JSPM's
RAJARSHI SHAHU COLLEGE OF ENGINEERING
TATHAWADE, PUNE-33
(An Autonomous Institute Affiliated to Savitribai Phule Pune University, Pune)

Department of Information Technology

Structure & Syllabi

Final Year B. Tech (2019 Pattern)

w.e.f. Academic Year 2022-2023

Dr. N. M. Ranjan	Dr. Ram Joshi		Dr. Rakesh K. Jain
BoS Chairman	Dean of Academics		Director

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Dr. N. M. Ranjan
BoS Chairman

Dr. Ram Joshi
Dean of Academics

Dr. Rakesh K. Jain
Director

Department of Information Technology

Vision

"To create quality information technology professionals through superior academic environment."

Mission

- To incorporate the IT fundamentals in students to be successful in their career.
- To motivate students for higher studies, research and entrepreneurship.
- To provide IT services to society.

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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 needs 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 modelling 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. JSPM's Rajarshi Shahu College of Engineering Department of IT Engineering
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 team work:** 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. **Life-long 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.

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Program Specific Outcomes (PSOs):

Upon successful completion of UG course in Information Technology, the students will attain following PSOs:

PSO1: Demonstrate the ability to apply discrete principles of mathematics along with programming paradigms to expedite solution building in the IT domain.

PSO2: Apply computational techniques using core aspects of network and system programming to deliver secured application in the arena of analytics and computing.

PSO3: demonstrate project management skills to handle multidisciplinary complex tasks proficiently and utilize these skills for entrepreneurship.

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Highlights of the Syllabus

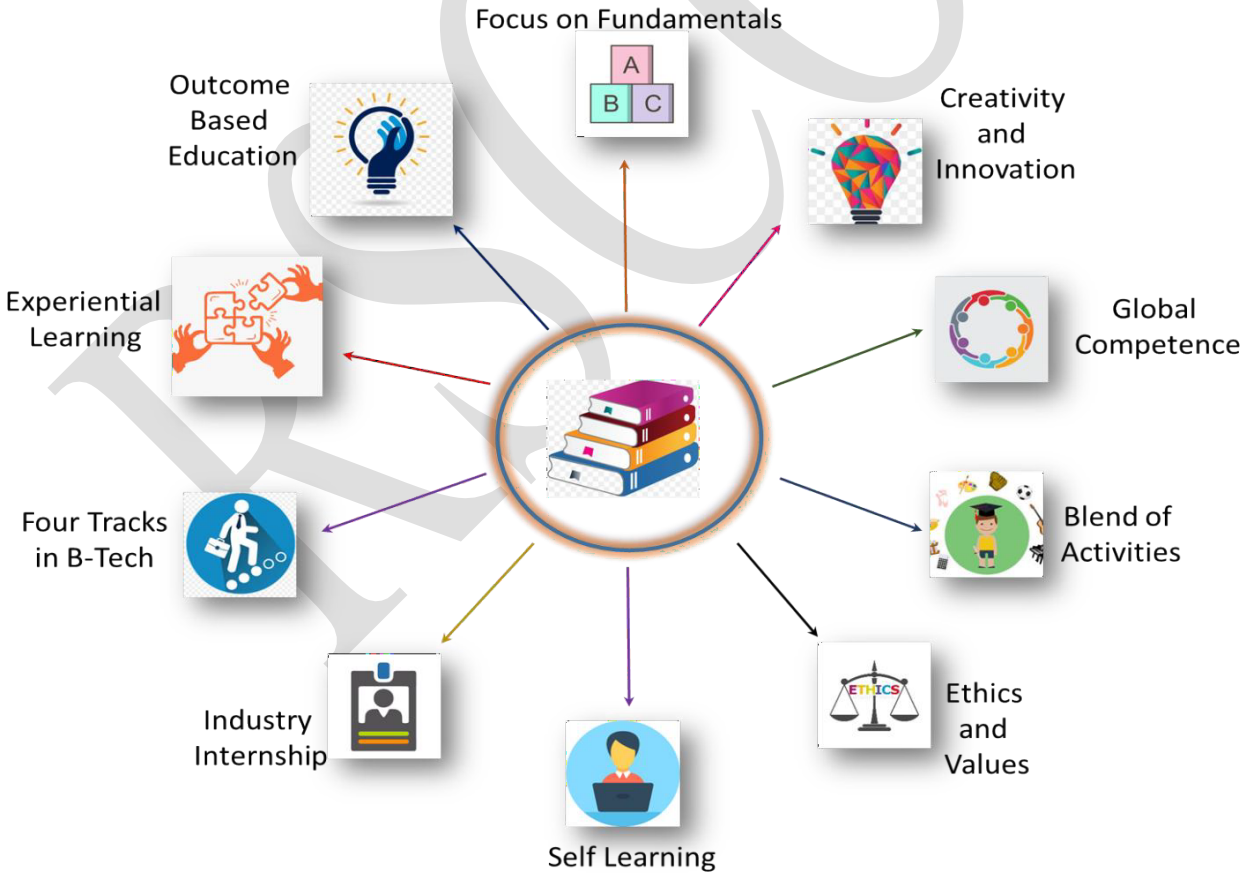
Curriculum of Information Technology Department is designed in consultation with experts like:

Academic Experts

Industry/Corporate Experts

Distinguished Alumni

Following are the features of the curriculum of the **Information Technology Department**designed in association with the **Persistent Systems Pvt. Ltd. Pune and Tata Consultancy Services, Pune**



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Unique features of the curriculum

1. **Curriculum centered at Outcome Based Education:**

   The new Curriculum is based on student-centered instruction models that focus on measuring student performance through outcomes. The outcomes include subject knowledge, industry required skills and attitudes.

2. **Emphasize on Fundamentals:**

   The nature of the new curriculum is rigorous and well prescribed so that the students can spend more time on preparation and self-study. The students have to learn core subjects, solve practical based assignments and must attempt periodical quizzes. This will benefit them to grasp and keep a strong hold on fundamentals of Engineering in the most effective way.

3. **Experiential Learning:**

   The curriculum emphasizes on hands-on sessions along with theoretical information. The new curriculum considers Problem Based Learning (PBL) as a teaching pedagogy and includes different subjects that encourage the students for hands on learning through virtual labs, mini-projects, etc. Accordingly, the curriculum maintains good balance between theory and laboratory credits.

4. **Promote Creativity and Innovation:**

   Along with experiential learning, the curriculum also motivates the students to inculcate creativity and innovation. Apart from conventional lab, the curriculum provides a freedom for students to perform industry assignments, pilot projects, innovative development, etc.

5. **Inculcating Ethics and Values:**

   To improvise student's behavior, the curriculum has included systematic courses on ethics and values. The moral principles can help students to make right decisions, lead their professional lives and become ethical citizen.

6. **Blend of Curricular and Noncurricular Activities**

   The curriculum also gives importance of different activities like co-curricular, extra-curricular, sports, culture, etc. This will help to do all round development of students in all possible ways.

7. **Four Tracks in B-Tech:**

   The curriculum provides four tracks in the curriculum as

   I. Industry Internship
   II. Entrepreneur
   II. Higher Studies and Research
   IV. In house Project

8. **Global Competence:**

   The curriculum provides a unique opportunity for students to learn and engage in open and effective interaction with people from diverse and interconnected world. The combination of foreign languages (German, Japanese, English) and international internships in the curriculum help the students to build a capacity to examine global and intercultural issues and to propose perspectives and views.

9. **Industry Induced Internship Program**

   To support ever demanding industry requirements, the curriculum has included an industry internship with an objective to learn technologies pertaining to their discipline and enhance their technical knowledge with a support of the live platform of Industry.

10. **Motivation for Self Learning:**

    The curriculum also offers a freedom to students to take the initiatives in their learning needs and set the goals with the help of online learning platforms like MOOCs, NPTEL, Swayam, etc.

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Final Year B. Tech. (Department of Information Technology)
Semester-VII- Syllabus Structure

Course Code	Course	Teaching Scheme			Semester Examination Scheme of Marks						Credits
		TH	TU	Lab	ISE (15)	MSE (25)	ESE (60)	TW	LAB	Total	
IT4101	Parallel and Distributed Computing	03	-	02	15	25	60	-	50	150	4
IT4102	Deep Learning	03	-	02	15	25	60	-	50	150	4
IT4103	Elective-III	03	-	02	15	25	60	-	50	150	4
IT4104	Project Phase I	-	-	12	-	-	-	50	100	150	6
Total		**09**	-	**18**	**45**	**75**	**180**	**50**	**250**	**600**	**18**

Elective III Options

Elective III Course Code	Elective III Title
IT4103A	Wireless Sensor Network
IT4103B	Blockchain Technology
IT4103C	Software Testing and Quality Assurance
IT4103D	Software Defined Network

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Final Year B. Tech. (Department of Information Technology)
Semester-VIII- Syllabus Structure
Track I –Regular

Course Code	Course	Teaching Scheme				Semester Examination Scheme of Marks					Credits
		TH	TU	Lab	ISE (15)	MSE (25)	ESE (60)	TW	LAB	Total	
IT4105	Soft Computing	03	-	-	15	25	60	-	-	100	03
IT4106	Finance and Management Information System	03	-	-	15	25	60	-	-	100	03
IT4107	Industry-Sponsored Subject- Data Management, Protection, and Governance	03	-	-	15	25	60	-	-	100	03
IT4108	IT Lab-Track-I	-	-	02	-	-	-	-	50	50	01
IT4109	Project Phase II	-	-	16	-	-	-	150	100	250	08
Total		**09**	**-**	**18**	**45**	**75**	**180**	**150**	**150**	**600**	**18**

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Final Year B. Tech. (Department of Information Technology)
Semester-VIII- Syllabus Structure
Track II - Industry Internship and Project

Course Code	Course	Teaching Scheme				Semester Examination Scheme of Marks					Credits
		TH	TU	Lab	ISE (15)	MSE (25)	ESE	TW	LAB	Total	
IT4110	Industry Internship	-	-	20	-	-	-	150	200	350	10
IT4109	Project Phase II	-	-	16	-	-	-	150	100	250	08
Total		**-**	**-**	**36**	**-**	**-**	**-**	**300**	**300**	**600**	**18**

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Final Year B. Tech. (Department of Information Technology)
Semester-VIII- Syllabus Structure

Track III – Entrepreneurship

Course Code	Course	Teaching Scheme			Semester Examination Scheme of Marks						Credits
		TH	TU	Lab	ISE (15)	MSE (25)	ESE (60)	TW	LAB	Total	
IT4111	Business Modeling	03	-	-	15	25	60	-	-	100	03
IT4106	Finance and Management Information System	03	-	-	15	25	60	-	-	100	03
IT4107	Industry-Sponsored Subject- Data Management, Protection, and Governance	03	-	-	15	25	60	-	-	100	03
IT4112	IT Lab-Track-III	-	-	02	-	-	-	-	50	50	01
IT4109	Project Phase II	-	-	16	-	-	-	150	100	250	08
Total		**09**	**-**	**18**	**45**	**75**	**180**	**150**	**150**	**600**	**18**

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Final Year B. Tech. (Department of Information Technology)
Semester-VIII- Syllabus Structure

Track IV – Higher Studies and Research

Course Code	Course	Teaching Scheme			Semester Examination Scheme of Marks						Credits
		TH	TU	Lab	ISE (15)	MSE (25)	ESE (60)	TW	LAB	Total	
IT4113	Research Methodology	03	-	-	15	25	60	-	-	100	03
IT4106	Finance and Management Information System	03	-	-	15	25	60	-	-	100	03
IT4107	Industry-Sponsored Subject- Data Management, Protection, and Governance	03	-	-	15	25	60	-	-	100	03
IT4114	IT Lab-Track IV	-	-	02	-	-	-	-	50	50	01
IT4109	Project Phase II	-	-	16	-	-	-	150	100	250	08
Total		**09**	**-**	**18**	**45**	**75**	**180**	**150**	**150**	**600**	**18**

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Final Year B. Tech (Department of Information Technology)
Academic Year – 2022-2023 Semester -VII
[IT4101]: Parallel and Distributed Computing

Teaching Scheme:	**Credits:**	**Examination Scheme:**
TH: 03 Hours/Week PR: 02 Hours/Week	TH:03 PR:01	In Sem. Evaluation: 15 Marks Mid Sem. Exam : 25 Marks End Sem. Exam : 60 Marks Laboratory Exam :50 Marks

Course Prerequisites:
1. Web Technology.
2. Computer Network Technology.
3. Operating System.

Course Objectives:
- Understand theories and practices in parallel computing
- To understand the fundamentals and knowledge of the architectures of distributed systems.
- To gain knowledge of working components and fault tolerance of distributed systems
- To make students aware about security issues and protection mechanism for distributed environment.

Course Outcomes: After successful completion of the course, students will able to-
CO1: Describe parallel programming construct and implement it using OpenMP
CO2: Explain parallel algorithms and write programs for parallel systems
CO3: Design distributed application by considering issues and architectural aspects of distributed system
CO4: Analyze different techniques used for communication in distributed system and develop the solutions for clock synchronization and mutual exclusion
CO5: Use and apply scalability and fault tolerance methods for distributed application
CO6: Draw and explain various distributed file system architectures

Course Contents

UNIT-I	**Foundations of Parallel Programming**	**07 Hours**

Need for parallel computing,Parallel languages and compilers: Language features for parallelism, parallel language constructs, optimizing compilers for parallelism, dependency analysis, loop parallelization and pipelining
Case study : OpenMP Execution Model, Memory Model and Consistency, Open MP Directives, Run Time Library Routines

UNIT-II	**Parallel Algorithms**	**07 Hours**

Parallel Algorithms for Reduction, Prefix Sum, List Ranking, Preorder Tree Traversal , Searching, Sorting, Merging Two Sorted Lists, Matrix Multiplication , Graph Coloring, Graph Searching. 2D Mesh SIMD Model – Parallel Algorithms for Reduction, Prefix Computation, Selection -Odd-Even Merge Sorting

UNIT-III	**Fundamentals of Distributed Systems**	**07 Hours**

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Introduction: Characteristics and examples of distributed systems, Design goals, Types of distributed systems, Trends in distributed systems, Focus on Resource Sharing, Challenges.
Architectures: Architectural styles, middleware and middleware organization, system architectures

UNIT-IV	Communication And Coordination	07 Hours

Communication: Introduction, Layered protocols , Types of communication, Inter-process Communication, Remote Procedure Call (RPC), Message oriented communication, Multicast Communication
Network Coordination: Clock Synchronization, Logical Clocks, Mutual Exclusion, Election algorithms, Gossip Based coordination

UNIT-V	Replication And Fault Tolerance	07 Hours

Replication: Reasons for replication, Replica management, Failure masking and replication, Consistency protocols, Catching and replication in web
Fault Tolerance: Introduction, Failure models, Fault systems with arbitrary failures, Distributed commit, Recovery, Checkpoints.

UNIT-VI	Distributed Files	07 Hours

Distributed File Systems: Introduction, File System Architecture, Sun Network File System,Andrew File System,HDFS
Name Services: Introduction, Name Services and the Domain Name System, Directory Services.
Case Study- The X.500 Directory Service.

Lab Contents

Guidelines for Lab Assessment

1) Continuous assessment shall be based on experiments performed, submission of results of practical assignments in the form of journal / reports, timely completion, attendance, understanding, performance.
2) Practical / Oral examination shall be based on the practical's performed in the lab.
3) Lab assessment marks shall be based on continuous assessment and performance in Practical/Oral examination.

List of Laboratory Assignments/Experiments

1	Study Basics of OpenMP API (Open Multi-Processor API)
2	To develop any distributed application using Message Passing Interface (MPI).
3	To develop any distributed application through implementing client-server communication programs based on Java Sockets and RMI techniques
4	To develop any distributed application using Messaging System in Publish-Subscribe paradigm.
5	To create a simple web service and write any distributed application to consume the web service.
6	To develop any distributed application with CORBA program using JAVA IDL.

Text Books:

T1. Michael J. Quinn, "Parallel Computing : Theory and Practice", Tata McGraw Hill Edition, Second edition, 2017.

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T2. Maarten van Steen, Andrew S. Tanenbaum, Distributed Systems , PHI, 3rd Edition Version 3.01, ISBN: 978-15-430573-8-6(Printed).
T3. Andrew S. Tanenbaum, Maarten van Steen, Distributed Systems – Principles and Paradigms, PHI, 2nd Edition, ISBN: 978-0130888938.

Reference Books:

R1. Ananth Grame, George Karpis, Vipin Kumar and Anshul Gupta, "Introduction to Parallel Computing", 2nd Edition, Addison Wesley, 2003.
R2. M Sasikumar, Dinesh Shikhare and P Ravi Prakash , " Introduction to Parallel Processing", PHI learning , 2013
R3. S.G.Akl, "The Design and Analysis of Parallel Algorithms", PHI, 1989
R4. George Coulouris, Distributed Systems: Concepts and Design,Pearson, 5th edition, Jean Dollimore, Tim Kindberg, Gordon Blair, ISBN:13: 978-0132143011,ISBN:10: 0132143011.
R5. Abhijit Belapurkar, Anirban Chakrabarti, Harigopal Ponnapalli, Niranjan Varadarajan, Srinivas Padmanabhuni, Srikanth Sunderrajan, Distributed System Security: Issues, Processes and solutions, Willey online Library, ISBN: 978-0-470-51988-2.
R6. Sunita Mahajan, Seema Shah, Distributed Computing, Oxford University Press, 2nd Edition, ISBN-13: 978-0198093480.

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Final Year B. Tech (Department of Information Technology)
Academic Year – 2022-2023 Semester - VII
[IT4102]: Deep Learning

Teaching Scheme:	Credits:	Examination Scheme:
TH: 03 Hours/Week	TH:03	In Sem. Evaluation: 15 Marks
PR: 02 Hours/Week	PR:01	Mid Sem. Exam : 25 Marks
		End Sem. Exam : 60 Marks
		Laboratory Exam: 50 Marks

Course Prerequisites: Machine Learning, Computational Statistics

Course Objectives:

- To present the mathematical, statistical and computational challenges of building neural networks
- To study the concepts of deep learning
- To learn different deep learning architectures
- To enable the students to know deep learning techniques to support real-time applications
- To examine the case studies of deep learning techniques

Course Outcomes: After successful completion of the course, students will able to-

CO1: Describe the fundamental concepts of deep learning, neural networks, and implement basic neural networks, including perceptrons, multi-layer perceptrons (MLPs), and backpropagation algorithms.
CO2: Apply optimization techniques and dimensionality reduction methods like PCA and SVD to improve deep learning models.
CO3: Analyze the role of autoencoders, denoising autoencoders, and sparse autoencoders in unsupervised learning, and apply regularization techniques to improve model performance.
CO4: Design and develop deep learning models using Convolutional Neural Networks (CNNs) and explore different architectures such as LeNet, AlexNet, VGG16, Inception 3, and EfficientNet B0.
CO5: Implement sequential models using Recurrent Neural Networks (RNNs), Long Short-Term Memory (LSTM), Gated Recurrent Units (GRUs), and Bidirectional LSTMs for time-series and NLP applications.
CO6: Apply deep learning techniques in real-world scenarios, including ImageNet classification, WaveNet for speech processing, Word2Vec for NLP, bioinformatics, and face recognition.

Course Contents

UNIT-I	Introduction	07 Hours
History of Deep Learning, Deep Learning Success Stories, McCulloch Pitts Neuron, Biological Neuron, Multilayer Perceptron's (MLPs), Backpropagation Neural Network, Feed Forward Neural Network, Sigmoid Neurons, Activation functions.		
UNIT-II	**Gradient Descent & Optimizations**	**07 Hours**
Optimization Techniques, Gradient Descent, Stochastic GD, Batch Optimization, Principal Component Analysis and its interpretations, Singular Value Decomposition.		

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UNIT-III	Autoencoders and Regularizations	07 Hours
Auto encoders and relation to PCA, Regularization in auto encoders, Denoising auto encoders, Sparse auto encoders, Regularization: Bias Variance Tradeoff, L2 regularization, Early stopping, Dataset augmentation		
UNIT-IV	**Deep Learning Architectures**	**07 Hours**
CNN, Different deep CNN architectures: LeNet, AlexNet, VGG16, Inception 3, Efficient Net B0		
UNIT-V	**Recurrent Neural Networks**	**07 Hours**
RNN, Back propagation through time, Long Short-Term Memory, Gated Recurrent Units, Bidirectional LSTMs, Bidirectional RNNs, Generative Adversarial Networks		
UNIT-VI	**Case Study and Applications**	**07 Hours**
Imagenet- Detection-Audio WaveNet-Natural Language Processing Word2Vec - Joint Detection-Bioinformatics- Face Recognition, Applications in Vision, Speech, Natural language processing		

Lab Contents

Guidelines for Lab Assessment

1) Continuous assessment shall be based on experiments performed, submission of results of practical assignments in the form of journal / reports, timely completion, attendance, understanding, performance.
2) Practical / Oral examination shall be based on the practical's performed in the lab.
3) Lab assessment marks shall be based on continuous assessment and performance in Practical/Oral examination.

List of Laboratory Assignments/Experiments

1	Classification with Multilayer Perceptron using Scikit-learn (MNIST Dataset)
2	Classification of MNIST Dataset using CNN
3	Face recognition using CNN
4	Time Series Prediction using RNN
5	Image generation using GAN
6	Sentiment analysis of text using LSTM

Text Books:

T1. Ian Goodfellow, Yoshua Bengio and Aaron Courville, " Deep Learning", MIT Press, 2017. Available online: http://www.deeplearningbook.org

T2. Josh Patterson, Adam Gibson "Deep Learning: A Practitioner's Approach", O'Reilly Media, 2017

Reference Books:

R1. Antonio Gulli, Sujit Pal "Deep Learning with Keras", Packt Publishers, 2017.

R2. Umberto Michelucci "Applied Deep Learning. A Case-based Approach to Understanding Deep Neural Networks" Apress, 2018.

R3. Francois Chollet "Deep Learning with Python", Manning Publications, 2017

R4. S. Haykin, Neural Networks and Learning Machines , Prentice Hall of India, 2010

R5. Ragav Venkatesan, Baoxin Li, "Convolutional Neural Networks in Visual Computing", CRC Press, 2018.

R6. Charu C. Aggarwal. Neural Networks and Deep Learning: A Textbook. Springer. 2019.

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Final Year B. Tech (Department of Information Technology)
Academic Year – 2022-2023 Semester - VII
[IT4103A]: Wireless Sensor Network

Teaching Scheme:	Credits:	Examination Scheme:
TH: 03 Hours/Week	TH:03	In Sem. Evaluation : 15 Marks
PR: 02 Hours/Week	PR:01	Mid Sem. Exam : 25 Marks
		End Sem. Exam : 60 Marks
		Laboratory Exam : 50 Marks

Course Prerequisites : Computer Networks

Course Objectives:

- To realize the challenges Wireless Sensor networks (WSNs)
- To study the basis of Sensors with its applications
- To learn Architectures of WSN
- To understand the networking of sensors to from the network
- To learn the architecture and placement strategies of Sensors

Course Outcomes: After successful completion of the course, students will able to-

CO1: Understand the basis of Sensors with its applications
CO2: Design the WSN architecture and Introduction to sensor networks
CO3: Understand the MAC layer issues
CO4: Understand the Localization and Synchronization
CO5: Work with motes and Simulators.

Course Contents

UNIT-I	Overview of Wireless Sensor Networks	07 Hours
Introduction to Sensor Networks, Unique Constraints and Challenges, Advantages of Sensor Networks and Sensor Network Applications.		
UNIT-II	**Sensor Node Hardware and Network Architecture**	**07 Hours**
Single-node Architecture, Hardware Components, Energy consumption of sensor nodes, Operating systems and execution environments. Network Architecture: Sensor Network Scenarios, Optimization Goals and Figures of Merit and Design principles for WSNs.		
UNIT-III	**Networking Sensors**	**07 Hours**
Medium Access Control Protocols for Wireless Sensor Networks, the S-MAC Protocol, IEEE 802.15.4 Standard and ZigBee. Address and Name Management in Wireless Sensor Networks. Routing Protocols: - Energy-efficient unicast, Geographic routing.		

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UNIT-IV	Time Synchronization	07 Hours
Introduction to the time synchronization problem, Protocols based on sender/receiver synchronization and Protocols based on receiver/receiver synchronization.		
UNIT-V	**Localization and Localization Services**	**07 Hours**
Ranging Techniques, Range-Based Localization Algorithms, Other Localization Algorithms and Location Services.		
UNIT-VI	**Sensor Network Platforms and Tools**	**07 Hours**
Sensor Node Hardware, Berkeley Motes, Programming Challenges, Node Level Software Platform, Node Level Simulator, State Centric Programming.		

Lab Contents

Guidelines for Lab Assessment

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2) Practical / Oral examination shall be based on the practical's performed in the lab.
3) Lab assessment marks shall be based on continuous assessment and performance in Practical/Oral examination.

List of Laboratory Assignments/Experiments

1	Introduction to Wireless Sensor Networks
2	Learn nesC Programming - Demonstration of a "Hello World" Application
3	Wireless Sensor Network Duty Cycle Implementation vs. Analysis of Power Consumption
4	Sensor Data Acquisition: Implementation of wireless sensor network (WSN) to acquire sensor data from the wireless sensor board and also from external sensors such as dielectric moisture sensor, rain gauge, temperature sensor, humidity sensor etc
5	Design wireless sensor network topologies and experiment data sending and reception at various power levels
6	Wireless Sensor Network Data Acquisition, Transmission, and Aggregation Program the WSN to acquire sensor data, transmit it to the nearby nodes, and aggregate it
7	Design, develop and implement different time synchronization algorithms for wireless sensor networks and study its real world characteristics.
8	To Study Range-Based Localization Algorithms

Text Books:

T3. Protocols and Architectures for Wireless Sensor Networks by Holger Karl and Andreas Willig, John Wiley Publication-2005

T4. Feng Zhao, Leonidas Guibas- Wireless Sensor Networks_ An Information Processing Approach (2004)

Reference Books:

R1. Bhaskar Krishnamachari, Networking Wireless Sensors, Cambridge University Press

R2. Fundamentals of Wireless Sensor Networks, Theory and Practice, Waltenegus Dargie, Christian Poellabauer , Wiley Series on wireless Communication and Mobile Computing,

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R3. C. S. Raghavendra, Krishna M. Sivalingam, Taieb Znati, Wireless Sensor Networks, Kluwer Academic.
R4. Kazem Sohraby, Daniel Minoli, Taieb Znati, Wireless Sensor Networks: Technology, Protocols, and Applications, John Wiley

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Final Year B. Tech (Department of Information Technology)
Academic Year – 2022-2023 Semester - VII
[IT4103B]: Blockchain Technology

Teaching Scheme:	Credits:	Examination Scheme:
TH: 03 Hours/Week	TH:03	In Sem. Evaluation : 15 Marks
PR: 02 Hours/Week	PR:01	Mid Sem. Exam : 25 Marks
		End Sem. Exam : 60 Marks
		Laboratory Exam : 50 Marks

Course Prerequisites : Cryptography, Data Structure, Networking, OOP

Course Objectives:

- This course is intended to study the basics of Blockchain technology.
- During this course learner will explore various aspects of Blockchain technology like application in various domains.
- By implementing learner will have idea about private and public Blockchain, and smart contract.

Course Outcomes: After successful completion of the course, students will able to-

CO1 : Understand Basics of Blockchain Technology.
CO2 : Describe BitCoin and Cryptocurrency with EVM
CO3 : Analyze the Consensus Mechanisms and design smart contracts
CO4 : Understand hyperledger with fabric and composer
CO5 : Design and develop application using solidity programming with smart contract
CO6 : Analyze different block chain applications

Course Contents

UNIT-I	Introduction of Cryptography and Blockchain	07 Hours

Introduction of Cryptography and Blockchain: What is Blockchain, Blockchain Technology Mechanisms & Networks, Blockchain Origins, Objective of Blockchain, Blockchain Challenges, Transactions And Blocks, P2P Systems, Keys As Identity, Digital Signatures, Hashing, and public key cryptosystems, private vs. public Blockchain.

UNIT-II	BitCoin and Cryptocurrency	07 Hours

What is Bitcoin, The Bitcoin Network, The Bitcoin Mining Process, Mining Developments, Bitcoin Wallets, Decentralization and Hard Forks, Ethereum Virtual Machine (EVM), Merkle Tree, Double-Spend Problem, Blockchain And Digital Currency, Transactional Blocks, Impact Of Blockchain Technology On Cryptocurrency.

UNIT-III	Introduction to Ethereum	07 Hours

What is Ethereum, Introduction to Ethereum, Consensus Mechanisms, How Smart Contracts Work, Metamask Setup, Ethereum Accounts, Receiving Ether's What's a Transaction?, Smart Contracts

UNIT-IV	Introduction to Hyperledger	07 Hours

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What is Hyperledger? Distributed Ledger Technology & its Challenges, Hyperledger & Distributed Ledger Technology, Hyperledger Fabric, Hyperledger Composer.		
UNIT-V	**Solidity Programming**	**07 Hours**
Solidity - Language of Smart Contracts, Installing Solidity & Ethereum Wallet, Basics of Solidity, Layout of a Solidity Source File & Structure of Smart Contracts, General Value Types (Int, Real, String, Bytes, Arrays, Mapping, Enum, address)		
UNIT-VI	**Block chain Applications**	**07 Hours**
Internet of Things, Medical Record Management System, Domain Name Service and Future of Blockchain, Alt Coins Case Studies : Block chain in supply chain management, Block chain in financial and insurance sector Block chain in healthcare sector, Block chain in e-governance such as elections or unified ID card, Block chain in manufacturing Block chain in agribusiness		

Lab Contents

Guidelines for Lab Assessment

1) Continuous assessment shall be based on experiments performed, submission of results of practical assignments in the form of journal / reports, timely completion, attendance, understanding, performance.
2) Practical / Oral examination shall be based on the practical's performed in the lab.
3) Lab assessment marks shall be based on continuous assessment and performance in Practical/Oral examination.

List of Laboratory Assignments/Experiments

1	Create a Simple Blockchain in any suitable programming language.
2	Use Geth to Implement Private Ethereum Block Chain.
3	Build Hyperledger Fabric Client Application.
4	Build Hyperledger Fabric with Smart Contract
5	Create Case study of Block Chain being used in illegal activities in real world.
6	Using Python Libraries to develop Block Chain Application.

Text Books:

T1 Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller and Steven Goldfeder, Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction, Princeton University Press (July 19, 2016).
T2 Antonopoulos, Mastering Bitcoin

Reference Books:

R1 Antonopoulos and G. Wood, Mastering Ethereum.
R2 D. Drescher, Blockchain Basics. Apress, 2017.

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Final Year B. Tech (Department of Information Technology)
Academic Year – 2022-2023 Semester- VII
[IT4103C]: Software Testing and Quality Assurance

Teaching Scheme:	Credits:	Examination Scheme:
TH: 03 Hours/Week	TH:03	In Sem. Evaluation : 15 Marks
PR: 02 Hours/Week	PR:01	Mid Sem. Exam : 25 Marks
		End Sem. Exam : 60 Marks
		Laboratory Exam : 50 Marks

Course Prerequisites: Software Engineering and Agile development, Advance Software Modeling

Course Objectives:

- Introduce basic concepts of software testing.
- Understand techniques and levels of testing.
- Understand details of automation testing and tools used for automation testing.
- Understand the importance of software quality and assurance software systems development.

Course Outcomes: After successful completion of the course, students will able to-

CO1: Explain the role of software testing as an essential engineering activity within the software development lifecycle.
CO2: Describe various software testing techniques
CO3: Explain the fundamental concepts of Test Automation and its role in the software development lifecycle.
CO4: Describe the fundamentals of Selenium and its role in automated testing.
CO5: Discuss various approaches and methodologies to achieve software quality
CO6: Understand and Apply Software Quality Tools, Total Quality Management (TQM) Principles.

Course Contents

UNIT-I	Software Testing Basics	07 Hours

Testing as an engineering activity, Role of process in software quality, testing as a process, Basic definitions, Software testing principles, the tester's role in a software development organization, Origins of defects, Defect classes, the defect repository and test design, Defect examples, Developer / Tester support for developing a defect repository.

UNIT-II	Testing Techniques and Levels of Testing	07 Hours

Using White Box Approach to Test design - Static Testing Vs. Structural Testing, Code Functional Testing, Coverage and Control Flow Graphs, Using Black Box Approaches to Test Case Design, Random Testing, Requirements based testing, Decision tables, State-based testing, Cause-effect graphing, Error guessing, Compatibility testing, Levels of Testing -Unit Testing, Integration Testing, Defect Bash Elimination. System Testing - Usability and Accessibility Testing, Configuration Testing, Compatibility Testing.

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UNIT-III	Software Test Automation	07 Hours
What is Test Automation, Terms used in automation, Skills needed for automation, what to automate, scope of automation, Design and Architecture of automation, Generic requirement for Test Tool, Process Model for Automation, Selecting Test Tool, Automation for XP/Agile model, Challenges in Automation, Data-driven Testing. Automation Tools like JUnit, Jmeter		
UNIT-IV	**Selenium Tool**	**07 Hours**
Introducing Selenium, Brief History of The Selenium Project, Selenium's Tool Suite, Selenium IDE, Selenium RC, Selenium Web driver, Selenium Grid, Test Design Considerations		
UNIT-V	**Software Quality Assurance**	**07 Hours**
Software Quality, Software Quality Dilemma, Achieving Software Quality, Software Quality Assurance. Elements of SQA, SQA Tasks, Goals, and Metrics, Formal Approaches to SQA, Statistical Software Quality Assurance, Six Sigma for Software Engineering, ISO 9000 Quality Standards, SQA Plan.		
UNIT-VI	**Software Quality Tools**	**07 Hours**
Total Quality Management, Product Quality Metrics, in process Quality Metrics, Software maintenance, Ishikawa's 7 basic tools, Checklists, Pareto diagrams, Histogram, Run Charts, Scatter diagrams, Control chart, Cause Effect diagram. Defect Removal Effectiveness and Process Maturity Level.		

Lab Contents

Guidelines for Lab Assessment

1) Continuous assessment shall be based on experiments performed, submission of results of practical assignments in the form of journal / reports, timely completion, attendance, understanding, performance.
2) Practical / Oral examination shall be based on the practical's performed in the lab.
3) Lab assessment marks shall be based on continuous assessment and performance in Practical/Oral examination.

List of Laboratory Assignments/Experiments

1	Mini-Project 1: Create a small application by selecting relevant system environment / platform and programming languages. Narrate concise Test Plan consisting features to be tested and bug taxonomy. Prepare Test Cases inclusive of Test Procedures for identified Test Scenarios. Perform selective Black-box and White-box testing covering Unit and Integration test by using suitable Testing tools. Prepare Test Reports based on Test Pass/Fail Criteria and judge the acceptance of application developed
2	Mini-Project 2: Create a small web-based application by selecting relevant system environment / platform and programming languages. Narrate concise Test Plan consisting features to be tested and bug taxonomy. Narrate scripts in order to perform regression tests. Identify the bugs using Selenium WebDriver and IDE and generate test reports encompassing exploratory testing

Text Books:

T5. M G Limaye, "Software Testing Principles, Techniques and Tools", Tata McGraw Hill, ISBN:

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9780070139909 0070139903 2.
T6. Srinivasan Desikan, Gopalswamy Ramesh, “Software Testing Principles and Practices”, Pearson, ISBN-10: 817758121X
T3. Daniel Galin, Software Quality Assurance: From Theory to Implementation, Pearson Addison Wesley.

Reference Books:

R1. Aditya P. Mathur, Foundations of Software Testing, Pearson.
R2. Paul Ammann, Jeff Offutt, Introduction to Software Testing, Cambridge University Press.
R3. William Perry, Effective Methods of Software Testing, Wiley Publishing, Third Edition.
R4. Renu Rajani, Pradeep Oak, Software Testing – Effective Methods, Tools and Techniques, Tata McGraw Hill.
R5. Naresh Chauhan, “Software Testing Principles and Practices ", OXFORD, ISBN-10: 0198061846. ISBN-13: 9780198061847 2.
R6. Stephen Kan, “Metrics and Models in Software Quality Engineering”, Pearson, ISBN-10: 0133988082; ISBN-13: 978-013398808

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Final Year B. Tech (Department of Information Technology)
Academic Year – 2022-2023 Semester - VIII
[IT4103D]: Software Defined Networking

Teaching Scheme:	**Credits:**	**Examination Scheme:**
TH: 03 Hours/Week	TH:03	In Sem. Evaluation : 15 Marks Mid Sem. Exam : 25 Marks End Sem. Exam : 60 Marks Laboratory Exam : 50 Marks

Course Prerequisites : Computer Network and Wireless Sensor Network (WSN)

Course Objectives:

- To learn the fundamentals of software defined networks
- To understand design and development of SDN.
- To study SDN Programming.
- To understand various applications of SDN

Course Outcomes: After successful completion of the course, students will able to-

CO1: Analyze the evolution of software defined networks.
CO2: Apply different storage mechanisms in SDN.
CO3: Analyze SDN Controllers using OpenFlow protocol.
CO4: Develop SDN with Data Center capabilities.
CO5: Design and Develop SDN in the current networking scenario.
CO6: Design and Develop an application using SDN Concepts.

Course Contents

UNIT-I	**Introduction To SDN**	**07 Hours**
History of Software Defined Networking (SDN), Modern Data Center, Traditional Switch Architecture, Need of SDN, Evolution of SDN, Working o SDN Works, Centralized and Distributed Control and Data Planes		
UNIT-II	**Storage and Virtualization**	**07 Hours**
Storage Virtualization- Computer Storage Operation, network-attached storage, Storage-area networks, Server based Storage Virtualization, Storage-network-based storage virtualization, Storage-controller-based storage virtualization		
UNIT-III	**Open Flow and Controllers**	**07 Hours**
Open Flow Specification, Drawbacks of Open SDN, SDN via APIs, SDN via Hypervisor, Based Overlays, SDN via Opening up the Device, SDN Controllers General Concepts, Open Source		

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Controllers - NOX, POX, Beacon, Maestro, Floodlight, Ryu and Open Daylight, Implementing software-defined network (SDN) based firewall.		
UNIT-IV	**SDN and Data Centers**	**07 Hours**
Data Center Definition, Data Center Demands: Adding, Moving, Deleting Resources, Failure Recovery, Multitenancy, Traffic Engineering & Path Efficiency, Tunneling Technologies for the Data Center, SDN Use Cases in the Data Center, Comparison of Open SDN, Real-World Data Center Implementations, SDN Solutions for the Data Center Network :VLANs, EVPN, VxLAN, NVGRE		
UNIT-V	**Programming in SDN**	**07 Hours**
Network Programming, Network Function Virtualization, NetApp Development, Network Slicing. Cisco Open network environment, Northbound Application Programming Interface, Current Languages and Tools, Composition of SDNs, Network Functions Virtualization (NFV)		
UNIT-VI	**Applications and Use Cases**	**07 Hours**
Wide Area Networks, Service Provider and Carrier Networks, Campus Networks, Hospitality Networks, Mobile Networks, Optical Networks, SDN vs P2P/Overlay Networks, The Open Network Operating System		

Text Books:

T1. Paul Goransson and Chuck Black, ―Software Defined Networks: A Comprehensive Approach, First Edition, Morgan Kaufmann, 2014.

T2. Thomas D. Nadeau, Ken Gray, ―SDN: Software Defined Networks, O'Reilly Media, 2013

Reference Books:

R1. Siamak Azodolmolky, ―Software Defined Networking with Open Flow, Packet Publishing, 2013.

R2. Vivek Tiwari, ―SDN and Open Flow for Beginners, Amazon Digital Services, Inc., 2013.

R3. Fei Hu, Editor, ―Network Innovation through Open Flow and SDN: Principles and Design, CRC Press, 2014.

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Final Year B. Tech (Department of Information Technology)

Academic Year – 2022-2023 Semester - VII

[IT4104]: Project Phase I

Teaching Scheme:	Credits:	Examination Scheme:
PR: 12 Hours/Week	PR:06	Term Work : 50 Marks Laboratory Exam :100 Marks

Course Prerequisites: Project Based Seminar.

Course Objectives:

- To implement their ideas/real time industrial problem/ current applications from their engineering domain.
- To develop plans with help of team members to achieve the project's goals.
- To break work down into tasks and determine appropriate procedures.
- To estimate and cost the human and physical resources required, and make plans to obtain the necessary resources.
- To allocate roles with clear lines of responsibility and accountability and learn team work ethics.
- To apply communication skills to effectively promote ideas, goals or products.

Course Outcomes: After successful completion of the course, students will able to-

CO1: Describe motivation, objectives and scope of the project with problem definition.
CO2: Identify the requirement of the problem statement and apply domain knowledge to identify software hardware requirement.
CO3: Analyze different technologies to implement the project problem.
CO4: Design and develop all modelling diagrams using tools.
CO5: Design and develop project module partially.
CO6: Write the report of their project work.

Course Contents

Project Based Seminar (PBS) helped students to gather, organize, summarize and interpret technical literature with the purpose of formulating a project proposal in third year. Students had also submitted a technical report summarizing state-of-the-art on an identified domain and topic in third year.
In Project Phase-I, the student will undertake project over the academic year, which will involve the analysis, design of a system or sub system in the area identified earlier in the field of Information Technology and Computer Science and Engineering. The project will be undertaken preferably by a group of 3-4 students who will jointly work and implement the project. The group will select a project which is based on seminar delivered in relevant domain in Project based Seminar activity with approval

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from a committee formed by the department of senior faculty to check the feasibility and approve the topic. The student needs to identify a technological problem in the area of Computer Engineering or Information Technology of their choice like signal processing, computer vision, machine learning and artificial intelligence, control systems, game theory, and communication networks and address the problem by formulating a solution for the identified problem. B.E. projects can be application oriented and/or will be based on some innovative/ theoretical work.

The Motivation for this Major Project is

a. Synthesis of knowledge
b. To demonstrate the aptitude of applying the own knowledge to solve a specific problem.
c. To mature the knowledge.
d. Preparation for joining the working world.

Overview of the Course:

- The Head of the department/Project coordinator shall constitute a review committee for project group; project guide would be one member of that committee by default.
- There shall be two reviews in Project phase –I in semester-I by the review committee.
- The Project Review committee will be responsible for evaluating the timely progress of the projects.
- The Student Project Group is expected to make a survey of situation for identifying the requirements of selected Technological Problem.
- Students should Identify Project of enough complexity, which has at least 4-5 major functionalities to justify 10 credits.
- Student should identify stakeholders, actors and write detailed problem statement
- The project requires the students to conceive, design a mechanism. The mechanism may be entirely of the student's own design, or it may incorporate off-the-shelf parts. If the mechanism incorporates off-the-shelf parts, the students must perform appropriate analysis to show that the parts are suitable for their intended purpose in the mechanism.
- Upon receiving the approval, the Student Project Group will prepare a preliminary project report consisting Requirement Definition Document, Feasibility Study Document, System Requirement Specification, System Analysis Document, Preliminary System Design Document. All the documents indicated will have a prescribed format.
- If change in project topic is unavoidable then the students should complete the process of ¬ Project approval by submitting synopsis along with the review of important papers.
- This new project topic should be approved by review committee.
- The students or project group shall make presentation on the progress made by them before the committee.
- The record of the remarks/suggestions of the review committee should be properly maintained and should be made available at the time of examination.

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- Each student/group is required to give presentation as part of review for 10 to 15 minutes followed by a detailed discussion.

Review 1: Synopsis –
Deliverables:

- The precise problem statement/title based on literature survey and feasibility study.
- Purpose, objectives and scope of the project.
- List of required hardware, software or other equipment for executing the project, test Environment/tools, cost and human efforts in hours.
- System overview- proposed system and proposed outcomes.
- Architecture and initial phase of design (DFD).
- Project plan 1.0.

Review 2: SRS –
Deliverables:

- SRS and High level design.
- Detail architecture/System design/algorithms/techniques.
- At least 30-40% coding documentation with at least 3 to 4 working modules.
- Test Results.
- Project plan 2.0.

One paper should be published in reputed International conference/International journal based on literature done during the project work/project work done.

Use appropriate plagiarism tools, reference managers, Latex /latest Word for efficient and effective project writing.
Project report contains the details as Follows:
Contents
List of Abbreviations
List of Figures
List of Graphs
List of Tables

- Introduction and aims/motivation and objectives
- Literature Survey
- Problem Statement/definition
- Project Requirement specification
- Systems Proposed Architecture
- High level design of the project(DFD/UML)
- System implementation-code documentation-algorithm, methodologies, protocols used.
- GUI/Working modules/Experimental Results

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- Project Plan
- Conclusions
- Bibliography in IEEE format

Appendices

Plagiarism Report of Paper and Project report from authentic plagiarism tool
Base Paper(s)
Tools used
Papers Published/Certificates

Tutorial:

Discussion on literature survey required for each task involved in project. Eg. Selecting software and hardware requirement

Term Work:

- The term work will consist of a report and presentation prepared by the student on the project allotted to them.
- Assessment Scheme:
  1. Review 1: 15 marks
  2. Synopsys: 10 marks
  3. SRS: 10 marks
  4. Review 2: 15 marks

Lab:

- Using laboratory to do literature survey to select appropriate algorithm for providing solution, select appropriate tool or programming language to implement algorithm, writing synopsis, SRS and project report etc.
- Assessment Scheme:
  1. Project report: 30 marks
  2. Presentation of project work: 50 marks
  3. Paper publication: 20 marks

Text Books:

T1. UML 2 and the Unified Process, Second Edition, JIM Arlow, Ila Neustadt, Pearson.
T2. Design Patterns in Java Second Edition by Steven John Metsker, Pearson

Reference Books:

R1. UML2 Bible by Tom Pender, Wiley India Pvt. Limited 2011.
R2. Applying UML and Patterns Second Edition by Craig Larman, Pearson Education.
R3. Design Patterns: Elements of Reusable Object Oriented Software, Erich Gamma, Pearson

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Track I- Regular

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Final Year B. Tech (Department of Information Technology)
Academic Year – 2022-2023 Semester -VIII
[IT4105]: Soft Computing

Teaching Scheme:	**Credits:**	**Examination Scheme:**
TH: 03 Hours/Week	TH:03	In Sem. Evaluation : 15 Marks Mid Sem. Exam : 25 Marks End Sem. Exam : 60 Marks

Course Prerequisites :

1. Linear Algebra and Calculus.
2. Probability Theory.

Course Objectives:

- Identifying Soft computing techniques and their roles in problem solving.
- Generate an ability to build neural networks for solving real life problems.
- Conceptualize fuzzy logic and its implementation for various real world applications.
- Apply evolutionary algorithms and Fuzzy logic to solve the problems.
- Design soft computing systems by hybridizing various other techniques.

Course Outcomes: After successful completion of the course, students will able to-

CO1: Identify problems of interdisciplinary nature.
CO2: State an alternate solution, which may offer more adaptability, resilience and optimization.
CO3: Describe knowledge of soft computing domain and neural network architectures.
CO4: Describe and apply fuzzy logic and fuzzy systems.
CO5: Describe and apply different genetic algorithms.
CO6: Discuss advances in soft computing.

Course Contents

UNIT-I	**INTRODUCTION**	**07 Hours**

Introduction, soft computing vs. hard computing, various types of soft computing techniques, and applications of soft computing. Soft Computing Characteristics and Problem Solving– Strengths and Weaknesses, Constitutes of Soft Computing: Neural Computing, Fuzzy Logic and Computing, Evolutionary Computing and Genetic Algorithms, Probabilistic Reasoning.

UNIT-II	**BASICS OF NEURAL NETWORKS**	**07 Hours**

Fundamentals: Biological Neurons and Model of Artificial Neuron. Neural Network Architectures: Single Layer Network, Multi-Layer Feed Forward Neural Networks, and Feedback Networks. Perceptron Model and Learning in Perceptron, Limitation of Learning in Perceptron, Back Propagation learning in Multilayer FFNN. Performance Issues of EBP algorithm for MLFFNN.

UNIT-III	**NEURAL NETWORK ARCHITECTURES**	**07 Hours**

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Complex Architectures Learning: Competitive Learning-Self Organizing Maps, Hebbian Learning-Hopfield Networks, Boltzmann Machines, Adaptive Resonance Theory (ART) Networks, Bayesian Neural Networks, Deep Learning Architecture of Neural Networks, Applications of Neural Networks.		
UNIT-IV	**FUZZY LOGIC AND FUZZY SYSTEMS**	**07 Hours**
Concept, Fuzzy Logic, Fuzzy Sets and Operations, Fuzzy Relations, Fuzzy Arithmetic and Fuzzy Measures. Fuzzy to Crisp Conversions: Lambda Cuts for fuzzy sets, Fuzzy Relations, Defuzzification Methods. Mamdani Fuzzy Models – Sugeno Fuzzy Models, Applications of Fuzzy Modeling for Decision Making.		
UNIT-V	**GENETIC ALGORITHMS**	**07 Hours**
Introduction, genetic algorithms, procedures of genetic algorithms, the working of genetic algorithms, the logic behind genetic algorithms, evolutionary programming, the working of evolutionary programming, genetic-algorithm based machine learning classifier system		
UNIT-VI	**ADVANCES IN SOFT COMPUTING**	**07 Hours**
Soft Computing Paradigms and Hybrid Approaches. Neuro-Fuzzy modeling, Simplified Fuzzy ARTMAP, Ant colony optimization (ACO): development of the ant colony systems, application of ant colony intelligence, the working of ant colony systems. Particle Swarm intelligent systems, engineering applications of PSIS and future research.		

Text Books:

T1. S. N. Sivanandam, S. N. Deepa, Principles of Soft Computing, Wiley publications,2nd Edition, ISBN: 9788126527410.

T2. J. S. R. Jang, C. T. Sun, E. Mizutani, Neuro-Fuzzy and Soft Computing- A computational approach to Learning and Machine Intelligence, PHI,1st Edition, ISBN:978-8131792469.

T3. N.P.Padhy, "Artificial Intelligence and Intelligent Systems", Oxford

Reference Books:

R1. David E. Goldberg, Genetic Algorithms, Pearson Education, 2nd Edition, ISBN: 9788120322431, ISBN: 9780201157673.

R2. Satish Kumar, Neural Networks - A Classroom Approach, Tata McGraw Hill,2nd Edition, ISBN:1259006166.

R3. Timothy J. Ross, Fuzzy Logic with Engineering Applications, Wiley India, 3rd Edition, ISBN: 9788126531264.

R4. Samir Roy, Udit Chakroborthy,Introduction to soft computing - neuro-fuzzy and genetic algorithm ,Person Education, 1st Edition

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Final Year B. Tech (Department of Information Technology)
Academic Year – 2022-2023 Semester -VIII
[IT4106]: Finance and Management Information Systems

Teaching Scheme:	**Credits:**	**Examination Scheme:**
TH: 03 Hours/Week	TH:03	In Sem. Evaluation : 15 Marks Mid Sem. Exam : 25 Marks End Sem. Exam : 60 Marks

Course Objectives:

- To introduce basic concepts of finance to an Engineer.
- To understand basic structure of balance sheet.
- To understand and implement finance management strategies with risk analysis.
- To understand concepts of management of information systems.
- To understand MIS issues and functional areas.

Course Outcomes: After successful completion of the course, students will able to-

CO1: Understand basic concepts of finance to any firm.
CO2: Apply to prepare balance sheet with predefined structure.
CO3: Analysis financial management techniques with risk mitigation.
CO4: Understand role of MIS and it's challenges.
CO5: Apply information management for quality work.
CO6: Evaluate MIS principles to the various functional areas of a firm.

Course Contents

UNIT-I	**Introduction to Finance**	**07 Hours**

Conceptual Framework of Accounting: Users of Financial Statements; Capital of a Firm; Structure of Business Firms; Objectives of Corporate Financial Reporting; Components of Financial Statements; Accounting Conventions; Qualitative Characteristics of Financial Statements; True and Fair View; and Accounting Policy and Accounting Standards; Accounting Standards Disclosure of Accounting Policies. Accounting Records and Systems: (Journal, Cash Book, General Ledger, Trial Balance) and Bank Reconciliation Statement.

UNIT-II	**Balance Sheet**	**07 Hours**

Accounting Equation; Balance Sheet Structure; Assets; Current Assets; Non-Current Assets; Classification of Assets; Liabilities; Current Liabilities; Non-Current Liabilities; Secured and Unsecured Liabilities; Classification of Liabilities; Accounting Standards Contingencies and Events Occurring after the Balance Sheet Date.

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Structure of Profit and Loss Account: Nature of Profit and Loss Account; Expenditure and Expenses; Income; Accrual Basis of Accounting; Structure of Profit and Loss Account; Extraordinary Items; Prior-Period Items; Accounting Standards; Net Profit or Loss for the period, prior period items and changes in Accounting Policies. Cash Flow Statements: Preparation of Cash Flow Statement; Presentation of Cash Flow Statement; Operating Activities; Investing Activities; Financing Activities; Foreign Currency Cash Flows; and Analysis; Accounting Standards Cash Flow Statement.		
UNIT-III	**Financial Management**	**07 Hours**
An Overview Finance and Related Disciplines; Scope of Financial Management; Objectives of Financial Management; Primary Objective of Corporate Management; Agency Problem; Organization of Finance Function; and Emerging role of Finance Managers in India. Time Value of Money Rationale; Techniques; Practical Applications of Compounding; and Present Value Techniques, Risk and Return Conceptual Framework of Risk and Return: Type of Risks; Risk and Return of a Single Asset; Risk and Return of Portfolio (only two asset portfolio); Portfolio Selection; and Capital Asset Pricing Model (CAPM).		
UNIT-IV	**Introduction to Management Information Systems**	**07 Hours**
Information Systems – Information systems and their role in Business systems, changing role of information systems, users of information systems; Introduction, Concept, evolution and meaning of MIS; Information system for competitive advantage; Systems approach to problem solving; Challenges in the development of MIS, MIS function in an organization. Types of information systems – transaction processing systems, MIS decision support systems, executive support system; Enterprise Resource Planning (ERP) system, Business expert system.		
UNIT-V	**Information and Managerial Effectiveness**	**07 Hours**
Information and Managerial Effectiveness, Information as a corporate resource, pervasiveness of information, types of information – operational, tactical and strategic; Levels of management and information needs of management; Process of generation of information; Quality of information; information systems for finance, marketing, manufacturing, research and development and human resource areas.		
UNIT-VI	**MIS for Functional Areas and Issues and New Trends**	**07 Hours**
Information System for Functional Areas – Information for Financial – Marketing Inventory Control – Production and HR Functions, Security Issues Relating to Information Systems, threats to information systems, Vulnerability, risk and control measures. Cloud computing, Big data, CRM technology for Business, Data ware housing and artificial intelligence, Near field Communication, Super Beam (Only concepts)		
Text Books:		

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T1. Ashish K. Bhattacharya : Financial Accounting for Business Managers : Prentice-Hall of India Pvt. Ltd. : Year of Publication 2006
T2. R. Narayanaswamy: Financial Accounting: A Managerial Perspective: Prentice-Hall of India Pvt. Ltd.: Year of Publication 2002 3. Robert N. Anthony, David F. Hawki
T3. Khan, M.Y & Jain, P.K.: Financial Management; Tata McGraw Hill, New Delhi, 2008. 2
T4. Management Information System, 10th Edition, Loudon & Loudon, EEE
T5. Management Information Systems by Jaiswal and Mittal, Oxford University Press

Reference Books:

R1. Khan, M.Y & Jain, P.K.: Financial Management; Tata McGraw Hill, New Delhi, 2008.
R2. Chandra, Prasana: Financial Management; Tata McGraw Hill, New Delhi, 2008.
R3. Brealey and Meyers: Principles of Corporate Finance: Tata McGraw Hill, New Delhi, 2008
R4. Management Information Systems, 2nd Edition, David & Olsen, TMH
R5. Management Information Systems, 2nd Edition, D.P Goyal, Mcmillan India Ltd.
R6. Management Information Systems by C.S.V.Murthy

Dr. N. M. Ranjan
BoS Chairman

Dr. Ram Joshi
Dean of Academics

J.S.P.M.'s Rajarshi Shahu College of Engineering Pune University I.D. No. PU/PN 'Engg./ 173/(2001) Tathawade, Pune-33.

Dr. Rakesh K. Jain
Director

[IT4107]: Industry-Sponsored Subject- Data Management, Protection, and Governance

Teaching Scheme:	Credit	Examination Scheme:
TH: - 03 Hours/Week	TH: 03	In Sem. Evaluation: 15 Marks Mid Sem. Exam : 25 Marks End Sem. Exam : 60 Marks

Course Prerequisites : N/A

Course Objective:

- Get acquainted with the high-level phases of data life cycle management.
- Acquire knowledge about the various aspects of data storage, data availability, data protection.
- Gain exposure to various solutions/reference architectures for various use-cases.
- Understand the technical capabilities and business benefits of data protection

Course Outcome:

After successful completion of the course, students will able to:

CO1: Explain the data management world, challenges and best practices.
CO2: Compare various concepts and technologies for enabling data storage and high availability.
CO3: Explain the various concepts related to data protection.
CO4: Illustrate various types of data threats and approaches to ensure data center security.
CO5: Outline different standards for compliance and governance of data.
CO6: Illustrate various approaches for designing data intensive enterprise applications and industry standard solutions in data management.

Course Contents

UNIT-I	Introduction to data life cycle management (DLM)	04 Hours

Goals of data life cycle management, Challenges involved-Volume of data source-Ubiquity of data location-User demand for access, Stages of data life cycle-creation, storage, usage, archival, destruction, Risks involved without DLM, benefits, best practices

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UNIT-II	Data storage and data availability Storage technology	08 Hours
Storage technology-Hard Disk Device (HDD), Solid State Devices (SSD), memory devices-Data access-block, files, object-Data center End to End View-overview of complete stack including storage, network, host, cluster, applications, virtual machines, cloud storage-Storage virtualization technologies-RAID level, storage pooling, storage provisioning-Advance pic in storage virtualization-storage providing thin provisioning-Could storage-13-glacier, Storage tiering, High Availability-introduction to high availability-clustering failover, parallel access, Disaster Recovery-Need of disaster recovery-Building Blocks,global cluster, wide-area-connector(WAC), heartbeat-Split Brain - problem and solutions-Preparing for DR- firedrill		
UNIT-III	**Introduction to data protection**	**08 Hours**
Introduction-Need for data protection-basic of backup/restore, Snapshots for data protection, copy data management (cloning, DevOps)-De duplication-Replication-Long Term Retention-Archival, Design considerations-System recovery-Solution architecture- Backup/Archival-media considerations and management (tapes, disks, cloud)-challenges with new edge technology (cloud, containers)		
UNIT-IV	**Data Threats and Data center security**	**06 Hours**
Type of Threats-Denial of Service (DoS), man in the middle attacks-Unintentional data loss Repudiation-Malicious attacks to steal data, Snapshots Understanding, Identification and Threat modelling tools, Introduction to Ransomware, Security-De duplication-Authorization and authentication access control, Transport Layer ecurity (TLS), key management, security in cloud- Design and architecture considerations for security		
UNIT-V	**Data regulation, compliance and governance**	**04 Hours**
Regulations requirements and Privacy Regulations-General Data Protection Regulation (GDPR)-The Health Insurance Portability and Privacy Act of 1996 (HIPPA)-PII (Personal identity Information), Snapshots Understanding, Identification and Threat modeling tools, Information Governance, Security-Auditing-Legal Hold-Data classification and tagging (Natural Language Processing)		
UNIT-VI	**Applications uninterrupted**	**06 Hours**
Understand data management aspects of traditional and new edge applications, Reference architecture/best practices-Transactional Databases (Oracle, MySQL, DB2)-NoSQL Databases (MongoDB, Cassandra)-Distributed applications (micro service architectures)-Cloud applications-Platform as Service (PaaS) Software as Service (SaaS)-Kubernetes-Multi-Tiered applications-ETL workloads-Data analytics (AU/ML)		

Text Books:

T1. Storage Networks: The complete Reference. Robert Spalding

T2. Vic (J.R.) Winkler, "Securing The Cloud: Cloud Computing Security Techniques and (Syngress/Elsevier)-978-1-59749-592-9

T3. TBD-online reference for each topic.

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Reference Books:

R1. Designing Data-Intensive Applications (O'Reilly, Martin Kleppmann).

R2.TBD: provide more online material details and books (This can include some publicly available white-paper, solution guides etc.)

Online reference material:

https://www.enterprisestorageforum.com/storage-hardware/storage-virtualization.html
https://searchstorage.techtarget.com/definition/data-life-cycle management/
https://www.hitechnectar.com/blogs/three-goals-data-lifecycle-management/
https://www.bmc.com/blogs/data-lifecycle-management/
https://www.dataworks.le/5-stages-in-the-data-management-lifecycle-process/
https://medium.com/jagoanhosting/what-is-data-lifecycle-management-and-what-phases would-it pass-through-94dbd207ff54
https://www.spirion.com/data-lifecycle-management/
https://www.bloomberg.com/professional/blog/7-phases-of-a-data-life-cycle/
https://www.datacore.com/storage-virtualization/
https://www.veritas.com/content/dam/Veritas/docs/solution-overviews/V0907 SB InfoScale Software-Defined-Infrastructure.pdf

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Final Year B. Tech (Department of Information Technology)
Academic Year – 2022-2023 Semester -VIII

[IT4108]: IT Lab-Track-I

Teaching Scheme:	**Credits:**	**Examination Scheme:**
PR: 02 Hours/Week	PR: 01	Laboratory Exam: 50 Marks

Course Prerequisites: Advanced Python Programming

Course Objectives:

1. Generate an ability to build neural networks for solving real life problems.
2. Conceptualize fuzzy logic and its implementation for various real world applications.
3. Apply evolutionary algorithms and Fuzzy logic to solve the problems.
4. To understand the financial issues and challenges in business.
5. To prepare the finance budget sheets and other relevant documents.
6. To understand the issues and challenges for the MIS system for a business firm.

Course Outcomes: After successful completion of the course, students will able to -

CO1: Implement and apply knowledge of soft computing domain and neural network architectures.
CO2: Implement fuzzy operations.
CO3: Implement genetic algorithm
CO4: Plan finance by considering issues and challenges for a business firm.
CO5: Apply MIS concepts to a business firm.
CO6: Apply MIS to enhance the existing system for a business.

Course Contents

Part 1 – Soft Computing

1. Create a perceptron with appropriate number of inputs and outputs. Train it using fixed increment learning algorithm until no change in weights is required. Output the final weights
2. Write a program to implement artificial neural network with and without back propagation.
3. Implement Union, Intersection, Complement and Difference operations on fuzzy sets. Also create fuzzy relation by Cartesian product of any two fuzzy sets and perform max-min composition on any two fuzzy relations.

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4. Implement travelling sales person problem (TSP) using genetic algorithms.

Finance and MIS (Any THREE)

Case Study1: Mahindra and Mahindra Limited (M&M) financial crises and statements

The objectives are to analyze:

- Variation in the operational performance and financial position of M&M using Horizontal Analysis.
- Variation in the composition of expenses, assets, liabilities of M&M using Common size analysis.
- The operating performance of M&M using profitability ratios.
- The efficiency of asset management of M&M using turnover ratios.
- The long-term and short-term solvency of M&M using liquidity ratios.

Case Study2: Finance insights of TCS

The objectives are to analyze:

- To understand financial statements of an information technology (IT) company.
- To analyze and interpret the financial ratios of an IT company.
- To analyze and interpret the common size and common base statements of an IT company.
- To understand the various challenges in doing ratio analysis for an IT company

Case Study3: A Restaurant Management System

The objectives are to analyze:

- In the light of the system, the decisions to be made in the area of strategic planning, managerial control and operational control. What information would you require to make such decisions?
- To make the system a more complete MIS rather than just doing transactions processing.
- The probable effects that making the system more formal would have on the customers and the management.

Case Study4: Wal-Mart Stores

The objectives are to analysis:

- In the light of the system, the decisions to be made in the area of strategic planning, managerial control and operational control. What information would you require to make such decisions?
- To make the system a more complete MIS rather than just doing transactions processing.
- The probable effects that making the system more formal would have on the customers and the management.

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Text Books:

T1. S. N. Sivanandam, S. N. Deepa,Principles of Soft Computing,Wiley publications,2nd Edition, ISBN: 9788126527410.

T2. J. S. R. Jang, C. T. Sun, E. Mizutani, Neuro-Fuzzy and Soft Computing- A computational approach to Learning and Machine Intelligence, PHI,1st Edition, ISBN:978-8131792469.

T3. Management Information System, 10th Edition, Loudon & Lo udon, EEE

T4. Management Information Systems by Jaiswal and Mittal, Oxford University Press

Reference Books:

R1. David E. Goldberg, Genetic Algorithms, Pearson Education, 2nd Edition, ISBN: 9788120322431, ISBN: 9780201157673.

R2. Satish Kumar, Neural Networks - A Classroom Approach, Tata McGraw Hill,2nd Edition, ISBN:1259006166.

R3. Timothy J. Ross, Fuzzy Logic with Engineering Applications, Wiley India, 3rd Edition, ISBN: 9788126531264.

R4. Khan, M.Y & Jain, P.K.: Financial Management; Tata McGraw Hill, New Delhi, 2008.

R5. Chandra, Prasana: Financial Management; Tata McGraw Hill, New Delhi, 2008.

R6. Brealey and Meyers: Principles of Corporate Finance: Tata McGraw Hill, New Delhi, 2008

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Final Year B. Tech (Information Technology Engineering)
Academic Year – 2022-2023 Semester -VIII
[IT4109]: Project Phase II

Teaching Scheme:	Credits:	Examination Scheme:
PR: 16 Hours/Week	PR:08	Term Work : 150 Marks Laboratory Exam: 100 Marks

Course Prerequisites:

1. BE-Project Phase I
2. Project Based Seminar.

Course Objectives:

- To enable the student to extend further the investigative study taken up under Project stage 1, either fully theoretical/practical or involving both theoretical and practical work, under the guidance of a Supervisor from the Department alone or jointly with a Supervisor drawn from R&D laboratory/Industry.
- To expose students to product development cycle using industrial experience, use of state of art technologies.
- To encourage and expose students for participation in National/International paper presentation activities and funding agency for sponsored projects.
- To Expose to Learning and knowledge access techniques using Conferences, Journal papers and anticipation in research activities.
- To evaluate the various validation and verification methods.
- To analyze professional issues, including ethical, legal and security issues, related to computing projects.

Course Outcomes: After successful completion of the course, students will able to

CO1: Apply hands on experience using recent technology to develop a project.
CO2: Apply different software testing techniques on project module
CO3: Analyze the experimental results and validate.
CO4: Write project reports.
CO5: Design and develop solution of a problem fulfilling all objectives.

Course Contents

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This is a culmination of four years of learning into Practical. This course is essential for Graduate Engineers to practice the successful management of a software development project. The course emphasizes on project life cycle phases requirement engineering, system analysis and system design and gives them the exposure to research in any area of their interest. A further goal is for students to increase personal awareness of the importance of developing strategies for themselves and It is a way of increasing the student's maturity and preparing him/her for their future career. The students carry out cutting edge projects with a flexibility to balance between research- and application-oriented works as per their interest. The program enables the students to find opportunities for higher studies in top ranking universities abroad, and to find jobs in dream companies.

The Project Work can lead to:

a. Novice algorithm development
b. Optimization of existing system/method
c. New state of the art application
d. Some incremental work in any existing field of their choice

The project requires the students to conceive, design, implement and operate a mechanism (the design problem). The mechanism may be entirely of the student's own design, or it may incorporate off-the-shelf parts. If the mechanism incorporates off-the-shelf parts, the students must perform appropriate analysis to show that the parts are suitable for their intended purpose in the mechanism.

Review 3:

- Review 3 should be based on Implementation (50% implementation expected)
- The project must have an experimental component. Students must implement and operate an appropriate experiment as part of the project. The experiment might be to collect data about some aspect of the design (i.e., to verify that the design will work as expected). Alternatively, the experiment could be to verify that the final mechanism performs as expected.

Review 4:

- Complete Project and Testing
- All the groups should try to overcome all the lacunas identified by the external examiner during Project Phase I exam.
- The Student Project Group needs to actively participate in the presentation. The panel of examiners will evaluate the candidate's performance based on presentation skills, questions based on the Project Work, understanding of the Project, analysis, design and output of the project.
- The outcome of the project should be tangible in terms of paper publication/patent/prototype/copyright.

The group will submit following at the end of semester II.

1. The Workable project.

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2. Project report (in Latex/Lyx/latest Word) in the form of bound journal complete in all respect – 1 copy for the Institute, 1 copy for guide and 1 copy for each student in the group for certification.

The project report contains the details.

1. Problem definition.
2. Requirement specification.
3. System design details (UML diagrams).
4. System implementation – code documentation – dataflow diagrams/ algorithm, protocols used.
5. Test result and procedure – test report as per ATP.
6. Conclusions.
7. Appendix
    a. Tools used
    b. References
    c. Papers published/certificates
    d. Plagiarism Report of paper and project report from any open source tool.

One paper should be published in reputed International conference/International journal.

Term Work:

- The term work will consist of project report and presentation prepared by the student on the project allotted to them.
- Assessment Scheme:
    5. Review 3: 50 marks
    6. Review 4: 50 marks

Lab Exam:

- Lab exam will consist of demonstration of the project and presentation of it by all team members.
- Assessment Scheme:
    1. Development of Prototype/ Model: 40 marks
    2. Innovativeness and intellectual input:40 marks
    3. evaluation of literature review: 20 marks
    4. Individual contribution: 20 marks
    5. Usage of Modern Tool/ Technology and experimental competency: 20 marks
    6. Presentation of the Project Work: 20 marks
    7. Results and analysis: 20 marks
    8. Quality Publication and Project Report: 20 marks

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Track II - Industry Internship

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Final Year B. Tech (Department of Information Technology)
Academic Year – 2022-2023 Semester –VIII
[IT4110]: Industry Internship

Teaching Scheme:	Credits:	Examination Scheme:
TH: --N/A	10	Term Work : 150 Marks
PR: --20 Hours/Week		Oral Exam : 200 Marks

Course Objectives:

- To provide opportunities to learn, understand and gain the real time skills required.
- To develop work competencies and professional ethics.
- To expose the aspirants as future entrepreneurs or employers.
- To acquire knowledge of modern tools and recent technologies used in industries.

Course Outcomes: After successful completion of the course, students will able-

CO1: Apply knowledge and skills gained in the program to real-world challenges.

CO2: Explore ideas to improve work effectiveness and efficiency by analyzing challenges in the work environment.

CO3: Adapt work culture and professional ethics required to build career successfully.

CO4: Understand workplace dynamics, professional expectations and apply the same in the respective field/discipline

CO5: Assess the internship experience in terms of personal, professional and career needs

Course Contents

Introduction

The important goal of the internship is to provide an opportunity for the students to gain their knowledge and sharpen their real-time skills, which will help to nurture their employability skills. Essential idea is to expose industry aspirants to the industrial environment, which cannot be imitated in classroom teaching. Internships are educational and career development opportunities, providing practical experience in a respective field or discipline.

The industry internship program not only helps students to get familiar with an industry work culture but also benefits, corporate by discovering future business leaders.

An industry internship may be compensated, non-compensated or some time may be paid. The internship has to be meaningful and mutually beneficial to the intern and the organization.

The following guidelines are designed to give academic credit to those who have successfully completed their industry internship in the respective domain.

General Guidelines:

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- **Allocation of faculty supervisor:** Department / Internship coordinator should allocate the faculty mentor/supervisor to the students for the monitoring the internship activities and evaluation as per guidelines.
- **Identify Industry for Internship:** The activity of finding industry/organization for the internship of adequate duration and upto befitting level shall be done by aspirants/students in the consultation with their faculty mentor/supervisor. Students have choice to choose internship at industry/Organization/ Govt. Organization/NGO/MSME etc.
- **Duration:**
- **Students Diary/ Daily log:** It is mandatory to maintain Internship diary/ workbook. The main objective of internship diary is to nurture the habit of documentation. Students should record day-to-day observations, any distinguishable information (if any), suggestions from the industry mentor. Internship diary can contain drawings / sketches related to the projects/ assignments handled. The internship diary/workbook should be signed periodically by the industry mentor and/or faculty supervisor/mentor.
- **Internship Report:** After completion of industry internship, the students should prepare the internship report (as per guide lines) and submit the same, along with internship diary/ workbook to the faculty supervisor. Students have to prepare and present the power point presentation for the activities carried out during internship period to the committee appointed by the department and only upon approval by the committee, the students can proceed further to prepare and submit the hard/soft copy of final internship report.

Students may use following broad format to prepare their presentation but not limited to...

- Comprehensive format for PPT presentation:
  1. Cover page including student's information (for eg: Name of student, Roll number) along with faculty supervisor name.
  2. Introduction about an Industry/Organization/Company.
  3. Technology used / Tools handled or used.
  4. Work environment / Schedule
  5. Challenges faced
  6. Things Learned
  7. Internship completion certificate

Students may use following broad format to prepare the internship final report but not limited to...

- Comprehensive format for Industry Internship Report:
  1. Cover page including student's information (for eg: Name of student, Roll number) along with faculty supervisor name.
  2. Internship completion certificate from Industry / Organization.
  3. Acknowledgment
  4. Synopsis
  5. Table of contents
  6. Chapter 1 – Profile of the organization

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7. Chapter 2 – Activities of the department
8. Chapter 3 – Tasks Performed
9. Chapter 4 – Reflections (needs to highlight specific technical skill acquired during Internship)
10. Chapter 5 - Conclusion

- **Evaluation Process:**

Evaluation of the internships shall be through the committee constituted by the department. Every student will be required to give oral PPT presentation to department committee and submit a summer internship report to the faculty supervisor/mentor along with duly signed internship diary/workbook. The evaluation will be based on the following criteria:

- Quality of content presented
- Effectiveness of presentation
- Depth of knowledge and skills gained
- Attendance record, Internship diary / Workbook shall be analyzed along with the Internship Report.
- Feedback from the industry mentor.
- Regularity and Punctuality.

Internship diary / Workbook may be evaluated on the basis of following points:

- Sufficiency and standard of information
- Prompt and appropriate documented entries
- Thought process and recording techniques/tools used
- Organization and representation of information.

Reference:

- https://aicte-india.org/sites/default/files/AICTE%20Internship%20Policy.pdf
- https://www.honorsociety.org/articles?category=internships
- https://codegnan.com/blog/benefits-of-internships-and-importance

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Annexure I

Internship Application Form

To,
The Head of Department,
Department of Information Technology,
JSPM's RSCOE,
Pune-33.

Subject: Internship application / consent form.

Respected Sir/Madam,

I undersigned Mr./Ms. _____ from class _____ Div_____ Roll No._____
According to our curriculum, I am due for an internship for this Academic year. I am therefore, writing to request permission for the same.
I recently got selected for industry internship program at _____ (Name of Industry/ Organization). I will work hard, be regular and sincere during this period of internship starting from _____to _____. I will follow all the timelines, rules and regulations of the industry/ organization.
I will submit an individual internship report as well as internship diary/ workbook at the time of evaluation. I would appreciate it if you grant me the permission.
I look forward to hearing from you.

Thank You,

Yours Faithfully,

(Signature of Student)
Roll Number:
Name of Student:

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Annexure II

Internship Deputation Letter

To,

_____
_____
_____

Subject: Internship deputation letter.

Respected Sir/Madam,

We are very much glad to depute Mr./Ms. _____from class _____Div____Roll No._____, bonafide student of our college for the industry internship program at your esteemed organization for the period starting from _____till _____.

He / She is expected to performed all the task assigned to him/her with utmost priority and honesty. He/She will have to maintain an internship diary of his /her daily activity and at the end it is expected to submit the same along with an internship report duly signed by his/her industry mentor to the department.

I thank you for giving this opportunity to our student

Thank You,

Name and Sign of Faculty supervisor / Mentor

Head of the Department

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Dr. Rakesh K. Jain
Director

Annexure III

Evaluation Format for Oral Examination
(To be filled by Faculty Supervisor/ Mentor during final evaluation)

Name of the Organization: _____

Sr. No.	Roll No.	Name of the Student	Internship Project / Assignment Title	Evaluation (OR)					Total Marks (50 Marks)
				Knowledge Gained (10)	Objective Achieved (10)	Technology / Tools Used (10)	Presentation (10)	Viva Voce (10)	

1.
2.
3.

Name and Sign of Committee Member

Head of the Department

Dr. N. M. Ranjan
BoS Chairman

Dr. Ram Joshi
Dean of Academics

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Dr. Rakesh K. Jain
Director

Annexure IV

Feedback Form for Industry/Organization

Kindly evaluate the student on below personal and technical skills at work (1 for below Average, 2 for Average, 3 for Good, 4 for Very Good and 5 for Excellent)

Supervisor Information					
Name of the Industry Mentor :			**Mobile No.:**		
Name of the organization :					
Email Address :					
About the Intern					
1. Please evaluate the intern on the following items by checking the appropriate rating	1	2	3	4	5
Arrived to work on time					
Behaved in a professional manner					
Effectively performed assignments					
Oral Communication Skill					
Written Communication Skill					
Team Work					
Knowledge					
Societal Understanding					
Reliability and dependability					
Attention to accuracy and details					
2. Has the work done by the students been of value to the Company?	YES		NO		
3. Would you like to take our students again in next year?	YES		NO		
	If "No" Any Specific reason: (Please Mention)				

Signature:
Name of Industry Mentor:

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Track III – Entrepreneurship

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Final Year B. Tech (Department of Information Technology)
Academic Year – 2022-2023 Semester –VIII
[IT4111]: Business Modeling

Teaching Scheme:	**Credits:**	**Examination Scheme:**
TH: 03 Hours/Week	TH:03	In Sem. Evaluation : 15 Marks Mid Sem. Exam : 25 Marks End Sem. Exam : 60 Marks

Course Prerequisites: Business Analytics and Intelligence

Course Objectives:

- Get awareness about various domains in Business Management.
- Understand concept of Quality Management, Financial Management
- Understand the functions and responsibilities of managers.
- Enable them to analyze and understand the environment of the organization.
- Develop cognizance of the importance of management principles.

Course Outcomes: After successful completion of the course, students will able to-

CO1: Describe the business process.
CO2: Analyze the feasibility of a company to grow a business.
CO3: Apply the principles of Business Management.
CO4: Analyze the Business Economics.
CO5: Evaluate the financial accounting for a business.
CO6: Analyze Business statistics.

Course Contents

UNIT-I	INTRODUCTION TO BUSINESS PROCESS	07 Hours

Introduction to business: Meaning, nature, scope & objectives of business; essentials of a successful business & businessman, business process and types, Classification of industries, nature of commerce; components of commerce, Forms of business organization: Meaning & characteristics of an ideal form of business organization. Sole Trader: meaning; features; merits and demerits. Partnership: meaning; characteristics; kinds of partners; partnership deed; advantages and disadvantages of partnership form of business organization; dissolution of partnership firms

UNIT-II	JOINT STOCK AND PROMOTION OF A COMPANY	07 Hours

Joint Stock Company: Meaning and definition, characteristics, kinds of companies; distinction between private and public company; merits and demerits of joint stock company, Promotion of a company: Introduction, stages of promotion, promoters; memorandum of association: alteration of memorandum

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of association, articles of association: alteration of articles of association; distinction between memorandum and articles of association; prospectus and its contents		
UNIT-III	**PRINCIPLES OF BUSINESS MANAGEMENT**	**07 Hours**
Introduction: Management Concept; Managerial Roles; Functions of managers; Levels of management; Managerial skills; Management process; Development of management thoughts: Taylor's scientific management, Fayol's Modern approach, Decision Making: Process; Group decision making; Rationality in decision making.		
UNIT-IV	**BUSINESS ECONOMICS**	**07 Hours**
Introduction to Economics: Basic Concept & Utility Analysis, analysis of Consumer Behavior & Consumer Equilibrium: The Demand and Supply Analysis, Elasticity of Demand, Production and Market Analysis: Production Function, law of returns, Cost Analysis Short Run and Long Run, Pricing under Perfect Competition, Monopolistic Competition, and Monopoly		
UNIT-V	**FINANCIAL ACCOUNTING**	**07 Hours**
Introduction to Accounting: Book Keeping- Meaning of Accounting; Sub fields of Accounting; Advantages & disadvantages of accounting system, Importance of Accounting; Accounting Principle: Concepts, assumptions, conventions; Accounting Cycle, Final Accounts: Preparation of Trading and Profit and Loss Account and Balance Sheet without adjustment & with adjustment		
UNIT-VI	**BUSINESS STATISTICS**	**07 Hours**
Introduction: Meaning and definitions of statistics; importance of statistics in business; limitations of statistics; classification and tabulation of Data; graphic and diagrammatic presentation of Data. Correlation Analysis: Concept and Importance of Correlation; types of correlation; Methods of Studying Correlation; rank correlation		
Text Books: **T1:** Business Organization & Management: D P Jain (Vrinda) **T2:** Fundamentals of Statistics: S C Gupta (HPH)		
Reference Books: **R1**. Principles of Management: R. K. Sharma & S. K. Gupta (Kalyani) **R2.** Principles of Management: L. M. Prasad (S. Chand & Co.) **R3**. Managerial Economics: Peterson and Lewis (PHI) **R4**. Modern Accountancy: Hanif and Mukherjee Volume I (TMH) **R5**. Financial Accounting: P.C. Tulsian (Pearson) **R6.** Statistics for Management: Lavin & Rubbin (TMH)		

Dr. N. M. Ranjan **BoS Chairman**	**Dr. Ram Joshi** **Dean of Academics**	J.S.P.M.'s Rajarshi Shahu College of Engineering, Pune, University, I.D. No. PU/PN 'Engg./ 173/(2001), Tathawade, Pune-33	**Dr. Rakesh K. Jain** **Director**

Final Year B. Tech (Department of Information Technology)
Academic Year – 2022-2023 Semester –VIII
[IT4112]: IT Track-III Lab

Teaching Scheme:	**Credits:**	**Examination Scheme:**
PR: 02 Hours/Week	PR: 01	Laboratory Exam: 50 Marks

Course Objectives:

1. To understand the financial issues and challenges in business.
2. To prepare the finance budget sheets and other relevant documents.
3. To understand the issues and challenges for the MIS system for a business firm.
4. To apply MIS concepts to solve the issues and challenges in step3.
5. To understand the functions and responsibilities of managers.

Course Outcomes: After successful completion of the course, students will able to -

CO1: Understand finance management concepts for a business firm.
CO2: Plan finance by considering issues and challenges for a business firm.
CO3: Apply MIS concepts to a business firm.
CO4: Analysis MIS principles to enhance the existing system for a business.
CO5: Analyze Business statistics.

PART A
Business Modeling (Any TWO)

Case Study1: OLA/UBER

- Presentation and Report on "Business Modeling of OLA/UBER".

Case Study2: Zomato/ Swiggy

- Presentation and Report on "Business Modeling of Zomato/ Swiggy ".

Case Study3: Online Shopping Portals

- Presentation and Report on "Business Modeling of online shopping portals such as flipkart/ Amazon/ Myntra etc."

Finance and MIS (Any THREE)

Dr. N. M. Ranjan	Dr. Ram Joshi		Dr. Rakesh K. Jain
BoS Chairman	Dean of Academics		Director

Case Study1: Mahindra and Mahindra Limited (M&M) financial crises and statements

The objectives are to analyze:

- Variation in the operational performance and financial position of M&M using Horizontal Analysis.
- Variation in the composition of expenses, assets, liabilities of M&M using Common size analysis.
- The operating performance of M&M using profitability ratios.
- The efficiency of asset management of M&M using turnover ratios.
- The long-term and short-term solvency of M&M using liquidity ratios.

Case Study2: Finance insights of TCS

The objectives are to analyze:

- To understand financial statements of an information technology (IT) company.
- To analyze and interpret the financial ratios of an IT company.
- To analyze and interpret the common size and common base statements of an IT company.
- To understand the various challenges in doing ratio analysis for an IT company

Case Study3: A Restaurant Management System

The objectives are to analyze:

- In the light of the system, the decisions to be made in the area of strategic planning, managerial control and operational control. What information would you require to make such decisions?
- To make the system a more complete MIS rather than just doing transactions processing.
- The probable effects that making the system more formal would have on the customers and the management.

Case Study4: Wal-Mart Stores

The objectives are to analysis:

- In the light of the system, the decisions to be made in the area of strategic planning, managerial control and operational control. What information would you require to make such decisions?
- To make the system a more complete MIS rather than just doing transactions processing.
- The probable effects that making the system more formal would have on the customers and the management.

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Text Books:

T1. Ashish K. Bhattacharya : Financial Accounting for Business Managers : Prentice-Hall of India Pvt. Ltd. : Year of Publication 2006

T2. R. Narayanaswamy: Financial Accounting: A Managerial Perspective: Prentice-Hall of India Pvt. Ltd.: Year of Publication 2002 3. Robert N. Anthony, David F. Hawki

T3. Management Information System, 10th Edition, Loudon & Loudon, EEE

T4. Management Information Systems by Jaiswal and Mittal, Oxford University Press

Reference Books:

R1. Khan, M.Y & Jain, P.K.: Financial Management; Tata McGraw Hill, New Delhi, 2008.

R2. Chandra, Prasana: Financial Management; Tata McGraw Hill, New Delhi, 2008.

R3. Management Information Systems, 2nd Edition, D.P Goyal, Mcmillan India Ltd.

R4. Management Information Systems by C.S.V.Murthy

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Track IV – Higher Studies and Research

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Final Year B. Tech (Department of Information Technology)
Academic Year – 2022-2023 Semester –VIII
[IT4113]: Research Methodology

Teaching Scheme:	**Credits:**	**Examination Scheme:**
TH: 03 Hours/Week	TH:03	In Sem. Evaluation : 15 Marks Mid Sem. Exam : 25 Marks End Sem. Exam : 60 Marks

Course Prerequisites : Basic knowledge of Mathematics

Course Objectives:

- To understand basic concepts of research and its methodologies
- To identify appropriate research topics
- To select and define appropriate research problem and parameters
- To organize and conduct research in a more appropriate manner
- To write a research report and thesis

Course Outcomes: After successful completion of the course, students will able to-

CO1: Define and Identify their research problems
CO2: Interpret and Classify different research problems
CO3: Correlate and Analyze the dataset to be used for research
CO4: Design and Develop a model addressing the research problem
CO5: Write and Rewrite a research report by following research ethics

Course Contents

UNIT-I	**Introduction To Research**	**07 Hours**

Meaning of Research, Objectives of Research, Motivations in Research, types of Research, Research Approaches, Significance of Research, Research Methods v/s Methodology, Research and Scientific Methods, Research Process, Criteria of Good Research.

UNIT-II	**Defining Research Problems**	**07 Hours**

Research Problem concept and need, Identification of Research problem, Defining and Delimiting Research problem, Research questions, Research Hypothesis, Quality of good Hypothesis, Null Hypothesis & Alternative Hypothesis

UNIT-III	**Research Design**	**07 Hours**

Definition, Need, Features of Good Design, Types of Research Design, Basic Principles of Experimental Design, Various methods of Research: Survey, Philosophical, Historical, Experimental, CausalComparative, Genetic, Case Studies.

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UNIT-IV	Data Collection and Sampling	07 Hours
Primary Data collection, Secondary Data collection, Methods of Primary Data collection, Methods of Secondary Data collection, Selection of appropriate methods for Data collection, Statistical Population, Sample, Sampling Frame, Sampling Error, Sample Size,. Characteristics of a good sample. Probability and Non Probability Sampling :Simple Random Sample, Systematic Sample, Stratified Random Sample & Multi-stage sampling.		
UNIT-V	**Report Writing and Tools**	**07 Hours**
Layout of a Research Paper, Journals in Computer Science, Impact factor of Journals, When and where to publish? Available academic Databases for Computer Science Discipline, Bibliography and Citation, Reference Management Tools: Zotero/Mendeley, Software for paper formatting like LaTeX/MS Office, Software for detection of Plagiarism, Abstract and Conclusions		
UNIT-VI	**Research Ethics and IPR**	**07 Hours**
Research ethics and ethical issues, Ethical issues related to research publication, Plagiarism and Self-Plagiarism, Citation and acknowledgement. IPR- intellectual property rights and patent law, Commercialization, Copy right, Royalty, Scholarly publishing		

Text Books:

T1. Garg, B.L., Karadia, R., Agarwal, F. and Agarwal, U.K., 2002. An introduction to Research Methodology, RBSA Publishers.

T2. Kothari, C.R. Research Methodology (Methods and Techniques), New Age Publisher.

Reference Books:

R1. Best and Kahn, Research Methodology, PHI Limited.

R2. Wadehra, B.L. 2000. Law relating to patents, trade marks, copyright designs and geographical indications. Universal Law Publishing.

R3. Sinha, S.C. and Dhiman, A.K., 2002. Research Methodology, Ess Publications.

R4. Trochim, W.M.K., 2005. Research Methods: the concise knowledge base, Atomic Dog Publishing.

R5.Kerlinger, Foundation of Research.

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Final Year B. Tech (Information Technology)
Academic Year – 2022-2023 Semester -VIII
[IT4114]: IT Lab-Track IV

Teaching Scheme:	**Credits:**	**Examination Scheme:**
PR: 02 Hours/Week	PR: 01	Laboratory Exam: 50 Marks

Course Prerequisites: Business Analytics and Intelligence

Course Objectives:

To understand basic concepts of research and its methodologies
To identify appropriate research topics
To select and define appropriate research problem and parameters.
To understand the issues and challenges for the MIS system for a business firm.
To apply MIS concepts to solve the issues and challenges.
To understand the functions and responsibilities of managers.

Course Outcomes: After successful completion of the course, students will able to -

CO1: Define and Identify their research problems
CO2: Interpret and Classify different research problems
CO3: Apply MIS concepts to a business firm.
CO4: Apply MIS to enhance the existing system for a business.
CO5: Analyze Business statistics

Course Contents

PART A
Research Methodology

1. Download at least 5 quality papers from good indexed journals of your domain interest, Read the abstract and conclusions of all these papers and try to understand the significant difference between these two also understand the significance of keywords in research papers.
2. Read the future scope of all these papers and understand the work left out by the current authors. Formulate your own problem statement based on these future scope
3. Download and read more number of papers related to your identified problem and write a literature review as per your understanding in tabular form. (Keep one good paper as a base paper and search other papers mentioned in its bibliography)
4. Write abstract, introduction and conclusions of your own paper, mention all the papers in bibliography which you referred during your research work and cite it properly

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5. Check the plagiarism of your draft, identify good journal/ conference and send your article for review and comments

PART B-Finance and MIS (Any THREE)

Case Study1: Mahindra and Mahindra Limited (M&M) financial crises and statements

The objectives are to analyze:

- Variation in the operational performance and financial position of M&M using Horizontal Analysis.
- Variation in the composition of expenses, assets, liabilities of M&M using Common size analysis.
- The operating performance of M&M using profitability ratios.
- The efficiency of asset management of M&M using turnover ratios.
- The long-term and short-term solvency of M&M using liquidity ratios.

Case Study2: Finance insights of TCS

The objectives are to analyze:

- To understand financial statements of an information technology (IT) company.
- To analyze and interpret the financial ratios of an IT company.
- To analyze and interpret the common size and common base statements of an IT company.
- To understand the various challenges in doing ratio analysis for an IT company

Case Study3: A Restaurant Management System

The objectives are to analyze:

- In the light of the system, the decisions to be made in the area of strategic planning, managerial control and operational control. What information would you require to make such decisions?
- To make the system a more complete MIS rather than just doing transactions processing.
- The probable effects that making the system more formal would have on the customers and the management.

Case Study4: Wal-Mart Stores

The objectives are to analysis:

- In the light of the system, the decisions to be made in the area of strategic planning, managerial control and operational control. What information would you require to make such decisions?
- To make the system a more complete MIS rather than just doing transactions processing.

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- The probable effects that making the system more formal would have on the customers and the management.

Text Books:

T1.S. N. Sivanandam, S. N. Deepa,Principles of Soft Computing,Wiley publications,2nd Edition, ISBN: 9788126527410.

T2.J. S. R. Jang, C. T. Sun, E. Mizutani, Neuro-Fuzzy and Soft Computing- A computational approach to Learning and Machine Intelligence, PHI,1st Edition, ISBN:978-8131792469.

T3. Management Information System, 10th Edition, Loudon & Lo udon, EEE

T4. Management Information Systems by Jaiswal and Mittal, Oxford University Press

Reference Books:

R1. David E. Goldberg, Genetic Algorithms, Pearson Education, 2nd Edition, ISBN: 9788120322431, ISBN: 9780201157673.

R2. Satish Kumar, Neural Networks - A Classroom Approach, Tata McGraw Hill,2nd Edition, ISBN:1259006166.

R3. Timothy J. Ross, Fuzzy Logic with Engineering Applications, Wiley India, 3rd Edition, ISBN: 9788126531264.

R4. Khan, M.Y & Jain, P.K.: Financial Management; Tata McGraw Hill, New Delhi, 2008.

R5. Chandra, Prasana: Financial Management; Tata McGraw Hill, New Delhi, 2008.

R6. Brealey and Meyers: Principles of Corporate Finance: Tata McGraw Hill, New Delhi, 2008

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