

**Punyashlok Ahilyadevi Holkar Solapur University,
Solapur**



NAAC Accredited-
2015 'B' Grade
(CGPA 2.62)

Name of the Faculty: Science & Technology

CHOICE BASED CREDIT SYSTEM

Syllabus Structure: B. Tech. (Information Technology)

S.Y. B.Tech. (Information Technology) w.e.f. Academic Year 2021-22

T.Y. B.Tech. (Information Technology) w.e.f. Academic Year 2022-23

**Final Year B. Tech (Information Technology) w.e.f. Academic Year
2023-24**



Punyashlok Ahilyadevi Holkar Solapur University, Solapur

FACULTY OF SCIENCE & TECHNOLOGY

B. Tech. Information Technology

Program Educational Objectives (PEOs)

1. Graduates will exhibit strong fundamental knowledge and skills in the field of Information Technology to pursue successful professional careers and higher studies and research.
2. Graduates will exhibit capabilities to understand and resolve the various societal issues through their problem solving skills.
3. Graduates will be sensitive to ethical, societal and environmental issues while serving at their professional work and society.





Punyashlok Ahilyadevi Holkar Solapur University, Solapur

FACULTY OF SCIENCE & TECHNOLOGY

B. Tech. Information Technology

Program Outcomes (POs)

Engineering Graduates will be able to:

- 1. Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- 2. Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- 3. Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet- the specified need with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- 4. Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- 5. Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
- 6. The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- 7. Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- 8. Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- 9. Individual and teamwork:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- 10. Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear

instructions.

- 11. Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- 12. Lifelong learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.





Punyashlok Ahilyadevi Holkar Solapur University, Solapur

FACULTY OF SCIENCE & TECHNOLOGY

B. Tech. Information Technology

Program Specific Outcomes (PSOs)

PSO1: Student will be able to apply fundamentals of mathematics, algorithms and computational systems to Information Technology.

PSO2: Student will be able to provide a solution to the problem in the areas of Networking, Database management, System Software, Web Technology, Information Security and Thrust areas.

PSO3: Student will be able to design and develop IT solution for societal problem/s, while encouraging usage of Free Open Source Software (FOSS).





PUNYASHLOK AHILYADEVI HOLKAR SOLAPUR UNIVERSITY, SOLAPUR
FACULTY OF SCIENCE AND TECHNOLOGY
Credit System Structure of Final Year B. Tech. (Information Technology)
Semester-VII w.e.f. 2023-2024

Course Code	Theory Course Name	Engagement Hours			Credits	FA	SA		Total
		L	T	P		ESE	ISE	ICA	
IT411	Cyber Security	3	-	-	3	70	30	-	100
IT412	Management Information Systems	3	-	-	3	70	30	-	100
IT413	Professional Elective-II	3	-	-	3	70	30	-	100
IT414	Professional Elective-III	3	-	-	3	70	30	-	100
IT415	DevOps	2	-	-	2		25	-	25
	Sub Total	14	0	0	14	280	145	0	425
	Laboratory/Workshop					ESE			
						POE			
IT411	Cyber Security	-	-	2	1	-	-	25	25
IT412	Management Information Systems	-	-	2	1	-	-	25	25
IT413	Professional Elective-II	-	-	2	1	-	-	25	25
IT414	Professional Elective-III	-	-	2	1	-	-	25	25
IT415	DevOps	-	-	2	1	50	-	25	75
IT416	Project Phase – I	-	-	2	1	-	-	50	50
IT417	Vocational Training	-	-	2	1	-	-	50	50
	Sub Total	0	0	12	6	50	-	225	275
	Grand Total	14	0	12	20	330	145	225	700

Abbreviations: L- Lectures, P –Practical, T- Tutorial, D- Drawing, ISE -In- Semester Examination, ESE –End Semester Examination (Theory , Practical and Oral Examination, Oral Examination), ICA-Internal Continuous Assessment.

IT413 A to C	Professional Elective-II :	IT414 A to C	Professional Elective-III :
A	Internet of Things	A	Human Computer Interaction
B	Distributed Systems	B	Big Data Analytics
C	Blockchain Technology	C	Information Retrieval



PUNYASHLOK AHILYADEVI HOLKAR SOLAPUR UNIVERSITY, SOLAPUR

FACULTY OF SCIENCE AND TECHNOLOGY

Credit System Structure of Final Year B. Tech.(Information Technology)

Semester-VIII w.e.f. 2023-2024

Laboratory / Tutorials Courses											
Course Code	Name of Laboratory / Tutorials Courses	L	T	P	D	Credits	Examination Scheme				
							ISE	ESE		ICA	Total
								POE	OE		
IT421	Project Phase –II (Capstone Project / Internship)	-	-	20	-	10	-	100	-	100	200
	Sub Total	-	-	20	-	10	-	100	-	100	200
	Grand Total	-	-	20	-	10	-	100	-	100	200

Abbreviations: L- Lectures, P –Practical, T- Tutorial, D- Drawing, ISE -In-Semester Examination, ESE –End Semester Examination (Theory , Practical and Oral Examination, Oral Examination), ICA- Internal Continuous Assessment.

Note:

1. At Final Year B-Tech level Batch Size for the practical/tutorial shall be of 18 students. On forming the batches, if the strength of remaining student exceeds 7, then a new batch shall be formed.
2. Vocational Training (evaluated at B. Tech Semester-VII) of minimum 15 days shall be completed in any vacation after B. Tech. Semester-III, but before B. Tech. Semester-VII & the report shall be submitted and evaluated at B. Tech. Semester-VII.
3. Project group for B. Tech. Semester-VII and Semester-VIII shall not be of more than 4 students, however in exceptional cases group size may be of 5 students.
4. In semester VIII, all students shall complete a Capstone Project at institute in a group formed in previous semester or Internship of minimum three months in any industry and submit the report at the end of the semester.
5. ICA assessment shall be a continuous process based on student's performance in—class tests, assignments, homework, seminars, quizzes, and laboratory books and their interaction and attendance for theory and lab sessions, as applicable.



PUNYASHLOK AHILYADEVI HOLKAR SOLAPUR UNIVERSITY, SOLAPUR
FINAL YEAR B.TECH. (INFORMATION TECHNOLOGY)
SEMESTER - VII
IT411 : CYBER SECURITY

Teaching Scheme

Lectures: 3Hours /Week, 3 Credits

Practical: 2Hours / Week, 1 Credit

Examination Scheme

ESE: 70 Marks

ISE: 30 Marks

ICA: 25 Marks

COURSE OBJECTIVES:

- 1) Develop a comprehensive understanding of computer security concepts, security attacks, services, and mechanisms, as well as cryptography techniques.
- 2) Analyze and classify various types of Cybercrimes, trace their origins, and assess the impact they have on individuals and organizations.
- 3) Acquire proficiency in evaluating tools and methods employed by Cybercriminals, such as phishing, password cracking, malware, DoS attacks, and SQL injection.
- 4) Students will develop the skills to ensure the confidentiality, integrity, and availability of data and information in the mobile computing era, protecting against unauthorized access and Cyberattacks.
- 5) Examine the Indian IT Act and its relevance in combating Cybercrimes.

COURSE OUTCOMES:

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

- 1) Demonstrate knowledge of computer security concepts, OSI Security Architecture, security attacks, services, mechanisms, and cryptography techniques.
- 2) Comprehend various Cybercrimes, their origins, and their impact on individuals and organizations.
- 3) Use Cybercriminal tools and effective countermeasures for system and network security.
- 4) Analyze security challenges in mobile and wireless devices and create organizational security policies for mobile computing.
- 5) Identify appropriate Indian IT Act section for a given Cybercrimes in the Indian context.

SECTION- I

Unit 1: Security Fundamentals

8 Hrs.

Computer Security Concepts: The OSI Security Architecture, Security Attacks, Security Services, Security Mechanisms, a Model for Network Security. Cryptography: Concepts, Classical Encryption Techniques: Symmetric Cipher Model, Cryptography. Substitution Techniques and Transposition Techniques, Rotor Machines, Steganography.

Unit 2: Introduction to Cybercrime

8 Hrs.

Introduction to Cybersecurity : Cybercrime: Definition and Origins of the Word, Cybercrime and Information Security, Who are Cybercriminals?, Classifications of Cybercrimes, Cybercrime: The Legal Perspectives, Cybercrimes: Perspective, Cybercrime and the Indian ITA 2000, A Global Perspective on Cybercrimes, Cybercrime Era: Survival Mantra for the Netizens.

Unit 3: Cyberoffenses :How Criminals Plan Them**6 Hrs.**

Cyber offenses: How Criminals Plan Them: How Criminals Plan the Attacks, Social Cyber stalking Cyber cafe and Cybercrimes, Botnets: The Fuel for Cybercrime, Attack Vector, Cloud Computing.

SECTION - II**Unit 4: Tools and Methods Used in Cybercrime****8 Hrs.**

Introduction, Proxy Servers and Anonymizers, Phishing, Password Cracking, Key loggers and Spywares, Virus and Worms, Trojan Horses and Backdoors, Steganography, DoS and DDoS Attacks, SQL Injection, Buffer Overflow, Attacks on Wireless Networks. Phishing and Identity Theft: Introduction, Phishing, Identity Theft (ID Theft).

Unit 5: Cybercrime : Mobile and Wireless Devices**8 Hrs.**

Cybercrime: Mobile and Wireless Devices: Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit Card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Registry Settings for Mobile Devices, Authentication Service Security, Attacks on Mobile/Cell Phones, Mobile Devices: Security Implications for organizations, Organizational Measures for Handling Mobile, Organizational Security Policies and Measures in Mobile Computing Era, Laptops.

Unit 6: The Legal Perspectives on Cybercrimes and Cyber security**7 Hrs.**

The Legal Perspectives on Cybercrimes and Cyber security: The legal landscape around the world. Need of Cyber laws in the Indian context. The Indian IT Act. Digital signatures and The Indian IT Act. Amendments to The Indian IT Act. Cybercrime and Punishment.

TEXT BOOKS:

1. William Stallings, "Computer Security: Principles and Practices", Pearson Ed. ISBN :978-81-317- 3351-6 (Chapter 1,3)
2. Sunit Belapure and Nina Godbole, "Cyber Security: Understanding Cyber Crimes, Computer Forensics And Legal Perspectives", Wiley India Pvt Ltd, ISBN: 978-81-265-21791, Publish Date 2013

REFERENCE BOOKS:

1. Nina Godbole, "Information Systems Security", Wiley India Pvt Ltd, ISBN -978-81-265-1692-6
2. Dr. Surya Prakash Tripathi, Ritendra Goyal, Praveen Kumar Shukla, KLSI. "Introduction to information security and cyber laws". Dreamtech Pre ss. ISBN: 9789351194736, 2015

TERM WORK:

Term work should consist of at least 8-10 practical assignments covering the topics of the syllabus



PUNYASHLOK AHILYADEVI HOLKAR SOLAPUR UNIVERSITY, SOLAPUR
FINAL YEAR B.TECH. (INFORMATION TECHNOLOGY)
SEMESTER - VII

IT412 : MANAGEMENT INFORMATION SYSTEM

Teaching Scheme

Lectures : 3Hours /Week, 3 Credits

Practical : 2Hours / Week, 1 Credit

Examination Scheme

ESE : 70 Marks

ISE : 30 Marks

ICA: 25 Marks

COURSE OBJECTIVES:

- 1) To understand basic infrastructure and strategy for information systems.
- 2) To make student learn professional ethical codes of conduct as appropriate to industry and organizational environments
- 3) To introduce the Communication Technology required for IT.
- 4) To make student learn to develop secure information system.

COURSE OUTCOME:

- 1) Student can elaborate basic infrastructure and strategies used in information systems.
- 2) Student can apply professional ethical codes of conduct as appropriate to industry and organizational environments
- 3) Students can design information systems using principles of Communication Technologies.
- 4) Students will be able to develop secure information systems

SECTION-I

Unit 1 - Information Systems in Global Business Today

6 Hrs.

The Role of Information Systems in Business Today, How information systems are transforming business, What is new in information system. Business Processes and Information systems, Systems for collaboration and social business, Tools and technologies for collaboration and social business

Unit 2 - Information Systems, Organizations, and Strategy

7 Hrs.

Organizations and its features, How Information Systems Impact on Organizations, Competitive strategies using information systems, Challenges posed by strategic information systems

Unit 3 - Ethical and Social Issues in Information Systems

6 Hrs.

Understanding Ethical, Social, political issues raised by information systems, principles for conduct in ethical decisions, Contemporary information systems technology. Challenges to the protection individual privacy and intellectual property.

SECTION-II

Unit 4 - IT Infrastructure and Emerging Technologies

6 Hrs.

IT Infrastructure, Infrastructure Components, Contemporary Hardware Platform Trends, Contemporary Software Platform Trends, Management Issues

Unit 5 - Foundations of Business Intelligence: Databases and Information Management

6 Hrs.

Organizing Data in a Traditional File Environment, Major Capabilities of Database Management Systems, Using Databases to Improve Business Performance and Decision Making, Managing Data Resources, Telecommunications, the internet, and Wireless Technology: Principles Components of Telecommunications Network & Network Technologies, Different types of networks, principle technologies and standards for wireless networking, communication, internet access.

Unit 6 - Security Management of Information Technology

7 Hrs.

Introduction, Tools of Security Management, Internet worked Security Defenses, Encryption, Firewalls, Denial of Service Attacks, E-mail Monitoring, Other Security Measures, security codes, Security Monitors, Fault Tolerant Systems, and Disaster Recovery, System Control & Audits, Information Systems Controls, Auditing IT Security.

Unit 7 - E-commerce: Digital Markets, Digital Goods

7 Hrs.

Features of e-commerce. Digital Markets, Digital Goods, principles e-commerce business and revenue models, e-commerce transformed marketing, e-commerce business-to-business transaction, Role of M-commerce in business & its applications, issues related building e-commerce.

Text Book:

1. Management Information Systems: Managing the Digital Firm, 15th Edition by Kenneth C. Laudon and Jane Laudon, Pearson Education
2. Management Information Systems: James A O'Brien, George M Marakas, Ramesh Behi. (Tenth Edition), McGraw Hill Publication.

Reference Books:

1. Information Technology for Management: Transforming Organizations in the Digital Economy, Efraim Turban, 6th Edition, Wiley Edition
2. Management Information Systems: Shubhalakshmi Joshi, Smita Vaze, Biztantra

Internal Continuous Assessment (ICA):

Teacher can make a group of 4-5 students & assign Case Study and implement a Management information system Evaluation will be done by teacher by considering different factors based on the topics given in the syllabus



PUNYASHLOK AHILYADEVI HOLKAR SOLAPUR UNIVERSITY, SOLAPUR
FINAL YEAR B.TECH. (INFORMATION TECHNOLOGY)
SEMESTER – VII
IT413 PROFESSIONAL ELECTIVE-II - A. INTERNET OF THINGS

Teaching Scheme

Lectures: 3 Hours /week, 3 credits

Tutorial: 2 Hrs./week, 1 credits

Examination Scheme

ESE: 70 Marks

ISE : 30 Marks

ICA: 25 Marks

PREREQUISITES:

1. Fundamentals of Communication and computer network
2. Micro controller, Network Security and Web programming.

COURSE OBJECTIVES:

1. To study the genesis and impact of IoT applications and architectures in real world.
2. To illustrate diverse methods of deploying smart objects and connect them to network.
3. To get acquainted with different Application protocols for IoT and compare them.
4. To study basic principles of IoT Security and various business models.
5. To become aware of Data Analytics and Security in IoT.

COURSE OUTCOMES:

At the end of the course students will be able to

1. Interpret the characteristics and applications of IoT for deployment of the architectural model.
2. Compare smart objects and associated technologies for deployment in the network.
3. Analyze and choose the IoT protocol for efficient network communication.
4. Apply security concerns and challenges while implementing IoT solutions.
5. Provide the appropriate IoT solutions to the given problem

SECTION – I

Unit 1: Introduction to IoT

7 Hrs.

Definition, Applications and characteristics of IoT, Physical Design of IoT, Logical Design of IoT, IoT Enabling Technologies, IoT Levels.

Unit 2: IoT Architecture and Communication Technologies

8 Hrs.

IoT Architecture by Oracle, Sources of IoT, M2M Communication, IoT/M2M systems, layers and design standards, Communication Technologies.

Unit 3: Elements of IoT

8 Hrs.

Sensor Technology, Participatory Sensing – Industrial IoT and Automotive IoT, Actuator, Sensor Data Communication Protocols, RFID, WSN Technology.

SECTION – II

Unit 4: IoT Standards and Connectivity

8 Hrs.

Constrained Application Protocols (CoAP), Representational State Transfer (REST), Zigbee / IEEE 802.15.4, Bluetooth and its low energy profile, IEEE 802.15 WPAN, 6LoWPAN.

Unit 5: IoT Security and Business model

8 Hrs.

Introduction to IoT Privacy, Security and Vulnerabilities, Use case and Misuse cases, IoT Security Tomography and Layered attacker model, Business model and business model innovation for IoT, Value Creation in the IoT, Business model scenarios for IoT.

Unit 6: Case Studies

6 Hrs.

Domain Specific IoTs: Home Automation, Smart Cities, Environments, Energy, Agriculture, Industry, Health and Lifestyle.

Text Book :

1. Internet of Things: A Hands-on approach, Arshdeep Bahga, Vijay Madisetti, Universities Press (Unit 1 and 6).
2. IoT Architecture and Design Principles, Raj Kamal, McGraw Hill Education (Unit 2, 3 & 5).
3. Building the IoT with IPv6 and MIPv6, Daniel Minoli, Wiley Publication (Unit 4).

Reference Books:

1. The Internet of Things: Applications and Protocols, Wiley publications. Author(s): Oliver Hersent, David Boswarthick, Omar Elloumi .

Term Work :

The ICA shall consist of design and development of identified problem based on the techniques and tools covered in above chapters.



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FINAL YEAR B.TECH. (INFORMATION TECHNOLOGY)
SEMESTER – VII
IT413 PROFESSIONAL ELECTIVE-II - B. DISTRIBUTED SYSTEMS

Teaching Scheme

Lectures: 3 Hours/Week, 3 Credits
Practical: 2 Hours/Week, 1 Credit

Examination Scheme

ESE: 70 Marks
ISE: 30 Marks
ICA: 25 Marks

COURSE OBJECTIVES:

1. To provide students with existing knowledge in distributed systems.
2. To furnish students with skills to analyze and design distributed applications.
3. Enhance skills to measure the performance of distributed synchronization algorithms

COURSE OUTCOME:

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

1. Demonstrate knowledge of the basic elements of distributed system technologies.
2. Analyze the various techniques used for clock synchronization and mutual exclusion
3. Exhibit the concepts of Resource and Process management.
4. Apply the knowledge of Distributed File System to analyze various file systems and security.

SECTION – I

Unit 1: Fundamentals

4 Hrs.

Fundamentals of OS, What is Distributed System? Evolution of Distributed Computing System, Distributed Computing System Models, Distributed Computing Gaining Popularity, Issues in designing distributed System.

Unit 2: Message Passing

6 Hrs.

Introduction, Desirable features of Good Message-Passing System, Issues in IPC by Message Passing, Synchronization, Buffering, Message Passing Interface, Multidatagram Messages, Process Addressing, Failure Handling, Group communication

Unit 3: Remote Procedure Calls

6 Hrs.

Introduction, The RPC Model, Transparency of RPC, Implementing RPC mechanism, Stub Generation, RPC Messages, Marshalling Arguments and Results, Server Management, Parameter-Passing Semantics, Call Semantics, Communication Protocols for RPCs, Client-Server Binding.

Unit 4: Distributed Shared Memory

6 Hrs.

Introduction, Architecture, Implementation and Design issues, Granularity, Structure of share memory, Consistency models, Replacement Strategy, Heterogeneous DSM

SECTION – II

Unit 5: Synchronization in Distributed Systems **6 Hrs.**
Introduction, Clock Synchronization, Event Ordering, Election algorithms, Process Migration

Unit 6: Distributed File Systems **6 Hrs.**
Introduction, Architecture, Mechanisms for building Distributed File System, Design issues, Log-Structured file systems, Case studies- Google FS

Unit 7: Naming **5 Hrs.**
Features of naming system, Fundamental Terminologies, System oriented names, Object Locating Mechanisms, Name caches.

Unit 8: Security **6 Hrs.**
Introduction, Potential attacks, Cryptography, Authentication, Access Control, Digital signatures

Text Books:

1. Distributed Operating System Concepts and Design, P.K.Sinha, PHI
2. Distributed System Principles and Paradigms, Andrew S. Tanenbaum, 2nd edition, PHI

Reference Books:

1. Distributed Systems Concepts and Design, George Coulouris, Jean Dollimore, Tim Kindberg, Gordon Blair, 5th Edition, PHI

Internal Continuous Assessment (ICA):

Minimum 10 assignments on above topics which will ensure assessment of Course outcomes listed. ICA: It should consist of the following assignments:

1. Implementation of RMI for any given application.
2. Implementation of RPC for any given application.
3. Implementation of Communication Protocol of RPC (R, RR, RRA Protocol).
4. Implementation of different sorting algorithms using dispatcher thread model.
5. Implementation of logical clocks by using Counters.
6. Implementation of logical clocks by using Physical clocks.
7. Implementation of Mutual Exclusion by using Token-Passing approach.
8. Implementation of Stateful and Stateless server in file reading application.
9. Implementation of Bully Algorithm.
10. Implementation of Ring Algorithm.



PUNYASHLOK AHILYADEVI HOLKAR SOLAPUR UNIVERSITY, SOLAPUR
FINAL YEAR B.TECH. (INFORMATION TECHNOLOGY)
SEMESTER – VII

IT413 PROFESSIONAL ELECTIVE-II - C. BLOCKCHAIN TECHNOLOGY

Teaching Scheme

Lectures: 3 Hours/Week, 3 Credits

Practical: 2 Hours/Week, 1 Credit

Examination Scheme

ESE: 70 Marks

ISE: 30 Marks

ICA: 25 Marks

ABOUT THE COURSE

The course is designed to introduce students to the concept of Blockchain and explain the fundamentals of Blockchain and its implementation. Students will be learning the importance of consensus in transactions, how transactions are stored on Blockchain, the history of Bitcoin and how it's used. Students will be introducing to Ethereum development platform and develop and deploy smart contracts from web and console.

PREREQUISITE

An individual should have a good knowledge of distributed systems, networking, cryptography, data structures, basic knowledge of Linux commands.

COURSE OBJECTIVES

By the end of the course, students will be able to

- 1) Understand how blockchain systems (Bitcoin and Ethereum) work,
- 2) Design, build, and deploy smart contracts and distributed applications,
- 3) Integrate ideas from blockchain technology into their own projects.

COURSE OUTCOMES

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

- 1) Explain fundamentals of Blockchain Technology
- 2) Use various blockchain data structures
- 3) Use cryptographic hash functions & distributed consensus algorithms
- 4) Design, build, and deploy a smart contract and distributed application.

Chapter 1 : Overview of Block chain Technology

6 Hrs.

Defining Block chain and Distributed Ledger, Blockchain Properties Decentralized, Transparent, Immutable and secure. Blockchain Applications. Types of Blockchain: Public, private, and consortium based blockchain, When to use, and when not to use Blockchain, History of Blockchain.

Chapter 2: Introduction to computing models and P2P networking

5 Hrs.

Centralized, Decentralized and Distributed Systems, Decentralization vs distributed, P2P systems, properties of P2P systems, P2P communication architecture. P2P network applications: File sharing, P2P network for blockchain

Chapter 3: Foundational Concepts Block chain Data Structure

6 Hrs.

Cryptographic Hash Functions, Digital Signatures, Public Keys as Identities, Hash Pointers and Hash chain and Merkle tree, Consensus mechanisms

Chapter 4 : Block chain Characteristics

5 Hrs.

Decentralized Identity management, Transactions, incentivising and mining. Distributed Consensus (PoW), Cryptocurrency as the first blockchain application. Mechanics of

Bitcoin, Bitcoin Scripts, Storing and Using Bitcoins, Mining in Bitcoin.

Chapter 5: Consensus Mechanisms

6 Hrs.

Proof of storage, proof of stake, proof of deposit, proof of burn, proof of activity. algorithms for adjusting difficulty and retargeting. Limitations of Bitcoin, alternative cryptocurrencies.

Chapter 6: Smart Contracts and Ethereum

7 Hrs.

History, Purpose and types of smart contracts, Introduction to Ethereum, bitcoin vs Ethereum stack. P2P network in Ethereum, consensus in Ethereum, scripts in Ethereum, Smart contracts (Ethereum Virtual Machine). Developing and executing smart contracts in Ethereum. State and data structure in Ethereum.

Chapter 7: Private and Consortium based Blockchain: Hyperledger

5 Hrs.

Need for the consortium. Hyperledger stack, Multichainblockchain. Innovation in Hyperledger, smart contracts, and distributed applications in hyperledger.

Chapter 8: Case studies/ Enabling Technologies and applications

5 Hrs.

Application of blockchain in privacy and security, IoT and smart cities, Business and Industry, Data management, e-Governance

References:

1. <https://nptel.ac.in/courses/106/104/106104220/>
2. <https://www.investopedia.com/terms/b/blockchain.asp>
3. Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller and Steven Goldfeder, Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction, Princeton University Press (July 19, 2016).
4. Mastering Blockchain - Distributed ledgers, decentralization and smart contracts explained, Author- Imran Bashir, Packt Publishing Ltd, Second Edition, ISBN 978-1-78712-544-5, 2017
4. Wattenhofer, The Science of the Blockchain
5. Antonopoulos, Mastering Bitcoin: Unlocking Digital Cryptocurrencies
6. Satoshi Nakamoto, Bitcoin: A Peer-to-Peer Electronic Cash System
7. DR. Gavin Wood, "ETHEREUM: A Secure Decentralized Transaction Ledger," Yellow paper. 2014.
8. Nicola Atzei, Massimo Bartoletti, and Tiziana Cimoli, A survey of attacks on Ethereum smart contracts



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FINAL YEAR B.TECH. (INFORMATION TECHNOLOGY)
SEMESTER – VII
IT414 PROFESSIONAL ELECTIVE-III - A. HUMAN COMPUTER INTERACTION

Teaching Scheme

Lectures – 3 Hrs./week, 3 Credits
 Practical – 2 Hrs./week, 1 Credit

Examination Scheme

ESE : 70 Marks
 ISE : 30 Marks
 ICA: 25 Mark

COURSE OBJECTIVES:

- 1) To introduce the student to the literature of human-computer interaction.
- 2) To facilitate communication between students of psychology, design, and Computer science on user interface development projects.
- 2) To provide the future user interface designer with concepts and strategies for making design decisions.
- 4) To expose the future user interface designer to tools, techniques, and ideas for interface design and stress the importance of good user interface design

COURSE OUTCOME:

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

- 1) Demonstrate the literature of human-computer interaction.
- 2) Understand psychology, design, and computer science on user interface development projects.
- 2) Develop future user interface designer with concepts and strategies for making design decisions.
- 4) Apply the tools, techniques, and ideas for interface design and stress the importance of good user interface design.

SECTION- I

Unit 1: Introduction

5Hrs.

Introduction to user interface, Definition, importance of good design, Benefits of good design, A brief history of screen design.

Unit 2: The graphical user interface

8Hrs.

Popularity of graphics, the concept of direct manipulation, Graphical system: Advantages and Disadvantages, Characteristics of GUI, The Web user Interface: The Popularity of web, Characteristic of a web interface, The Merging of Graphical Business Systems and the Web ,Principles of User Interface Design.

Unit 3: The User Interface Design Process

8 Hrs.

Understanding How People Interact with Computers, Importance of Human Characteristics in design, Human Consideration in the Design of Business Systems, Human Interaction Speeds, understanding business functions.

SECTION- II

Unit 4: Principles of Good Interface and Screen Design

8 Hrs.

Interface Design Goals , The Test for a Good Design , Screen and Web Page Meaning and Purpose , Organizing Elements Clearly and Meaningfully , Consistency , Starting Point , Ordering of Data and Content , Navigation and Flow , Visually Pleasing Composition , Distinctiveness , Focus and Emphasis , Conveying Depth of Levels or a Three-Dimensional Appearance ,Presenting Information Simply and Meaningfully , Application and Page Size , Application Screen Elements , Organization and Structure Guidelines , The Web — Web sites and Web Pages.

Unit 5: Windows**8 Hrs.**

Select the Proper Kinds of Windows, Select the Proper Interaction Devices and Choose the Proper Screen-Based Controls.

Unit 6: Development Processes**8Hrs.**

Managing Design Processes, Evaluating Interface Designs, Software Tools.

TEXT BOOKS:

1. The essential guide to user interface design, Wilbert O Galitz, Wiley DreamTech.
2. Designing the user interface. 3rd Edition Ben Shneidermann, Pearson Education Asia

REFERENCE BOOKS:

1. Human – Computer Interaction. Alan Dix, Janet Finckay, Greg Goryd, Abowd, Russell Beal, Pearson Education
2. Interaction Design Prece, Rogers, Sharps. Wiley Dreamtech,
3. User Interface Design, Soren Lauesen , Pearson Education.

TERM WORK:

Term work should consist of at least 8-10 practical assignments covering the topics of the syllabus.





PUNYASHLOK AHILYADEVI HOLKAR SOLAPUR UNIVERSITY, SOLAPUR
FINAL YEAR B.TECH. (INFORMATION TECHNOLOGY)
SEMESTER – VII
IT414 PROFESSIONAL ELECTIVE-III - B. BIG DATA ANALYTICS

Teaching Scheme

Lectures: 3 Hours/week, 3 Credits
Practicals : 3 Hours/week, 3 Credits

Examination Scheme

ESE: 70 Marks
ISE: 30 Marks
ICA: 25 Marks

COURSE OBJECTIVES :

- 1) To get acquainted with the basic concepts of big data analytics
- 2) To Provide hands on Hadoop Eco System
- 3) To get acquainted to use analytics on Structured, Unstructured Data.
- 4) To implement concepts of Big Data Analytics with R.

COURSE OUTCOMES:

The students will be able to:

- 1) Demonstrate Big Data concepts and its Business Implications.
 - 2) Elaborate the components of Hadoop and Hadoop Eco-System
 - 3) Apply analytics on Structured, Unstructured Data.
 - 4) Apply Machine Learning Techniques using R.
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SECTION I

UNIT I : Introduction To Big Data And Hadoop

6 Hrs.

Types of Digital Data, Introduction to Big Data, Big Data Analytics, History of Hadoop, Apache Hadoop, Analysing Data with Unix tools, Analysing Data with Hadoop, Hadoop Streaming, Hadoop Echo System, IBM Big Data Strategy, Introduction to Infosphere BigInsights and Big Sheets.

UNIT II : HDFS(Hadoop Distributed File System)

8 Hrs.

The Design of HDFS, HDFS Concepts, Command Line Interface, Hadoop file system interfaces, Data flow, Data Ingest with Flume and Scoop and Hadoop archives, Hadoop I/O: Compression, Serialization, Avro and File-Based Data structures.

UNIT III : Map Reduce

8 Hrs.

Anatomy of a Map Reduce Job Run, Failures, Job Scheduling, Shuffle and Sort, Task Execution, Map Reduce Types and Formats, Map Reduce Features.

SECTION II

Unit IV : Hadoop Eco System

8 Hrs.

Pig : Introduction to PIG, Execution Modes of Pig, Comparison of Pig with Databases, Grunt, Pig Latin, User Defined Functions, Data Processing operators.

Hive : Hive Shell, Hive Services, Hive Metastore, Comparison with Traditional Databases, HiveQL, Tables, Querying Data and User Defined Functions.

Unit V :Advances in Hadoop Eco System)

7 Hrs.

Hbase : HBase Basics, Concepts, Clients, Example, Hbase Versus RDBMS.

Big SQL : Introduction

UNIT VI : Data Analytics with R

8 Hrs.

Machine Learning : Introduction, Supervised Learning, Unsupervised Learning, Collaborative Filtering, Big Data Analytics with BigR.

Text Books :

- Tom White “ Hadoop: The Definitive Guide” Third Edit on, O’reily Media, 2012.
- Seema Acharya, Subhasini Chellappan, "Big Data Analytics" Wiley 2015.

References :

- Michael Berthold, David J. Hand, "Intelligent Data Analysis”, Springer, 2007.
- Jay Liebowitz, “Big Data and Business Analytics” Auerbach Publications, CRC press (2013)
- Tom Plunkett, Mark Hornick, “Using R to Unlock the Value of Big Data: Big Data Analytics with Oracle R Enterprise and Oracle R Connector for Hadoop”, McGraw-Hill/Osborne Media (2013), Oracle press.
- Anand Rajaraman and Jeffrey David Ullman, “Mining of Massive Datasets”, Cambridge University Press, 2012.
- Bill Franks, “Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics”, John Wiley & sons, 2012.
- Glen J. Myat, “Making Sense of Data”, John Wiley & Sons, 2007
- Pete Warden, “Big Data Glossary”, O’Reily, 2011.
- Michael Mineli, Michele Chambers, Ambiga Dhiraj, "Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses", Wiley Publications, 2013.
- ArvindSathi, “BigDataAnalytics: Disruptive Technologies for Changing the Game”, MC Press, 2012
- Paul Zikopoulos ,Dirk DeRoos , Krishnan Parasuraman , Thomas Deutsch , James Giles , David Corigan , "Harness the Power of Big Data The IBM Big Data Platform ", Tata McGraw Hill Publications, 2012.

List of assignments

Implement the following systems using R

1. Sentiment Analysis
2. Uber Data Analysis
3. Credit Card Fraud Detection
4. Movie Recommendation
5. Music Recommendation



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SEMESTER – VII

IT414 PROFESSIONAL ELECTIVE-III - C. INFORMATION RETERIVAL

Teaching Scheme

Lectures : 3 Hours/week, 3 Credits

Practical : 2 Hour/week, 1 Credit

Examination Scheme

ESE : 70 Marks

ISE : 30 Marks

ICA : 25 Marks

COURSE OBJECTIVES:

- 1) To acquaint students to information retrieval process and information models.
- 2) To evaluate the performance of information retrieval systems.
- 3) To search text using sequential searching & pattern matching algorithms and using various indexing structures.
- 4) To learn difference in data retrieval, information retrieval and multimedia retrieval systems.
- 5) To learn different components of search engine and ranking algorithms.

COURSE OUTCOMES:

Students will be able to

- 1) Perform text operations, build classic information retrieval models, and evaluate the performance of information retrieval algorithms.
- 2) Formulate various types of queries and perform query operations.
- 3) Speed up retrieval result of text retrieval using indexing, searching techniques.
- 4) Model, index and search documents containing multimedia objects.
- 5) Search web using web search engines & web directories and use ranking algorithms to rank webpages.

SECTION – I

Unit 1. Introduction

7 Hrs.

Information retrieval vs. data retrieval, User Task, Logical View of the documents, Information retrieval process, Text Operations: Introduction, document pre-processing, Document Clustering, Text Compression, Comparing text compression techniques

Unit 2. Information Retrieval Models & Performance Evaluation

8 Hrs.

A Formal Characterization of IR Models, Classic Information Retrieval, Models for Browsing, Recall and Precision, Alternative measures

Unit 3. Query Languages and Query Operations

7Hrs.

Keyword based querying, Pattern Matching, Query operations: User relevance feedback, Automatic local analysis, Automatic global analysis

SECTION – II

Unit 4. Indexing and Searching

10 Hrs.

Inverted Files and Indices for text search, Boolean Queries, Sequential searching, Pattern Matching

Unit 5. Multimedia IR - Models and Languages **8 Hrs.**
Data Modelling & Query Languages, Indexing and searching

Unit 6. Searching the Web **5 Hrs.**
Search Engine architecture, User interfaces, Ranking, Web Crawling,
Browsing, Metasearchers, Searching using Hyperlinks

Text Book -

1. Modern Information Retrieval - Ricardo Baeza-Yates and Berthier Ribeiro-Neto - Pearson Education (Low Price Edition)

Reference:

1. Introduction to Information Retrieval, Christopher D. Manning, Prabhakar Raghavan and Hinrich Schütze, Cambridge University Press. 2008. (<http://nlp.stanford.edu/IR-book/information-retrieval-book.html>)
2. Information Storage and Retrieval- Robert R Korthage, WILEY-INDIA

Internal Continuous Assessment (ICA) :

ICA shall include the following:

Assignments:

1. Study of different search engines
2. Perform text operation and create logical Views of documents
3. Implementation of IR system using Boolean model.
4. Implementation of IR system using Vector model
5. Implementation of IR system using various types of queries.
6. Searching using inverted index (construction & Searching)
7. Sequential searching using Brute Force Algorithm
8. Sequential searching using Knuth-Morris-Pratt Algorithm
9. Sequential searching using Boyer- Moore Algorithm
10. Sequential searching using BDM (Backward DAWG Matching) Algorithm.
11. Sequential searching using Shift-OR Algorithm
12. Approximate matching using dynamic Programming
13. Implementation of Multimedia Information Retrieval System



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FINAL YEAR B.TECH. (INFORMATION TECHNOLOGY)
SEMESTER – VII
IT415 DevOps

Teaching Scheme

Lectures: 2 Hours/week, 2 Credits

Practical: 2 Hour/week, 1 Credit

Examination Scheme

ISE: 25 Marks

ICA: 25 Marks

POE: 50 Marks

DevOps is a set of practices that combines software development (Dev) and IT operations (Ops) to shorten the systems development life cycle, deliver features, fixes, and updates more frequently, and ensure a seamless collaboration between development and operations teams. Students will learn the fundamental concepts of DevOps, explore essential tools and practices, and gain hands-on experience.

COURSE OBJECTIVES:

- 1) Gain a clear understanding of DevOps principles and its significance in software development.
- 2) Master version control with Git for efficient code collaboration and management.
- 3) Understand Maven as a build automation and project management tool.
- 4) Learn to set up and use Jenkins for Continuous Integration and Continuous Delivery.
- 5) Explore the benefits of containerization with Docker for application deployment.

COURSE OUTCOMES:

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

- 1) Describe DevOps principles and their role in modern software development.
- 2) Proficiently use Git for version control and team collaboration.
- 3) Effectively use Maven to manage project builds.
- 4) Set up Jenkins for Continuous Integration and Continuous Delivery.
- 5) Use Docker for efficient application deployment.

Unit 1: Introduction to DevOps

3 Hrs.

What is DevOps and its significance in the software development lifecycle, DevOps Key Principles: collaboration, automation, continuous integration and continuous delivery, Benefits of adopting DevOps practices for organizations and development teams

Unit 2: Version Control with Git

6 Hrs.

Understanding the importance of version control in software development, setting up a Git repository using popular platforms like GitHub, GitLab, Branching strategies: creating and managing branches, Merging and resolving conflicts in Git Collaborative development using pull requests

Unit 3: Introduction to Maven

3 Hrs.

Understanding Maven as a build automation and project management tool, Maven Architecture, Maven - Build Life Cycle, Maven's project structure and POM (Project Object Model), Configuring Maven for a project: setting up dependencies and plugins, Building a simple project using Maven.

Unit 4: Continuous Integration and Continuous Delivery with Jenkins 8 Hrs.

Why Continuous Integration is essential for software projects, Jenkins Master-slave architecture, Configuring Jenkins and its basic features, Plugin Management in Jenkins, Jenkins Pipeline, Setting up automated builds triggered by code commits.

Understanding Continuous Delivery and its benefits, Integrating Jenkins with Docker for automated deployments.

Unit 5: Introduction to Docker 7 Hrs.

The concept of containerization and its advantages, Docker Architecture, Docker Container Lifecycle, Installing and running Docker on the local machine, Creating a Dockerfile to build a custom Docker image, Running and interacting with containers using Docker CLI, Sharing Docker images using Docker Hub or a private registry.

Unit 7: Infrastructure as Code 3 Hrs.

Introduction to Configuration Management, Understanding Infrastructure as Code (IaC) and its benefits

Text Books:

Text book 1: Effective DevOps: Building a Culture of Collaboration, Affinity, and Tooling at Scale, Jennifer Davis & Katherine Daniels, OREILLY.

Text book 2: Practical Devops: Harness the power of DevOps to boost your skill set and make your IT organization perform better. Joakim Veronam PACKT publishing Open source community experience distilled, Mumbai.

Reference Books:

1. The DevOps 2.1 ToolKit: Docker Swarm, Building, Testing, Deploying, and Monitoring services inside Docker Swarm clusters by Viktor Farcic Packt Birmingham, Mumbai.
2. THE DEVOPS HANDBOOK: How to Create World-Class Agility, Reliability, & Security in Technology Organizations, By Gene Kim, Jez Humble, Patrick Debois, and John Willis.

Internal Continuous Assessment (ICA):

Practical Assignments:

1. Set up the Git Server and perform the following operations:
 - Create a Repository
 - Create Branches
 - Perform Add, Commit, Push, Pull
 - Merge and Rebase
 - Squashing Commits
 - Delete branches
 - Undo commits
2. Perform the following operations on Git and GitHub
 - Create a Repository
 - Create Branches
 - Perform Add, Commit, Push, Pull
 - Fork a project, Open and merge Pull request
 - Merge and Rebase

- Squashing Commits
 - Delete branches
 - Undo commits
3. Perform the following operations on Git and GitLab.
 - Create a Repository/Project
 - Create Branches
 - Perform Add, Commit, Push, Pull
 - Undo commits
 - Fork a project, Open and merge Pull request
 - Merge and Rebase
 - Squashing Commits
 - Delete local & remote branches
 4. Set up a GitLab CI/CD Pipeline.
 5. Automate Deployment using Jenkins plugin "Deploy to container".
 6. Use Jenkins "Deploy to Container Plugin" and "Build Pipeline Plugin".
 7. Build a Docker image and push it to Docker Hub. Pull it on another system. Create and run a new container from an image. (Note: Perform commands on PowerShell / Command Prompt.)
 8. Set up a Jenkins job that picks up an application from a GitHub repository, builds it, and runs it and dockerizes the application.
 9. Create an application, push to GitHub/GitLab repository. Use GitHub/GitLab, Maven, Tomcat with Jenkins. Automate Deployment of the application to a container (Tomcat).





PUNYASHLOK AHILYADEVI HOLKAR SOLAPUR UNIVERSITY, SOLAPUR
FINAL YEAR B.TECH. (INFORMATION TECHNOLOGY)
SEMESTER – VII
IT416 PROJECT PHASE– I

Teaching Scheme

Practical : 2 Hour/week, 1 Credit

Examination Scheme

ICA : 50 Marks

COURSE OBJECTIVES:

- 1) To guide students to explore research areas and to undertake literature survey.
- 2) To identify & formulate a realistic problem statement.
- 3) To follow an appropriate designing technique for further development of project.
- 4) To prepare to work in a team and to understand importance of teamwork.
- 5) To develop soft skills including presentation, writing & convincing.

COURSE OUTCOMES:

At the end of the course students will be able to

- 1) Explore research areas, conduct literature survey and formulate a problem statement catering societal/professional need.
- 2) Select an appropriate design with due consideration for society.
- 3) Carry out impact analysis for environment and sustainability concern.
- 4) Prepare Software requirement specification (SRS) & design document using software engineering techniques and modern tools.
- 5) Engage in team work and communicate effectively while observing professional ethics.
- 6) Inculcate habit of self study to become a lifelong learner.

Strategy:

1. Student will finalize his project with the guide and submit a synopsis with presentation.
2. Student should apply appropriate SDLC steps & prepare the project design.
3. Student should prepare a Project report which should preferably contain abstract, literature survey, problem definition, proposed system & design.
4. Student will have to give a seminar on the design of the project.

Project will be assessed by a panel of teachers appointed as guides at the institute level ICA will be jointly assessed by a panel of teachers appointed by head of the department. Oral examination will be conducted by internal and external examiners as appointed by the University.



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FINAL YEAR B.TECH. (INFORMATION TECHNOLOGY)
SEMESTER – VIII
IT421 PROJECT PHASE– II (CAPSTONE PROJECT)

Teaching Scheme

Practical : 20 Hour/week, 10 Credits

Examination Scheme

ICA : 100 Marks

ESE : 100 Marks

COURSE OBJECTIVES:

- 1) To study methods to analyze technological alternatives for developing IT solution with relevance to environment and sustainability.
- 2) To explore state-of-art tools and FOSS alternatives to develop solutions meeting societal and professional needs.
- 3) To enable development of a system through Software Development Life Cycle.
- 4) To get acquainted to work in teams observing professional ethics.
- 5) To enable effective written and oral communication for presentation.
- 6) To enable self-study and lifelong learning.

COURSE OUTCOMES:

At the end of the course students will be able to

- 1) Analyze technological alternatives for developing IT solution with relevance to environment and sustainability.
- 2) Explore state-of-art tools and FOSS alternatives to develop solutions meeting societal and professional needs.
- 3) Develop a system through Software Development Life Cycle.
- 4) Demonstrate ability to engage in teamwork while observing professional ethics.
- 5) Communicate project work in writing and oral presentation.
- 6) Inculcate habit of self study to become a lifelong learner.

Strategy:

1. The group will continue to work on the implementation of project whose design is completed in the semester VII.
2. Project work should be continually evaluated based on the contributions of the group members, originality of the work, innovations brought in, research and developmental efforts, depth and applicability, etc.
3. The code will be developed and checked by the guide.
4. Students shall maintain Project Diary and record observations, impressions, information gathered and suggestions given, if any.
5. Project will be assessed by an expert committee constituted by the department as per norms of the institute as a part of ICA.

6. The group will submit project report in the bound copy. The project report should contain –

1. Title/Cover Page
2. Sponsorship certificate / completion certificate for sponsored project
3. Index/Table of Contents
4. Introduction
5. Title/Problem statement/objectives
6. Motivation/Scope and rationale of the study
7. System design – dataflow diagrams, database design
8. Methodological details (algorithm, code documentation etc.)
9. Results / Analysis /inferences
10. System design – dataflow diagrams, database design
11. Methodological details (algorithm, code documentation etc.)
12. Results / Analysis /inferences
13. Results / Analysis /inferences
14. Conclusion
15. Bibliography





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FINAL YEAR B.TECH. (INFORMATION TECHNOLOGY)
SEMESTER – VIII
IT421 PROJECT PHASE– II (INTERNSHIP)

Teaching Scheme

Practical: 20 Hour/week, 10 Credits

Examination Scheme

ICA : 100 Marks

ESE – 100 Marks

Internships are educational and career development opportunities, providing practical experience in a field or discipline. Internships are far more important as the employers are looking for employees who are properly skilled and having awareness about industry environment, practices and culture. Internship is structured, short-term, supervised training often focused around particular tasks or projects with defined time scales.

COURSE OBJECTIVES:

- 1) To give exposure of industrial environment and create competent professionals for the industry.
- 2) To provide possible opportunities to learn, understand and sharpen the real time technical/ managerial skills.
- 3) To familiarize with processes, products, software and their applications along with relevant aspects of quality control.
- 4) To understand various approaches towards problem solving.
- 5) To expose students to the engineer's responsibilities and ethics.
- 6) To understand the social, economic and administrative considerations that influences the working environment of industrial organizations.

COURSE OUTCOMES:

At the end of the course students will be able to

- 1) Develop professional competence through internship.
- 2) Apply academic knowledge in a personal and professional environment.
- 3) Build the professional network.
- 4) Apply professional and societal ethics in their day to day life.
- 5) Become a responsible professional having social, economic and administrative considerations
- 6) Make own career goals and personal aspirations.

Engineering internships are intended to provide students with an opportunity to apply theoretical knowledge from academics to the realities of the field work/training. The following guidelines are proposed to give academic credit for the internship undergone as a part of the Final Year Engineering curriculum.

1. Students may undergo internship with Small/ Medium / Large scale industries to make themselves ready for the industry.
2. Students should be available in the industry for the period of 3 months of the semester.
3. The evaluation of internship activities carried out shall be done by Program Head / Cell Incharge / Project Coordinator / Project Guide / Faculty mentor / Industry mentor.
4. Every intern shall send weekly report to their internal guide without fail. Interns shall have at least fortnightly communication with the internal guide without fail.

5. Students shall maintain Internship Diary/ Internship Workbook. The students should record in the daily training diary account of the observations, impressions, information gathered and suggestions given, if any.

6. Student will give a seminar based on his training report every month, before an expert committee constituted by the department as per norms of the institute as a part of ICA.

7. The Internship report shall be presented covering following recommended fields but not limited to:

1. Title/Cover Page
2. Internship completion certificate.
3. Internship Place Details- Company background-organization and activities/Scope and object of the study / personal observation.
4. Index/Table of Contents
5. Introduction
6. Title/Problem statement/objectives
7. Motivation/Scope and rationale of the study
8. Methodological details
9. Results / Analysis /inferences and conclusion
10. Suggestions / Recommendations for improvement to industry, if any
11. Attendance Record
12. References (Library books, magazines and other sources)

8. The report submitted by student will be accepted and considered for final evaluation only if student continuously reports their work to the project guide and periodically evaluated by the internal examiners at college level.

