



Shri Shamrao Patil (Yadravkar) Educational & Charitable Trust's
Sharad Institute of Technology College of Engineering
(An Autonomous Institute)

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Department: Computer Science & Engineering
Class: Final Year .B.Tech

Rev: CSE Course Structure/00/2020-21
Semester: VII

Sr No	Course Code	Course Type	Course	Teaching Scheme				Evaluation Scheme					Credits
				L	T	P	Total Hrs.	CA1	CA2	MSE	ESE	Total	
1	CS701	PCC	Cloud Computing	3	-	-	3	10	10	30	50	100	3
2	CS702	PEC	Elective-IV	3	-	-	3	10	10	30	50	100	3
3	CS703	PEC	Elective-V	3	-	-	3	10	10	30	50	100	3
4	CS704	PCC	Full Stack Development	1	-	2	3	15	15	-	20	50	2
5	OEXXX	OEC	Open Elective-III	3	-	-	3	10	10	30	50	100	3
6	CS705	PEC	Elective-V Laboratory	-	-	2	2	15	15	-	20	50	1
7	CS706	PCC	Cloud Computing Laboratory	-	-	2	2	15	15	-	20	50	1
8	PRJ06	PROJ	Mega Project Phase-II	-	-	8	8	25	25	-	50	100	4
9	PRJ07	PROJ	Seminar (Industrial Case Studies)	-	-	2	2	15	15	-	20	50	1
10	HMS09	HSMC	Values & Ethics	2	-	-	2	25	25	-	-	50	Audit
Total				15	-	16	31	150	150	120	330	750	21

Open Elective-III- Introduction to Big Data

Elective-IV- 1) Block chain Technology
 2) Storage Area Networks
 3) Ad-Hoc Sensor Networks

Elective-V- 1) Digital Image Processing
 2) Internet-of-Things
 3) Advanced Data Visualization



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CS701	PCC	Cloud Computing	3-0-0	3 Credits
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Teaching Scheme	Examination Scheme
Lecture: 3 hrs/week	CA I:10 Marks CA II:10 Marks Mid Semester Exam: 30Marks End Semester Exam: 50Marks

Pre-Requisites: Computer Networks, DBMS

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

CO1	Understand fundamental concepts of cloud computing
CO2	Understand the architecture of cloud computing
CO3	Make use of Cloud Platforms
CO4	Analyze virtualization technology and install virtualization software
CO5	Understand and Implement Cloud Security
CO6	Analyze cloud computing applications



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Computer Science & Engineering
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V. Chalkaranji Dist. Kolhapur



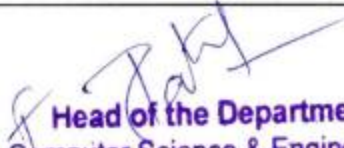
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Course Contents:

Unit1: Introduction to Cloud Computing Introduction to distributed and cluster computing, Definition of Cloud , Evolution of Cloud Computing, Importance of Cloud Computing, Characteristics, Pros and Cons of Cloud Computing, Migrating into the Cloud, Seven-step model of migration into a Cloud, Trends in Computing.	[6]
Unit2: Cloud Architecture Cloud computing types -Public, Private and Hybrid Clouds, Cloud Reference Model-, Cloud Service Models: SaaS, PaaS, IaaS, Layered Cloud Architecture Design, NIST Cloud Computing.	[6]
Unit3: Cloud Platforms Amazon Web Services (AWS): Amazon Web Services and Components, Elastic Cloud Computing (EC2), Amazon Storage System-S3 Bucket, AWS Identity and Access Management (IAM). Microsoft Cloud Services: Azure core concepts.	[6]
Unit4: Virtualization in Cloud Computing- Basics of Virtualization, VPC, Types of Virtualization, Implementation Levels of Virtualization, Virtualization Structures, Tools and Mechanisms, Virtualization of CPU ,Memory , I/O Devices, Virtualization Support and Disaster Recovery.	[6]
Unit5: Cloud Security Basics of Cloud security- Issues and Challenges, Categories of Cloud computing security, Cloud Security Governance, Architecture of security governance , Deployment Framework, Virtual Machine security, IAM security standards.	[6]
Unit6: Cloud Computing Applications- Healthcare: ECG Analysis in the Cloud, Biology: Protein Structure Prediction, Geosciences: Satellite Image Processing, Business and Consumer Applications: CRM and ERP, Social Networking, Google Cloud Application..	[6]
Reference/Textbooks:- 1. Mastering Cloud Computing, Buyya R, Vecchiola C, Selvi S T, McGraw Hill Education (India), 2013.	




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Computer Science & Engineering
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2. Cloud Computing Bible, Barrie Sosinsky ,Wiley Publishing Inc. 2011(Unit,VI)
3. Buyya R, Broberg J, Goscinski A, "Cloud Computing - Principles and Paradigms", Wiley, 2011.


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Computer Science & Engineering
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CS702A	PEC	Blockchain Technology	3-0-0	3 Credits
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Teaching Scheme	Examination Scheme
Lecture: 3 hrs/week	CA-I: 10 Marks CA-II: 10 Marks Mid Semester Exam: 30 Marks End Semester Exam: 50 Marks

Pre-Requisites: Computer Networks, computer Security.

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

CO1	Explain structure of Blockchain.
CO2	Illustrate Bitcoin Blockchain.
CO3	Explain Ethereum Blockchain.
CO4	Explain Enterprises Blockchain.
CO5	Make use of Ethereum Smart Contracts.
CO6	Summarize Hyperledger Fabric Chaincode.




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Course Contents:

Unit 1: Introduction to Blockchain What is Blockchain? The structure of Blockchains, Blockchain applications, The Blockchain life cycle, Consensus: The driving force of blockchains, blockchain in use: current blockchain in uses, future blockchain applications, Blockchain decision tree, Diving into Blockchain Technology.	[6]
Unit2: Bitcoin Blockchain Introduction to Bitcoin, Creation of coins, payments and double spending , Bitcoin cash, The limitations of Bitcoin, Bitcoin Wallets, Bitcoin Scripts, Bitcoin Attacks, Bitcoin Network, Mining for bitcoins, proof of work, making your first paper wallet	[6]
Unit3: Ethereum Blockchain Introduction to Ethereum, Swarm and whisper, Remix IDE, Truffle Framework , Ethereum Networks, Ethereum Wallets, Ethereum Clients, Web3.js, NFT, Exploring the Ethereum Mainnet	[6]
Unit4: Enterprises Blockchain Enterprise Blockchain, cross border payments, know your customer (KYC), dfood security, mortgage over blockchain, blockchain enabled trade, we trade-n trade finance network, supply chain financing, identity on blockchain.	[6]
Unit5: Ethereum Smart Contracts Introduction, Smart Contract Lifecycle, Solidity, Solidit Variables, Solidity Compilation and Deployment Solidity Functions Truffle Security Consideration	[6]
Unit6: Hyper ledger Fabric Chaincode Hyperledger fabric- architecture, identities and policies, membership and access control, channels, transaction validation, writing smart contracts using hyperledger fabric, overview of ripple and corda.	[6]
Reference/Textbooks: - 1. Draft version of "S. Shukla, M. Dhawan, S. Sharma, S. Venkatesan, 'Blockchain Technology: Cryptocurrency and Applications', Oxford University Press, 2019. 2. Josh Thompson, 'Blockchain: The Blockchain for Beginnings, Guild to Blockchain Technology and Blockchain Programming', Create Space Independent Publishing Platform, 2017. 3. Melanie Swan, "Blockchain: Blueprint for a New Economy", O'Reilly, 2015. 4. Daniel Drescher, "Blockchain Basics", Apress; 1st Edition, 2017. 5. Anshul Kaushik, "Blockchain and Crypto Currencies", Khanna Publishing House, Delhi.	




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6. Salman Baset, Luc Desrosiers, Nitin Gaur, Petr Novotny, Anthony O'Dowd, Venkatraman Ramakrishna, "Hands-On Block Chain with Hyperledger: Building Decentralized Applications with Hyperledger Fabric and Composer", Import, 2018.
7. Ritesh Modi, "Solidity Programming Essentials: A Beginner's Guide to Build Smart Contracts for Ethereum and Blockchain", Packt Publishing




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Computer Science & Engineering
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CS702B	PEC	Storage Area Networks	3-0-0	3 Credits
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Teaching Scheme	Examination Scheme
Lecture: 3 hrs/week	CA-I: 10 Marks CA-II: 10 Marks Mid Semester Exam: 30 Marks End Semester Exam: 50 Marks

Pre-Requisites: - DBMS, Operating System

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

CO1	Identify key challenges in information management
CO2	Illustrate Storage system architecture and data protection.
CO3	Explain concepts, components and protocols of Storage area network
CO4	Justify concepts, components, implementation and protocols of Network -Attached Storage
CO5	Illustrate Architecture of Storage Virtualization.
CO6	Make use of Replication, Replication techniques and Storage Security




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Course Contents:

<p>Unit1: Introduction to information storage</p> <p>Data Center Infrastructure, Key challenges in Managing Information, Information Lifecycle. Components of Storage System Environment, Disk Drive Components, Disk Drive Performance, Logical Components of Host, Application requirements and disk performance</p> <p>Data Protection (RAID):- Implementation of RAID, RAID array components, RAID levels, Comparison, RAID ,Impact on disk performance.</p>	[6]
<p>Unit2: Storage Network</p> <p>Components of SAN, Fibre Channel Protocol Stack- Links, ports and topologies, FC-0: Cables, plugs and Signal Encoding, FC-1: 8b/10b encoding, , FC-2: data Transfer, FC-3: common Services, FC-4 and ULPs, Fibre Channel SAN – point-to- point topology, Fabric topology, Arbitrated loop topology, Hardware components of Fibre channel SAN.</p> <p>IP SAN – iSCSI – components, connectivity, topology, protocol stack, discovery, names, session.</p>	[6]
<p>Unit3: Network -Attached Storage</p> <p>Local File Systems, Network File System and File Servers, Benefits of NAS, NAS file I/O, Components of NAS, NAS Implementations, NAS File sharing Protocols, NAS I/O operations, Factors affecting NAS Performance.</p> <p>Case Study: Direct Access File System, Shared Disk File System</p>	[6]
<p>Unit4: Storage Virtualization</p> <p>Introduction, Virtualization in the I/O path, Limitations and requirements, Definition of Storage Virtualization, Implementation considerations, Storage Virtualization on block, level, File level Virtualization, Storage Virtualization on various levels of the storage, network, Symmetric and Asymmetric Storage Virtualization.</p>	[6]
<p>Unit5: Backup and Recovery</p> <p>Introduction, Information Availability, Cause of Information unavailability, Measuring information Availability, Backup Purpose, Considerations, Backup Granularity, Recovery Considerations, Backup Methods, Backup Process, Backup and Restore Operations, Backup Topology, Backup in NAS environment, Backup Technologies.</p>	[6]



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Unit6: Replication and Storage Security Local Replication, Uses of Local Replicas, Data Consistency, Local Replication Technologies, Restore and Restart Considerations. Storage Security: Storage Security Framework, Risk Triad, Storage Security Domains, Security Implementations in Storage Networking.	[6]
Reference/Textbooks: - 1. A Information Storage and Management by G. Somasudaram – EMC Education Services (Wiley India Edition). 2. Storage Networks Explained by Ulf Troppen, Rainer Erkens, Wolfgang Müller (WileyIndia Edition).	



F. J. J.
Head of the Department
Computer Science & Engineering
SHARAD INSTITUTE OF TECHNOLOGY
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CS702C	PEC	AD-Hoc Sensor Networks	3-0-0	3 Credits
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Teaching Scheme	Examination Scheme
Lecture: 3 hrs/week	CA-I: 10 Marks CA-II: 10 Marks Mid Semester Exam: 30 Marks End Semester Exam: 50 Marks

Pre-Requisites: - Computer Networks

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

CO1	Explain the various ad-hoc routing protocols in ad-hoc networks.
CO2	Outline the architecture of sensor networks.
CO3	Understand the various routing protocols in wireless sensor networks.
CO4	Classify the upper layer issues in wireless sensor network.
CO5	Identify the security issues and challenges in wireless sensor network.
CO6	Analyze the sensor network platform and tools state-centric programming.



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Course Contents:

Unit 1: Ad-hoc Networks – Introduction and Routing Protocols Elements of Ad hoc Wireless Networks, Issues in Ad hoc wireless networks, Example commercial applications of Ad hoc networking, Ad hoc wireless Internet, Issues in Designing a Routing Protocol for Ad Hoc Wireless Networks, Classifications of Routing Protocols, Table Driven Routing Protocols – Destination Sequenced Distance Vector (DSDV), On-Demand Routing protocols – Ad hoc On-Demand Distance Vector Routing (AODV).	[6]
Unit 2: Sensor Networks – Introduction & Architectures Challenges for Wireless Sensor Networks, Enabling Technologies for Wireless Sensor Networks, WSN application examples, Single-Node Architecture – Hardware Components, Energy Consumption of Sensor Nodes, Network Architecture – Sensor Network Scenarios, Transceiver Design Considerations, Optimization Goals and Figures of Merit.	[6]
Unit 3: WSN Networking Concepts and Protocols MAC Protocols for Wireless Sensor Networks, Low Duty Cycle Protocols And Wakeup Concepts – S-MAC, The Mediation Device Protocol, Contention based protocols – PAMAS, Schedule based protocols – LEACH, IEEE 802.15.4 MAC protocol, Routing Protocols- Energy Efficient Routing.	[6]
Unit 4: Upper Layer issue of WSN Challenges and Issues in Transport layer protocol, High-level application layer support, Adapting to the inherent dynamic nature of WSNs, Sensor Networks and mobile robots.	[6]
Unit 5: Sensor Network Security Network Security Requirements, Issues and Challenges in Security Provisioning, Network Security Attacks, Layer wise attacks in wireless sensor networks, possible solutions for jamming, tampering, black hole attack, flooding attack. Key Distribution and Management, Secure Routing – SPINS, reliability requirements in sensor networks.	[6]
Unit 6: Sensor Network Platforms and Tools Sensor Node Hardware – Berkeley Motes, Programming Challenges, Node-level software platforms – TinyOS, nesC, CONTIKIOS, Node-level Simulators – NS2 and its extension to sensor networks, COOJA, TOSSIM, Programming beyond individual nodes – State centric programming.	[6]



J. Jadhav
Head of the Department
Computer Science & Engineering
SHARAD INSTITUTE OF TECHNOLOGY
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Reference/Textbooks: -

1. Ad Hoc and Sensor Networks – Theory and Applications, Carlos Corderio Dharma P. Aggarwal, World Scientific Publications, March 2006, ISBN – 981–256–681–3.
2. Wireless Sensor Networks: An Information Processing Approach, Feng Zhao, Leonidas Guibas, Elsevier Science, ISBN – 978-1-55860-914-3 (Morgan Kauffman).
3. C. Siva Ram Murthy and B. S. Manoj, “Ad Hoc Wireless Networks Architectures and Protocols”, Prentice Hall, PTR, 2004.
4. Kazem Sohraby, Daniel Minoli, & Taieb Znati, “Wireless Sensor Networks- Technology, Protocols, and Applications”, John Wiley, 2007.
5. Carlos De Morais Cordeiro, Dharma Prakash Agrawal “Ad Hoc & Sensor Networks: Theory & Applications”, World Scientific Publishing Company, 2006.
6. Holger Karl, Andreas Willig “Protocols and Architecture for Wireless Sensor Networks” John Wiley and Sons Ltd.



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Computer Science & Engineering
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CS703A	PEC	Digital Image Processing	3-0-0	3 Credits
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Teaching Scheme	Examination Scheme
Lecture: 3 hrs/week	CA-I: 10 Marks CA-II: 10 Marks Mid Semester Exam: 30 Marks End Semester Exam: 50 Marks

Pre-Requisites: - Computer Programming, Statistics

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

CO1	Describe the fundamental concepts of Digital Image Processing.
CO2	Explain Image Processing Transforms which play significant role in image enhancement, filtering, analysis and compression.
CO3	Demonstrate Image enhancement techniques which play significant role in image enhancement, filtering.
CO4	Examine the need of image compression i.e. the technique of reducing the amount of data required to represent a digital image.
CO5	Summarize the concepts Image segmentation.
CO6	Apply image processing techniques to solve various real time applications.



F. Jadhav
Head of the Department
Computer Science & Engineering
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Course Contents:

Unit1: Digital Image Fundamentals	
What is Digital Image Processing? The Origins of Digital Image Processing, Examples of Fields that Use Digital Image Processing, Digital image representation, Fundamental Steps in Digital Image Processing, Components of an Image Processing System.	[6]
Unit2: Image Transforms	
Elements of visual perception, Image sampling and quantization, Basic relationship between pixels, Discrete Fourier transform, Properties of 2D, DFT,KL-Transforms, Cosine, Introduction to Wavelet Transform.	[6]
Unit3: Image Enhancement Techniques	
Spatial Domain Techniques, Point processing, Neighborhood processing, Spatial domain filtering, Image smoothing and Image sharpening using spatial domain filters, Enhancement based on histogram modeling, Frequency domain filtering, Image smoothing and Image sharpening using frequency domain filters.	[6]
Unit 4: Image Compression	
Fundamentals, Types of redundancies, Lossy and Lossless compression, Dictionary based coding, Run-length coding, LZW coding, Huffman coding, Arithmetic coding, Image compression model	[6]
Unit 5: Image Segmentation	
Detection of Discontinuities - Point, Line and Edge detection, finding gradients using masks, Thresholding based image segmentation, global and local thresholding, Region based segmentation.	[6]
Unit 6: Image Processing Applications	
Biometric Pattern Recognition, Face Recognition. Preprocessing of Signature Patterns, Lung Disease Identification.	[6]
Reference/Textbooks: -	
1. R. C. Gonzalez, R. E. Woods, "Digital Image Processing" 2. A. K. Jain, "Fundamentals of Digital Image Processing", PH 3. Milan Sonka, Vaclav Hlavac, Boyle, "Digital Image Processing and Computer Vision", Cengage Learning S. Jayaraman, 4. S. Esakkirajan, T. Veerkumar, "Digital Image Processing", Tata McGrawHill 5. Rafael C. Gonzalez, Richard E. Woods, Steven L. Eddins, "Digital Image Processing Using MATLAB", 2nd ed	



S. J. Patil
Head of the Department
Computer Science & Engineering
SHARAD INSTITUTE OF TECHNOLOGY
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CS703B	PEC	Internet of Things	3-0-0	3 Credits
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Teaching Scheme	Examination Scheme
Lecture: 3 hrs/week	CA-I: 10 Marks CA-II: 10 Marks Mid Semester Exam: 30 Marks End Semester Exam: 50 Marks

Pre-Requisites: - Data Communication, Computer Programming

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

CO1	Explain how to design and develop Applications in IOT.
CO2	Explain the specifications and functionalities of various protocols/standards of IOT
CO3	Illustrate Working Principals of Different IOT devices
CO4	Develop simple IOT Applications
CO5	Demonstrate Applications of IOT using Arduino & Raspberry Pi
CO6	Elaborate Simple basic Case studies of IOT



F. Jadhav
Head of the Department
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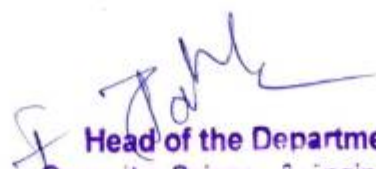
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Course Contents:

Unit 1: Introduction to the Internet of Things Architectural Overview, Design principles and needed capabilities, IoT Applications, Sensing, Actuation.	[6]
Unit2: IOT and Communication Protocols Basics of Networking, Communication Protocols, Sensor Networks, Machine-to-Machine Communications and IoT Technology, Fundamentals Devices and gateways, Data management, Business processes in IoT, Everything as a Service(XaaS), Role of Cloud in IoT, Security aspects in IoT	[6]
Unit3: Interoperability in IoT Hardware Components Computing (Arduino, Raspberry Pi), Communication, Sensing, Actuation, I/O interfaces, Software Components Programming API's (using Python Programming)	[6]
Unit4: IoT Application Development Solution framework for IoT applications- Implementation of Device integration, Data acquisition and integration.	[6]
Unit5: IoT Physical Devices and Endpoints Building IoT with Arduino: Arduino-Interfaces-Arduino IDE-Programming, Raspberry Pi: Introduction to Raspberry Pi, About the Raspberry Pi Board: Hardware Layout, Operating Systems on Raspberry Pi, Configuring Raspberry Pi, Programming Raspberry Pi with Python, Wireless Temperature Monitoring System Temperature Sensor	[6]
Unit6: IoT Case Studies IoT case studies and mini projects based on Industrial Automation, Transportation, Agriculture, Healthcare, Home Automation, and Smart Cities.	[6]




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Reference/Textbooks: -

1. Arashdeep Bahga ,Vijay Madisetti Internet of Things an Hands on Approach,University Press.
2. Dr. SRN Reddy, Rachit Thukral and Manasi Mishra, "Introduction to Internet of Things: A practical Approach", ETI Labs
3. S. Misra, A. Mukherjee, and A. Roy, 2020. Introduction to IoT. Cambridge University Press.
4. . Pethuru Raj and Anupama C. Raman, "The Internet of Things: Enabling Technologies, Platforms, and Use Cases", CRC Press
5. Jeeva Jose, "Internet of Things", Khanna Publishing House, Delhi
6. Adrian McEwen, "Designing the Internet of Things", Wiley
7. Raj Kamal, "Internet of Things: Architecture and Design", McGraw Hill
8. Cuno Pfister, "Getting Started with the Internet of Things", O Reilly Media.




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CS703C	PEC	Advanced-Data Visualization	3-0-0	2 Credits
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Teaching Scheme	Examination Scheme
Lecture: 3 hrs/week	CA-I: 10 Marks CA-II: 10 Marks Mid Semester Exam: 30 Marks End Semester Exam: 50 Marks

Pre-Requisites: Data science & Visualization


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

CO1	Construct different types of charts based on data.
CO2	Make use of different strategies for exploratory data analysis.
CO3	Construct histograms, tree maps for visualization of complicated data.
CO4	Demonstrate the story of the data using various options available in the tool.

Course Contents:

Unit 1: Fundamentals of visualization with tableau, Data visualization, and its importance, getting to know tableau for data visualization, Line chart, bar chart.	[6]
Unit 2: Introduction to Charting, Tableau Charts, Colors, Shapes, and Sizes, Pie Charts, Maps, Scatter Plots, Gantt Charts, Bubble Charts	[6]
Unit 3: Cognitive vs Perceptual Design Distinction, Explanatory Analysis, Static Versus Interactive Visualizations, Multiple, Connected View, Language, Labeling, and Scales, Visual Lies, and Cognitive Bias	[6]
Unit 4: Histograms, Bullet Charts, Heat Maps and Highlight Tables, Charting, Tree maps	[6]




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Unit 5: Box-and-Whisker Plots, Dates, Table calculation, Mapping	[6]
Unit 6: Hierarchies, Actions, Filters, and Parameters, Tell your story of data	[6]
Reference Book/ Text Book: <ol style="list-style-type: none">1. "Tableau For Dummies" by Molly Monsey and Paul Sochan2. "Tableau Public for Data Visualization" by Ryan Sleeper.	



F. Tah
Head of the Department
Computer Science & Engineering
SHARAD INSTITUTE OF TECHNOLOGY
COLLEGE OF ENGINEERING
Yadrav (Ichalkaranji) Dist. Kolhapur



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CS704	PCC	Full Stack Development	0-0-2	1 Credit
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Teaching Scheme	Examination Scheme
Lecture: 1 hr/week Practical: 2 hrs/week	CA I:15 Marks CA II:15 Marks End Semester Exam: 20 Marks

Pre-Requisites: Web Technology

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

CO1	Demonstrate the fundamental concepts of HTML and CSS.
CO2	Examine the concepts of Javascript.
CO3	Make use of basics of React JS concepts
CO4	Develop web based client side and server side applications.
CO5	Develop web based application using effective database access.



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UNIT – 1 : Web development basics Web development basics -HTML Basics - HTML Elements, HTML Semantic, HTML Attributes, HTML Headings, HTML Paragraph, HTML styles, HTML Formatting, CSS - How to write CSS: syntax, Using style sheets, Using external style sheets, Identities and classes, Style entire elements, CSS Comments, Change background colors, Setting background images, Change text color, Text formatting using CSS, Font Properties, Text Properties, Styling hyperlinks using CSS, Styling lists using CSS, Setting element width and height, Adding borders, Spacing: margin & padding	[2]
UNIT – 2 : Frontend Development Javascript basics OOPS Aspects of JavaScript Memory usage and Functions in JS AJAX for data exchange with server jQuery Framework jQuery events, UI components etc	[2]
UNIT – 3 : REACT JS Introduction to React React Router and Single Page Applications React Forms, Flow Architecture and Introduction to Redux More Redux and Client-Server Communication	[2]
UNIT – 4 : Java Web Development JAVA PROGRAMMING BASICS, Model View Controller (MVC) Pattern MVC Architecture using Spring RESTful API using Spring Framework	[2]
UNIT – 5 : Database and Deployment MongoDB introduction, MongoDB database, MongoDB collection, spring Boot with MongoDB integration, deploying application in Cloud	[2]
Reference Book/ Text Book: 1. Learning PHP, MySQL, JavaScript, CSS & HTML5: A Step-by-Step Guide to Creating Dynamic Websites by Robin Nixon 2. Web Design with HTML, CSS, JavaScript and JQuery Set Book by Jon Duckett Professional JavaScript for Web Developers Book by Nicholas C. Zakas 3. Full Stack JavaScript: Learn Backbone.js, Node.js and MongoDB. Copyright © 2015 BY AZAT MARDAN 4. Full-Stack JavaScript Development by Eric Bush. 5. Mastering Full Stack React Web Development Paperback – April 28, 2017 by Tomasz Dyl , Kamil Przeorski , Maciej Czarnecki	

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S. Jadhav
Head of the Department
Computer Science & Engineering
SHARAD INSTITUTE OF TECHNOLOGY
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List of Experiments:

1. Write a program to create a simple webpage using HTML.
2. Write a program to create a website using HTML CSS and JavaScript?
3. Write a program to build a Chat module using HTML CSS and JavaScript?
4. Write a program to create a simple calculator Application using React JS
5. Write a program to create a Voting Application using React JS
6. Write a program to create and Build a Password Strength Check using Jquery.
7. Develop web-based application using suitable client side and server side code.
8. Create a project on Grocery delivery application.
9. Develop student application using MongoDB database.
10. Develop application and deploy on cloud.




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CS705A	PEC	Digital Image Processing Laboratory	0-0-2	1 Credit
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Teaching Scheme	Examination Scheme
Lecture: 2 hrs/week	CA I:15 Marks CA II:15 Marks End Semester Exam: 20 Marks

Pre-Requisites: Computer Programming, Statistics.

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

CO1	Describe the fundamental concepts of Digital Image Processing.
CO2	Explain Image Processing Transforms which play significant role in image enhancement, filtering, analysis and compression.
CO3	Demonstrate Image enhancement techniques which play significant role in image enhancement, filtering.
CO4	Examine the need of image compression i.e. the technique of reducing the amount of data required to represent a digital image.
CO5	Summarize the concepts Image segmentation.
CO6	Apply image processing techniques to solve various real time applications.




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List of Experiments:

1. Study of Matlab environment and implementation of matlab commands, functions and programming constructs.
2. Point processing in spatial domain
 - a. Negation of an image
 - b. Thresholding of an image
 - c. Contrast Stretching of an image
3. Program to implement Bit Plane Slicing
4. Program for plotting a Histogram of an image
5. Program to implement Histogram Equalization
6. To write a Program for Histogram Specification
7. Zooming an image by interpolation and replication
8. Filtering in spatial domain
 - a. Low Pass Filtering
 - b. High Pass Filtering
 - c. Median filtering
9. Edge Detection using derivative filter mask
 - a. Prewitt
 - b. Sobel
 - c. Laplacian
10. Data compression using Huffman coding
11. Filtering in frequency domain
 - a. Low pass filter
 - b. High pass filter




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CS705B	PEC	Internet of Things Laboratory	0-0-2	1 Credit
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Teaching Scheme	Examination Scheme
Lecture: 2 hrs/week	CA I:15 Marks CA II:15 Marks End Semester Exam: 20 Marks

Pre-Requisites: Web technology.

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

CO1	To explain the Raspberry pi and Arduino hardware.
CO2	To Install and configure Operating System on Raspberry pi and Arduino.
CO3	To Design and develop an application on different hardware/Board.
CO4	To Design and develop an IoT application on different hardware/Board

List of Experiments:

1. Study of Raspberry pi and Arduino hardware.
2. Installation of Operating System on Raspberry pi.
3. LED Interfacing with Arduino.
4. LED Interfacing with Raspberry Pi.
5. LCD Interfacing with Arduino.
6. LCD Interfacing with Raspberry Pi.
7. Understanding the connectivity of Raspberry-Pi circuit with IR sensor. Write an application to detect obstacle and notify user using LEDs.
8. Write an application using Raspberry-Pi to control the operation of a hardware simulated traffic signal.
9. Write an application using Raspberry-Pi to control the operation of a hardware simulated lift elevator.
10. Develop a Real time application like smart home with following requirements: When user enters into house the required appliances like fan, light should be switched ON. Appliances should also get controlled remotely by a suitable web interface. The objective of this application is student should construct complete Smart application in group.



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CS705C	PEC	Advanced-Data Visualization Laboratory	0-0-2	1 Credit
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Teaching Scheme	Examination Scheme
Lecture: 2 hrs/week	CA I:15 Marks CA II:15 Marks End Semester Exam: 20 Marks

Pre-Requisites: Data Science & Visualization.

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

CO1	Construct different types of charts based on data.
CO2	Make use of different strategies for exploratory data analysis.
CO3	Construct histograms, tree maps for visualization of complicated data.
CO4	Demonstrate the story of the data using various options available in the tool.




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List of Experiments:

1. Connecting to data sources: Tableau allows you to connect to various data sources such as Excel, CSV, databases (SQL Server, MySQL, Oracle, etc.), and cloud platforms (Google Analytics, Salesforce, etc.).
2. Building visualizations: Tableau provides a wide range of visualization options, including bar charts, line charts, scatter plots, maps, heat maps, treemaps, and more. You can create interactive and dynamic visualizations using drag-and-drop functionality.
3. Creating dashboards: Dashboards are a collection of multiple visualizations that allow you to present and analyze data in a consolidated manner. You can combine various charts, tables, filters, and parameters to create interactive and informative dashboards.
4. Adding calculations and fields: Tableau enables you to create calculated fields using mathematical operations, aggregations, logical expressions, and functions. You can perform calculations on existing fields or create new fields based on specific criteria.
5. Applying filters and parameters: Filters allow you to limit the data displayed in your visualizations based on specific conditions. Parameters provide a way to dynamically change values in calculations, filters, and other elements, enabling user interactivity.
6. Implementing data blending and data joining: Tableau allows you to combine data from multiple sources into a single view, either by blending the data or joining it. Data blending helps when direct joins are not possible or when you need to connect data at different levels of granularity.
7. Utilizing table calculations: Tableau provides powerful table calculations that enable you to perform complex calculations on data displayed in tables and charts. Examples include running totals, percent of total, moving averages, and more.
8. Creating parameters for dynamic analysis: Parameters allow users to input values that affect calculations, filters, and other elements in the visualization. You can use parameters to enable dynamic what-if analysis or create interactive features for users.




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CS706	PCC	Cloud Computing Laboratory	0-0-2	1 Credit
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Teaching Scheme:	Evaluation Scheme:
Practical: 2 hours/week	CA I:15 Marks CA II:15 Marks End Semester Exam: 20 Marks

Pre-Requisites: Computer Networks, DBMS

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

CO1	Understand fundamental concepts of cloud computing
CO2	Understand the architecture of cloud computing
CO3	Make use of Cloud Platforms
CO4	Analyze virtualization technology and install virtualization software
CO5	Understand and Implement Cloud Security
CO6	Analyze cloud computing applications

Experiment List:

1. Use Google Doc to make spreadsheets and notes.
2. Create/Delete Virtual Machines using VMware (Private Cloud)
3. Cloud Service account Creation -AWS
4. Case Study on Launch AWS EC2 instance.
5. Create AWS S3 Bucket and Objects.
6. Create and Host Simple Web Application on AWS.
7. Implement Identity Access Management (IAM).
8. Mini project using cloud computing services.



S. Patil
Head of the Department
Computer Science & Engineering
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PRJ06	PROJ	Mega Project Phase II	0-0-8	4 Credits
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Teaching Scheme: Practical: 2 hours/week	Evaluation Scheme: CA I:25 Marks CA II:25 Marks End Semester Exam: 50 Marks
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Pre-Requisites: Basic Knowledge of Core Computer science Engineering Subjects

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

CO1	Identify real life problem and feasibility of solution to the problem
CO2	Analyze and optimize solutions to real life problems with individual and team work through modern tool usage
CO3	Improve professional ethics and communication skill and engage with environment sustainability to build lifelong learning attitude

Term Work:

1. At the end of semester student have to submit project phase-2 report for POE




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PRJ07	PROJ	Industrial Case Studies (Seminar)	0-0-2	1 Credit
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Teaching Scheme:	Evaluation Scheme:
Practical: 2 hours/week	CA I:15 Marks
	CA II:15 Marks
	End Semester Exam: 20 Marks

Pre-Requisites: Communication skill, Programming Languages

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

CO1	Identify technical and practical issues related to the area of course specialization.
CO2	Plan a well-organized case studies report employing elements of technical writing and critical thinking.
CO3	Demonstrate the ability to describe, interpret and analyze technical issues and develop competence in presenting.

Course Contents

The Computer Science Engineering Cases group believes that through industrial case studies, students will improve their ability to learn and retain concepts in their courses, on work terms and in their professional lives. One of the best means to create case studies is by converting them from student-generated work reports. As a result, it is in our best interest to ensure that work reports submitted to our group contain an adequate design process and topics that align with topics that professors have suggested would benefit from case studies. We also believe that students will benefit by having suggestions for work term report topics. The student has to select a Seminar topic/Case Studies work based on topic of interest. Periodically the implementation will be evaluated by the project guide. The work starts after sixth semester and evaluated in the seventh semester. The end of each semester student will be evaluated by departmental committee/faculty assigned by HOD. students can choose any relevant topic which is relevant to industry



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HMS09	HSMC	Values and Ethics	2-0-0	2 Credits
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Teaching Scheme:	Evaluation Scheme:
Lecture: 2 hours/week	CA I:25 Marks
	CA II:25 Marks
	End Semester Exam: 50 Marks

Pre-Requisites: NIL


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

CO1	Relate the Ethics & Human interface
CO2	Improve Attitude, Morals, Aptitude, Integrity towards Society
CO3	Distinguish between values and skills, happiness and accumulation of physical facilities, the Self and the Body, Intention and Competence of an individual, etc.
CO4	Explain the significance of value inputs in a classroom and start applying them in their life and profession
CO5	Develop Publication ethics
CO6	Develop Business ethics in professional careers

Course Contents:

Unit 1 Ethics and Human Interface: Ethics and Human Interface, Essence, determinants and consequences of Ethics in human actions; Dimensions of ethics; ethics in private and public relationships Human Values – lessons from the lives and teachings of great leaders, reformers and administrators, Role of family, society in inculcating values, role of educational institutions in inculcating values	[2]
Unit 2: Attitude, Morals, Aptitude, Integrity towards Society Attitude: content, structure, function, Attitude and its influence and relation with thought and behavior, Aptitude and foundational values towards society, integrity, impartiality and non-partisanship, objectivity, dedication towards society, empathy, tolerance and compassion intelligence-concepts, and their utilities and application	[2]
Unit 3: Understanding Harmony in the Human Being - Harmony in Myself Understanding human being as a co-existence of the sentient 'I' and the material 'Body', Understanding the needs of Self ('I') and 'Body', Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer), Understanding the characteristics and activities of 'I' and harmony in 'I', Understanding the harmony of I with the Body; correct appraisal of Physical needs, meaning of Prosperity in detail, Programs to ensure Sanyam and Swasthya, Understanding harmony in the Family	[2]




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Unit 4: Value Education: Need, Guidelines, content and process for Value Education, Self-Exploration-; Natural Acceptance and Experiential Validation, Continuous Happiness and Prosperity, Right understanding, Relationship and Physical Facilities, Understanding Happiness and Prosperity correctly, Method to fulfill the above human aspirations: understanding and living in harmony at various levels	[2]
Unit 5: Publication Ethics Publication Ethics: Introduction, Scope & importance, Best practices/standards initiatives & Guidelines: COPE, WAME, etc., Conflict of Interest, Publication Misconduct: definition, concept, problems that lead to unethical behavior & Vice versa, Violation of Publication Ethics, Authorship & Contributor ship, Identification of Publication misconduct, complaints & appeals, Predatory publishers & Journals	[2]
Unit 6: Business Ethics Ethics - Meaning, Importance, & Types of Ethics, Nature and Relevance to Business ethics, Values and Attitudes of Professional Engineers, Seven Principles of Public Life, Ethics in Business: Features, Principles, Need & Importance, Issues in Business ethics, Improving ethical behavior in Business	[2]
Reference Books /Text Books <ol style="list-style-type: none">1. R R Gaur, R Sangal, G P Bagaria, 2009, A Foundation Course in Human Values and Professional Ethics.2. M Govindrajan, S Natrajan & V.S. Senthil Kumar, Engineering Ethics (including Human Values), Eastern Economy Edition, Prentice Hall of India Ltd.3. Neeraj Kumar, "Lexicon for Ethics, Integrity & Aptitude", Chronicle Publication, 2016.4. Santosh Ajmera, Nand Kishor Reddi, "Ethics - Integrity and Aptitude", Tata Mc Graw Hill Publication, 2014.5. M. Karthikeyan "Ethics, Integrity and Aptitude", Tata Mc Graw Hill Publication, 2015.6. Ivan Illich, 1974, Energy & Equity, The Trinity Press, Worcester, and Harper Collins, USA.7. A N Tripathy, 2003, Human Values, New Age International Publishers.8. E G Seebauer & Robert L. Berry, 2000, Fundamentals of Ethics for Scientists & Engineers, Oxford University Press.9. B P Banerjee, 2005, Foundations of Ethics and Management, Excel Books.10. B L Bajpai, 2004, Indian Ethos and Modern Management, New Royal Book Co., Lucknow. Reprinted 2008.11. P L Dhar, RR Gaur, 1990, Science and Humanism, Commonwealth Publishers.	



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Yadav (Ichalkaranji) Dist. Kolhapur