effects with Flash, Creating a website splash screen, action script, web sources.
Rich Internet Applications(RIAs) with Flex 3 - Introduction, Developing with Flex 3,Working with Components, Advanced Component Development, Visual Effects and Multimedia.

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UNIT V:
Ajax- Enabled Rich Internet Application : Introduction, Traditional Web Applications vs Ajax Applications, Rich Internet Application with Ajax, History of Ajax, Raw Ajax example using xml http request object, Using XML, Creating a full scale Ajax Enabled application,Dojo Tool Kit.

Text Books:
1. Fundamentals of Multimedia by Ze-Nian Li and Mark S. Drew PHI Learning, 2004 UNITS 1,2,3
2. AJAX, Rich Internet Applications, and Web Development for Programmers, Paul J Deitel and Harvey M Deitel, Deitel Developer Series, Pearson Education. UNITS 4,5

Reference Books:

1. Professional Adobe Flex 3, Joseph Balderson, Peter Ent, et al, Wrox Publications,Wiley India, 2009.

2. Multimedia Communications: Applications, Networks, Protocols and Standards, FredHalsall, Pearson Education, 2001, rp 2005.

3. Multimedia Making it work, Tay Vaughan, 7th edition, TMH, 2008.

4. Introduction to multimedia communications and Applications, Middleware, Networks,K. R. Rao, Zoran, Dragored, Wiley India, 2006, rp. 2009.

5. Multimedia Computing, Communications & Applications, Ralf Steinmetz and KlaraNahrstedt, Pearson Education, 2004

6. Principles of Multimedia, Ranjan Parekh, TMH, 2006.

7. Multimedia in Action, James E. Shuman, Cengage Learning, 198, rp 2008.