



Avinashilingam Institute for Home Science and Higher Education for Women
(Deemed to be University under Category A by MHRD, Estd. u/s 3 of UGC Act 1956)
Re-accredited with A+ Grade by NAAC. Recognised by UGC Under Section 12 B
Coimbatore-641 043, Tamil Nadu, India.

M.Sc Information Technology
(Two year Programme with Practical)

Programme Outcomes

The Graduates will be able to

1. Devise possessed knowledge in advanced concepts and techniques of Information Technology domain.
2. Analysis various research and scientific problems in Information Technology.
3. Design software systems with appropriate consideration as per the Industrial needs.
4. Solve complex realistic problems by applying latest technologies.
5. Employ the contemporary IT tools to all IT related applications effectively.
6. Apply their responsibilities in social and environmental context.
7. Exhibit professional ethics and norms of scientific development in the field of Information Technology.
8. Operate individually and in teamwork.
9. Communicate and present technological information to the audience.
10. Manage the work and finance of a research, application and innovative projects.
11. Practice independent life-long learning.

Programme Specific Outcomes

1. Apply Information Technologyskills with a deep understanding in the areas of Programming languages, Open Source Technologies, Artificial Intelligence and Data Analytics.
2. Devise student to become Specialist in Web Designing, Data Science, Image processing, Cloud Computing, Network security and Internet of Things.
3. Develop as Researcher/Entrepreneur with Creative, Technical and Problem Solving Skills.

Scheme of Instruction & Examination
(For students admitted from 2023 - 2024& onwards)

Students admitted from 2023 - 2024& onwards)									
Part	Subject Code	Name of papers/component	Hours of Instruction/Week		Scheme of Examination				
			Theory	Practical	Duration of Exam	CIA	CE	Total	Credit
First Semester									
I	23MITC01	Mathematical Foundation for Information Technology	4	-	3	40	60	100	4
	23MITC02	Advanced Java Programming	4	-	3	40	60	100	4
	23MITC03	Design and Analysis of Algorithms	4	-	3	40	60	100	4
	23MITC04	Cloud Computing	5	-	3	40	60	100	5
	23MITC05	Artificial Intelligence and Machine Learning	3	2	3	40	60	100	5
	23MITC06	Advanced Java Programming –Practical I	-	6	3	40	60	100	3
II		CSS/Adult Education/Community Engagement and Social Responsibility	2	-	-	-	-	-	-
Second Semester									
I	23MITC07	Internet of Things	4	-	3	40	60	100	5
	23MITC08	Deep Learning	4	-	3	40	60	100	5
	23MITC09	Internet and Web Programming	4	-	3	40	60	100	4
	23MITC10	Open Source Technologies	4	-	3	40	60	100	4
	23MITC11	Web Technologies-Practical II (Open Book)	-	3	3	100	-	100	3
	23MITC12	Open Source –Practical III	-	4	3	40	60	100	3
	23MITC13	Mini Project	1	-	-	100	-	100	2
		Interdisciplinary course	4	-	3	40	60	100	4
II	23MXCSS1/ 23MXAED1/ 23MXCSR1	CSS/Adult Education/Community Engagement and Social Responsibility	2	-	-	-	-	-	2
		Professional Certification	-	-	-	-	-	-	2
Internship during Summer vacation for one month									

Part	Subject Code	Name of papers/component	Hours of Instruction/Week		Scheme of Examination				
			Theory	Practical	Duration of Exam	CIA	CE	Total	Credit
Third Semester									
I	23MITC14	Technical Communication	3	-	3	100	-	100	3
	23MITC15	Big Data Analytics	4	-	3	40	60	100	5
	23MITC16	Essentials of Cyber Security	5	-	3	40	60	100	5
	23MITC17	Digital Image Processing	4	-	3	40	60	100	4
	23MITC18	Data Analytics - Practical IV	-	6	3	40	60	100	3
	23MITC19	Digital Image Processing - Practical V	-	5	3	40	60	100	3
	23MITC20	Software Project Management(Self Study)	1	-	3	40	60	100	4
		Multidisciplinary course	2	-	3	100	-	100	2
II	23MITC21	Internship	-	-	-	100	-	100	2
Fourth Semester									
I	23MITC22	Research Project	-	30	-	100	100	200	8

Other courses to be undergone by the student:

MOOC courses- 2 to 4 Credits

Minimum 98 + 2 Credits to earn the degree

Other Courses offered by the Department

- 1. Interdisciplinary course :** 23MITI01 - Cyber Forensics
23MITI02 - Cyber Security
- 2. Multidisciplinary course :** 23MITM01 - ICT for Learning
- 3. Professional Certificate Course :** 23MITPC1- Data science using Python

Mathematical Foundation for Information Technology

Semester I

23MITC01

Hours of Instruction/week: 4

No of credits: 4

Course Objectives:

1. To learn the concepts of set theory, functions and relations.
2. To understand the formal languages.
3. To acquire the knowledge of finite state automata.
4. To calculate critical path.
5. To get familiar with correlation and regression techniques.

UNIT-I BASIC SET THEORY

Basic Definitions - set operations - Venn Diagrams - Algebraic laws of set theory - Relations - Types of relations - Properties of relations - Functions - Types of functions 12

UNIT-II FORMAL LANGUAGES

Languages and Grammar - Phrase structure Grammar – Types of Phrase structure Grammar - Context Free Languages. 12

UNIT-III FINITE STATE AUTOMATA

Finite state Automata -Deterministic Finite State Automata (DFA)- Non Deterministic Finite state Automata(NFA) - Equivalence of DFA and NFA - Equivalence of NFA and Regular Languages. 12

UNIT-IV PERT and CPM

Introduction - Critical Path analysis-Distinction between PERT and CPM- Applications of Network Techniques-Advantages of Network Techniques –Limitations and difficulties in using network. 12

UNIT-V CORRELATION AND REGRESSION

Karl Pearson's coefficient of correlation - Rank correlationRegression equations - Difference between Correlation and Regression. 12

Total Hours:60

TEXT BOOKS

1. T.Veerarajan, *"Discrete Mathematics with Graph theory and Combinatorics"*, Tata Mcgraw Hill Education Pvt.Ltd, New Delhi, 2010. (Unit I, II & III)
2. KantiSwarup,P.K.Gupta,& Manmohan ,*"An Introduction to Management Science operation research"* sultan chand and sons,2010.(Unit IV)
3. PA. Navanithan ,*"Business Mathematics and Statistics"*, Jai publishers,2008.(Unit V)

REFERENCES

1. G.Balaji, "*Discrete Mathematics*", Balaji Publishers, 2008.(Unit I)
2. Hopcroft and Ullam, "*Introduction to Automata Theory, Languages and Computation*", Narosa Publishing House, Delhi, 2002.
3. RM. Somasundaram, "*Discrete Mathematical Structures*", Prentice Hall of India Pvt.Ltd, New Delhi, 2003

Course Outcomes:

On successful completion of this course, the student will be able to

1. Illustrate simple set relationships in probability, statistics and computer science.
2. List out the operations on formal languages.
3. Understand the algorithm used to turn an NFA in to an equivalent DFA.
4. Apply PERT and CPM in project scheduling problems.
5. Identify the impact of varied factors on business sales and profits using regression analysis.

CO-PO Mapping and Matrix

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PSO 1	PSO 2	PSO 3
CO 1	M	H	-	M	L	-	-	M	-	M	L	L	M	M
CO 2	L	M	-	M	L	-	-	M	-	M	L	L	M	M
CO 3	L	M	-	M	L	-	-	M	-	M	L	L	M	M
CO 4	L	H	-	H	L	-	-	M	M	H	L	L	M	M
CO 5	L	H	-	H	L	L	-	M	M	H	L	L	M	M

Advanced Java Programming

Semester I

23MITC02

Hours of Instruction/week: 4

No of credits: 4

Course Objectives:

1. To recall the features and basic concepts of core java and object oriented programming.
2. To understand about the distributed strategies of Java using RMI and java networking concepts.
3. To apply different events and applet programming.
4. To enumerate the JDBC-ODBC connectivity through servlets.
5. To know about the advanced features of Java such as JSP and Java Beans.

UNIT-I BASIC CONCEPT

12

JAVA – Features and Characters of JAVA - Object-Oriented Programming – Encapsulation – Inheritance – Polymorphism - Overriding– Constants -Variables – Types – Swing features – Difference between Swing and AWT components.

UNIT-II DISTRIBUTED APPLICATION AND NETWORKING

12

Client/Server communication - Overview of the RMI – Advantages of RMI – RMI Architecture – Developing RMI Applications – Parameters in RMI - Java Virtual Machine - Java Serialization - Java Networking.

UNIT-III APPLETS AND EVENTS

12

Applets - HTML applet tags – Order of Applet initialization – Graphics – Mouse Event Handling – Examples of key event handling - The Delegation Event Model – Event class and event listener.

UNIT-IV JDBC AND SERVLETS

12

JDBC Vs ODBC – Types of JDBC Drivers – Basic operations on JDBC. Features of servlets – Servlet lifecycle service – Steps to run the servlet program – Cookies Vs Session – Database Connectivity with JDBC using Servlet.

UNIT-V JSP and EJB

12

Define JSP – Advantages of JSP – JSP tags - Servlet Vs JSP – JSP Syntax Basics – JSP Directories – EJB Benefits – Types of Enterprises Beans – Session Bean with types – Entity Bean – Entity Beans Vs Session Beans – Message Driven Beans.

Total Hours: 60

REFERENCES

1. Professional Java Server Programming, Subrahmanyam Allamaraju and Cedric Bues, Apress, SPD, 2005.
2. Java The Complete Reference, Herbert Schildt, Tata McGraw-Hill, Eighth edition, 2011.

3. Advanced Java for Students, Dr.AshwinMetha and Sarika Shah, The X team, Published by SPD Pvt.Ltd, 2012.
4. Jamie Jaworski, "Java Unleashed", SAMS Techmedia Publications 1999.
5. Jim Keogh," The Complete Reference J2EE", Tata McGraw-Hill Publishing Company Ltd,2002
6. <https://nptel.ac.in/courses/106105084/>
7. <https://www.edureka.co/blog/advanced-java-tutorial>

Course Outcomes:

On successful completion of this course, the student will be able to

1. Gain knowledge and usage of basic programming elements, functions and file handling in Java.
2. Demonstrate the client/server application through java networking.
3. Use the event handling and able to adapt applet programming strategy.
4. Acquire Knowledge about the ODBC-JDBC connectivity, servlets, cookies and sessions.
5. Use the JSP and Java Beans Technology for efficient programming.

CO-PO Mapping and Matrix

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PSO 1	PSO 2	PSO 3
CO 1	M	-	L	L	H	-	-	M	M	M	-	H	M	L
CO 2	H	L	H	M	H	-	M	M	M	H	-	H	M	L
CO 3	H	L	H	M	H	-	-	M	M	H	-	H	M	L
CO 4	H	L	H	M	H	-	-	M	M	H	-	H	M	L
CO 5	H	L	H	M	H	-	-	M	M	H	-	H	M	L

Design and Analysis of Algorithms

Semester I

23MITC03

Hours of Instruction/week: 4

No of credits: 4

Course Objectives:

1. To describe the fundamental techniques to design efficient algorithms and to analyze their running time.
2. To find optimal solution by applying the greedy method.
3. To solve problems using dynamic programming methods.
4. To derive and solve recurrences describing the performance of search and traversal techniques.
5. To explore NP-Hard and NP-Complete problems.

UNIT-I INTRODUCTION

12

Introduction to algorithms, Analyzing algorithms. Divide and Conquer: General Method, Binary Search, Finding the maximum and minimum, Merge sort, Quick sort, Selection sort, Strassen's matrix multiplication.

UNIT-II THE GREEDY METHOD

12

General method, Optimal storage on tapes, Knapsack problem, Job sequencing with deadlines, Optimal merge patterns, Minimum spanning trees, Single source shortest paths.

UNIT-III DYNAMIC PROGRAMMING

12

General method, Multistage graphs, All pairs shortest paths, Optimal binary search trees, 0/1 Knapsack, Travelling salesperson problem, Flow-shop Scheduling.

UNIT-IV BASIC SEARCH AND TRAVERSAL TECHNIQUES

12

Techniques, Code Optimization, AND/OR graphs, Game trees, Red Black trees Back Tracking: General method, 8-queens problem, Sum of subsets, Graph coloring, Hamiltonian cycles, Knapsack problem. Branch and Bound: General method, travelling salesperson problem.

UNIT-V NP-HARD and NP-COMPLETE PROBLEMS

12

Basic concepts: Non deterministic algorithms — The classes NP hard and NP complex, Cook's theorem. NP hard graph problems: Clique Decision Problem — Node cover decision problem — chromatic number decision problem — Directed Hamiltonian cycle — Traveling sales person decision problem. NP-hard scheduling Problems: scheduling identical processors — flow shop scheduling — job shop scheduling; NP-hard code generation problems: code generation with common sub expressions — Implementing parallel assignment instructions, Some simplified NP-hard problems.

TEXT BOOK

Total Hours: 60

1. Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran, "Fundamentals of Computer Algorithms", algotia Publications, 2011.

REFERENCES

1. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, "Introduction to Algorithms", Massachusetts Institute of Technology, MIT Press, III Edition, 2009.
2. Sara Baase, Allen Van Gelder, Computer Algorithms, Pearson education, 2008.
3. Mark Allen Weiss "Data Structures and Algorithm Analysis", Benjamin/Cummings Pub. Co, 2007

WEB REFERENCES

1. <https://nptel.ac.in/courses/106101060/>
2. https://swayam.gov.in/nd2_cec20_cs03/preview

Course Outcomes:

On successful completion of this course, the student will be able to

1. Understand the basic techniques for designing algorithms.
2. Evaluate and estimate the performance of the algorithms.
3. Select the appropriate algorithm to solve a problem by considering the problem characteristics.
4. Construct efficient algorithms for simple computational tasks.
5. Analyze NP-Hard and NP-Complete problems

CO-PO Mapping and Matrix

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PSO 1	PSO 2	PSO 3
CO 1	M	M	M	H	-	-	-	L	M	M	-	H	L	H
CO 2	M	H	M	H	-	-	-	L	M	M	-	H	L	H
CO 3	M	H	M	H	-	-	-	L	M	M	-	H	H	M
CO 4	M	H	M	H	-	-	-	L	M	M	-	H	H	M
CO 5	H	H	L	L	-	-	-	L	M	M	-	M	M	M

Cloud Computing

Semester I

23MITC04

Hours of Instruction/week: 5

No of credits: 5

Course Objectives:

1. To provide students with the fundamentals and essentials of Cloud Computing.
2. To understand cloud models.
3. To facilitate the students to understand the cloud Infrastructure.
4. To explore significant cloud computing driven commercial systems such as Google Apps, Microsoft Azure and Amazon Web Services .
5. To explain the security issues related to cloud computing.

UNIT-I CLOUD INTRODUCTION

15

Cloud Computing Fundamentals: Cloud Computing definition, Benefits and challenges of cloud computing, Evolution of Cloud Computing , usage scenarios and Applications , Business models around Cloud – Major Players in Cloud Computing - Types of cloud based on deployment model, Issues in Cloud -Eucalyptus - Nimbus - Open Nebula, CloudSim.

UNIT-II CLOUD SERVICES, PROVIDERS AND FILE SYSTEM

15

Types of Cloud services: Software as a Service - Platform as a Service – Infrastructure as a Service - Database as a Service - Monitoring as a Service – Communication as services. Service providers- Google App Engine, Amazon EC2, Microsoft Azure, Sales force. Introduction to MapReduce, GFS, HDFS, Hadoop Framework.

UNIT-III VIRTUALIZATION

15

Need for Virtualization – Pros and cons of Virtualization – Types of Virtualization – System Vm, Process VM, Virtual Machine monitor – Virtual machine properties - Interpretation and binary translation, High Level Language VM - Hypervisors – Xen, KVM , VMWare, Virtual Box, Hyper-V.

UNIT-IV CLOUD INFRASTRUCTURE

15

Architectural Design of Compute and Storage Clouds – Layered Cloud Architecture Development – Design Challenges - Inter Cloud Resource Management – Resource Provisioning and Platform Deployment – Global Exchange of Cloud Resources.

UNIT-V SECURITY IN THE CLOUD

15

Security Overview – Cloud Security Challenges and Risks – Software-as-a-Service Security – Security Governance – Risk Management – Security Monitoring – Security Architecture Design – Data Security – Application Security – Virtual Machine Security - Identity Management and Access Control – Autonomic Security.

Total Hours: 75

TEXT BOOKS

1. Bloor R., Kanfman M., Halper F. Judith Hurwitz "Cloud Computing for Dummies" (Wiley India Edition),2010 (UNIT-I)
2. John Rittinghouse& James Ransome, "Cloud Computing Implementation Management and Strategy",CRC Press, 2010.(UNIT-II)
3. RajkumarBuyya, Christian Vecchiola, S.ThamaraiSelvi, 'Mastering Cloud Computing', TMGH,2013. (UNIT-III)
4. Kai Hwang, Geoffrey C Fox, Jack G Dongarra, "Distributed and Cloud Computing, From Parallel Processing to the Internet of Things", Morgan Kaufmann Publishers, 2012. (UNIT IV)
5. Ronald L. Krutz, Russell Dean Vines, "Cloud Security – A comprehensive Guide to Secure Cloud Computing", Wiley – India, 2010. (UNIT-V)

REFERENCES

1. Toby Velte, Anthony Velte, Robert Elsenpeter, "Cloud Computing, A Practical Approach", TMH, 2009.
2. Kumar Saurabh, "Cloud Computing – insights into New-Era Infrastructure", Wiley India,2011.
3. George Reese, "Cloud Application Architectures: Building Applications and Infrastructure in the Cloud" O'Reilly
4. James E. Smith, Ravi Nair, "Virtual Machines: Versatile Platforms for Systems and Processes", Elsevier/Morgan Kaufmann, 2005.
5. Katarina Stanoevska-Slabeva, Thomas Wozniak, Santi Ristol, "Grid and Cloud Computing – A Business Perspective on Technology and Applications", Springer.

CourseOutcomes:

On successful completion of this course, the student will be able to

1. Assess various cloud models and services.
2. Describe Virtualization and classify its types.
3. Identify the infrastructure of cloud computing.
4. Demonstrate the use of Map-Reduce.
5. Analyze the Risks and challenges in Cloud environment.

CO-PO Mapping and Matrix

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PSO 1	PSO 2	PSO 3
CO 1	H	L	M	M	L	-	L	L	M	-	H	-	M	M
CO 2	H	L	M	M	L	-	L	L	M	-	H	-	M	M
CO 3	H	H	M	M	H	-	L	L	M	-	H	-	M	M
CO 4	H	M	M	H	M	-	L	L	M	-	H	-	M	H
CO 5	H	H	M	H	M	M	M	L	M	-	H	-	M	H

Artificial Intelligence and Machine Learning

Semester I

23MITC05

Hours of Instruction/week: 5(3T+2P)

No of credits: 5

Course Objectives

1. To describe the fundamentals of Artificial Intelligence
2. To illustrate the Knowledge Representation in Artificial Intelligence
3. To relate Machine Learning concepts
4. To estimate Supervised Learning
5. To devise Unsupervised Learning

UNIT-I INTRODUCTION TO ARTIFICIAL INTELLIGENCE

9

Definition of Artificial Intelligence – Learning Systems – Knowledge Representation and Reasoning – Planning – Knowledge Acquisition – Intelligent Search – Logic Programming – Soft Computing – Branches and Applications of Artificial Intelligence.

UNIT-II KNOWLEDGE REPRESENTATION

9

Knowledge Management: Value of Knowledge Management – Categories of Knowledge. Types of Knowledge: Declarative Knowledge – Procedural Knowledge. Knowledge Representation: Approaches – Issues. Knowledge Base.

UNIT-III MACHINE LEARNING

9

Why Machine Learning – History of Machine Learning – Timeline of Machine Learning – Types of Problems in Machine Learning. Aspects: Inputs to Training – Learning Systems. Machine Learning Applications and Examples.

UNIT-IV SUPERVISED LEARNING

9

Support Vector Machines – Inductive Logic Programming – Case-based Reasoning – Ensemble Classifiers – Nearest Neighborhood – Fuzzy Network: Fuzzy Systems – Info Fuzzy Networks – Fuzzy Neural Systems. Case Studies: Word Model – SVM, Education Loans – K-Nearest Neighbors.

UNIT-V UNSUPERVISED LEARNING

9

Types of Unsupervised Learning – Challenges in Unsupervised Learning – Clustering: K-Means, Agglomerative, DBSCAN, Comparing and evaluating Clustering Algorithms. Summary of Clustering Methods – Data Compression – Principal Component Analysis.

Total Hours: 45

List of Exercises**Hours of Instruction /Week: 2**

1. Implement Logistic Regression in Python
2. Implement Support Vector Machine in Python
3. Implement K-Nearest Neighbours algorithm in Python
4. Implement Ensemble Classifier implementation in Python
5. Implement Decision Trees using Python
6. Implement Naive Bayes Classifier using Python
7. Implement K-means clustering Implementation Python
8. Implement Agglomerative Clustering using Python
9. Implement DBSCAN algorithm using Python
10. Implement Principal Component Analysis in Python

Total Hours: 30**TEXT BOOKS**

1. Vinod Chandra S.S, Anand Hareendran S, "Artificial Intelligence and Machine Learning", PHI Learning Private Limited, 2014.
2. Andreas C.Muller, Sarah Guido "Introduction to Machine Learning with Python", O'Reily, 2017.

REFERENCES

1. Paul Wilmot, "Machine Learning – An Applied Mathematics Introduction", Panda Ohana, 2019.
2. Stuart Russell, Peter Norvig, "Artificial Intelligence: A Modern Approach", Pearson Education, 2016.
3. Deepak Khemani, "A First Course in Artificial Intelligence", McGraw Hill Education, 2013

WEB REFERENCES

1. https://onlinecourses.nptel.ac.in/noc22_cs56/preview
2. https://onlinecourses.swayam2.ac.in/cec21_cs08/preview
3. https://onlinecourses.nptel.ac.in/noc23_cs18/preview
4. <https://www.coursera.org/learn/machine-learning>

Course Outcomes:**On successful Completion of this course, the student will be able to**

1. Locate the Branches and Applications of Artificial Intelligence
2. Explain Knowledge Management
3. Discover problems in Machine Learning
4. Estimate Support Vector Machines and Fuzzy Networks
5. Evaluate Clustering Algorithms

CO-PO Mapping and Matrix

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PSO 1	PSO 2	PSO 3
CO 1	H	-	-	-	-	-	-	-	-	-	-	M	-	-
CO 2	H	-	-	-	-	-	-	-	-	-	-	M	-	-
CO 3	H	H	-	-	-	-	-	H	H	H	H	H	M	M
CO 4	H	H	M	M	M	M	M	H	H	H	H	H	M	M
CO 5	H	H	M	M	M	M	M	H	H	H	H	H	M	M

Advanced Java Programming –Practical I

Semester I
23MITC06

Hours of Instruction/week: 6

No of credits: 3

CourseObjectives:

1. To Practice an IDE like Eclipse or Netbeans for quicker coding/debugging.
2. To understand and develop the Client server programming using different networking concepts.
3. To Develop GUI applications to handle events with JDBC connectivity.
4. To learn to write reusable programs to solve specific problems.
5. To apply advanced Java features such as RMI, Servlets, JSP and Java Beans in programming.

List of Programs

1. Java Applet program.
2. Java program using AWT itemListener.
3. Java program using AWT ActionListener.
4. Java program to create TCP chat Application.
5. Java program for UDPClient Server Communication.
6. Java program for retrieving IP Address
7. Java program for multicasting messages.
8. Java program to store, delete and update data in a database with the support of JDBC-ODBC connectivity.
9. Java Servlet program to display different styles of phrase.
10. Java Servlet program to display cookie id
11. Java Servlet program to create a dynamic HTML form to accept and display user name and password with the help of 'get()' and 'post()' methods.
12. JSP program to implement form data validation to accept correct data.
13. JSP program for demonstrating creation and accessing Java Beans
14. Java program to demonstrate the use of Java Swing components,
15. Message transfer using RMI.

Total Hours : 90

Course Outcomes:

On successful completion of this course, the student will be able to

1. Use an IDE like Netbeans for quicker coding/debugging
2. Develop Client/server programming using different networking concepts
3. Demonstrate GUI applications to handle events with JDBC connectivity
4. Apply advanced Java features such as RMI, Servlets, JSP and Java Beans in programming.
5. Produce reusable and extensible design to minimize rework.

CO-PO Mapping and Matrix

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PSO 1	PSO 2	PSO 3
CO 1	H	-	H	M	M	-	-	H	M	H	H	M	M	M
CO 2	H	-	H	H	H	-	M	H	M	H	H	H	H	H
CO 3	H	-	H	H	M	-	-	H	M	H	H	M	M	M
CO 4	H	-	H	H	H	-	M	H	M	H	H	H	H	H
CO 5	H	-	H	L	M	-	-	H	M	H	H	H	M	M

Internet of Things

Semester II

23MITC07

Hours of Instruction/week: 4

No of credits: 5

CourseObjectives:

1. To develop knowledge on basics of IoT, its characteristics, and levels.
2. To compose a clear vision about sensors, microcontrollers and interfaces.
3. To provide knowledge on protocols for IoT.
4. To interpret the importance on integration of IoT with cloud.
5. To inculcate the comprehensive knowledge about the applications of IoT

12

UNIT-I INTRODUCTION TO INTERNET OF THINGS

Introduction – IoT Growth – Application areas of IoT – Characteristics of IoT – Things in IoT- IoT Stack – Enabling Technologies – IoT Challenges – IoT Levels

UNIT-II SENSORS, MICROCONTROLLERS AND INTERFACES

12

Sensor Interfacing – Types of Sensors – Controlling Sensors through webpages – 8051 Microcontroller - ARM (Advanced RISC Machine)

UNIT-III PROTOCOLS FOR IoT

12

Messaging Protocols :Message Queuing Telemetry Transport (MQTT), Constrained Application Protocol (CoAP) –Transport Protocols : Bluetooth Low Energy (BLE) – Light Fidelity (Li-Fi) – Internet Protocol Version 4 : IPV4 Protocol Frame Format,Internet Protocol Version 6 : IPV6 Protocol Frame Format – Uniform Resource Identifier

UNIT-IV CLOUD FOR IoT

12

IoT with Cloud – Challenges – Selection of Cloud Service Provider for IoT Applications : An Overview – Introduction to Fog Computing – Cloud Computing: Security Aspects

UNIT-V APPLICATIONS BUILDING WITH IoT

12

Case Studies: Smart Healthcare – Elderly Fall Detection with IoT Sensors, IoT based Application to Monitor Water Quality, Smart Retail, IoT based Smart Driver Assistance Systems

Total Hours: 60

REFERENCES

1. Internet of things, Shriram K Vasudevan, Abhishek S Nagarajan, RMD Sundaram, 2019, ISBN : 9788126578375
2. Designing the Internet of Things, HakinCassimally and AdrainMceweb, John Wiley and Sons Ltd. 2014.
3. Internet of things – A Hands on Approach, Bagha and Madiseti, 2014, ISBN-10: 0996025510, ISBN-13: 978-0996025515.
4. The Internet of Things, Samuel Greengard, The MIT Press Essential Knowledge series, 2015.
5. <https://nptel.ac.in/courses/106/105/106105166/>

Course Outcomes:

On successful completion of this course, the student will be able to,

1. Interpret the fundamental functionalities of IoT and enabling technologies.
2. Understand the significance of sensors and microcontrollers.
3. Gain knowledge about the protocols of IoT.
4. Identify the importance of Cloud for IoT
5. Integrate real world day-to-day applications with IoT systems.

CO-PO Mapping and Matrix

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PSO 1	PSO 2	PSO 3
CO 1	H	M	L	M	-	M	-	L	M	M	-	M	H	M
CO 2	H	M	L	M	-	H	-	L	M	M	-	M	H	M
CO 3	H	M	L	M	-	M	-	L	M	M	-	M	H	M
CO 4	H	M	L	M	-	M	-	L	M	M	-	M	H	M
CO 5	H	H	L	M	-	H	-	L	M	M	-	M	H	M

Deep Learning

Semester II

23MITC08

Hours of Instruction/week: 4

No of credits: 5

Course Objectives:

1. To recognize the foundation of Deep Learning and Neural Networks
2. To understand Gradient Descent and Learning Rates
3. To analyze TensorFlow
4. To describe the Convolutional Layer
5. To demonstrate Deep Reinforcement Learning

UNIT-I INTRODUCTION TO DEEP LEARNING AND NEURAL NETWORKS 12

What is Deep Learning - Why Deep Learning. The mechanics of Machine Learning -The Neuron - Expressing Linear Perceptrons as Neurons- Feed-Forward Neural Networks - Linear Neurons and their Limitations.

UNIT-II TRAINING FEED-FORWARD NEURAL NETWORKS 12

Gradient Descent - The Delta Rule and Learning Rates - Gradient Descent with Sigmoidal Neurons - The Back Propagation Algorithm - Stochastic and Minibatch Gradient Descent - Test Sets - Validation Sets and Overfitting – Preventing Overfitting in Deep Neural Networks.

UNIT-III NEURAL NETWORKS IN TENSORFLOW 12

What is TensorFlow - How does TensorFlow compare to Alternatives? TensorFlow Variables – Operations – Placeholder Tensors – Sessions in TensorFlow – Navigating Variable Scopes and Sharing Variables – Specifying the Logistic Regression Model in TensorFlow.

UNIT-IV CONVOLUTIONAL NEURAL NETWORKS 12

Neurons in Human Vision – Shortcomings of Feature Selection – Filters and Feature Maps – Full Description of the Convolutional Layer – Max Pooling – Full Architectural Description of Convolution Networks – Image Processing Pipelines– Accelerating Training with Batch Normalization – Visualizing Learning in Convolutional Networks.

UNIT-V DEEP REINFORCEMENT LEARNING 12

What is Reinforcement Learning – Markov Decision Processes – Explore Versus Exploit – Policy Versus Value learning – Pole-Cart with Policy Gradients – Creating an Agent – Building the Model and Optimizer – Sampling Actions – Keeping Track of History – Policy Gradient Main Function.

Total Hours: 60

TEXT BOOKS

1. Nikhil Buduma and Nicholas Lacascio, "Fundamentals of Deep Learning", O'Reilly Media, 2017.
2. Francois Chollet, "Deep Learning with Python", Manning, 2018.

REFERENCES

1. Ian Goodfellow, Yoshua Bengio, Aaron Courville, "Deep Learning", MIT Press, 2016.
2. Josh Patterson, Adam Gibson, Aaron Courville, "Deep Learning – A Practitioner's Approach", O'Reilly Media, 2017.
3. Jeff Heaton, "Artificial Intelligence for Humans Volume 3: Deep Learning and Neural Networks", Heaton Research, 2015.

WEB REFERENCES

1. <http://neuralnetworksanddeeplearning.com>
2. <https://www.datacamp.com/community/tutorials/deep-learning-python>
3. <http://www.deeplearning.net/tutorial/>
4. <http://deeplearning.stanford.edu/tutorial>
5. <https://medium.com/tensorflow/mit-deep-learning-basics-introduction>
6. <https://www.classcentral.com/course/swayam-deep-learning-iitkgp-13988>
7. <https://www.edureka.co/blog/deep-learning-with-python/>
8. <https://www.eckovation.com/course/deep-learning-certification-course>
9. <https://www.zapmeta.co.in/?q=deep+learning+free+course>
10. <https://www.apdaga.com/2019/03/coursera-neural-networks-and-deep-learning>

Course Outcomes:

On successful Completion of this course, the student will be able to

1. Identify the fundamentals of deep learning and Neurons
2. Discover Feed Forward Neural Networks
3. Apply Neural Networks in Tensorflow
4. Estimate Convolution Networks
5. Structure Markov Decision Processes

CO-PO Mapping and Matrix

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PSO 1	PSO 2	PSO 3
CO 1	H	-	-	-	-	-	-	-	-	-	-	H	-	-
CO 2	H	H	-	-	-	-	-	-	-	-	-	H	-	-
CO 3	H	H	M	M	M	M	M	H	H	M	H	H	M	M
CO 4	H	H	M	M	M	M	M	H	H	M	H	H	M	M
CO 5	H	H	M	M	M	M	M	H	H	M	H	H	M	M

Internet and Web Programming

Semester II
23MITC09

Hours of Instruction/week: 4

No of credits: 4

Course Objectives:

1. To endow students with principles, knowledge and skills for the construction of web enabled applications using HTML.
2. To provide a comprehensive knowledge of the semantics and syntax of Cascading Style Sheet.
3. To learn about Bootstrap, XML documents, AJAX, XPATH and XSLT.
4. To use Java script, jQuery, Angular JS for dynamic effects.
5. To understand the concepts of website creation and hosting using Word press.

UNIT-I INTRODUCTION TO INTERNET & WORLD-WIDE WEB

12

History-Web Browsers-Web Servers - Uniform Resource Locator- Tools and Web Programming Languages. Hypertext Mark Up Language (HTML):Basics of HTML page-Text Formatting- Table-Headers-Linking-Images-List-Forms.HTML5: Control elements –Semantic elements – Drag and Drop – Audio – Video controls

UNIT-II CASCADING STYLE SHEETS (CSS)

12

Introduction-CSS Syntax-Inline, Internal and External style sheet- CSS properties-selector. CSS styling: Background-text formatting-controlling fonts. Working with the block elements-working with lists and tables-Image gallery-Image sprites-CSS ID and class.Box model: Introduction- Border properties-padding properties-margin properties. CSS color-grouping-Dimensions- display-positioning-align-class- Navigation bar-Animation-Transition.

UNIT-III BOOTSTRAP AND XML

12

Bootstrap: Introduction—Grid system-Typography-Tables-Forms-Buttons-Images-Glyphicons-Dropdowns-button groups-Input groups-Navbar-Progress Bar-Jumbotron-Panels-Header-Tooltip.

XML: Basics of XML-XML Document Type Definition-XML Namespaces-Document Object Model-XML Parser-SAX Parser -XPATH-XSLT

UNIT-IV JAVASCRIPT

12

Javascript: Introduction to JavaScript-JavaScript Document Object Model-Date and Objects-Regular Expressions- Exception Handling-Validation.**jQuery:** Overview-Selectors-Events-effects-Traversing-AJAX-DOM-plugins-Validation.**Angular JS:** Introduction- Expression-Events-Forms-Validation-Controllers-Scopes and MVC architecture

UNIT-V WORDPRESS

12

Word Press: Introduction-Content management system-Website Planning and hosting-Settings-Dashboard-Categories-Posts-Pages-Menus-Media-Tags-Links-Comments-Users-permalink.

Appearance: Theme management-Customize theme-Widget Management. Elementor-slider-plugins-social media plugins. Search engine optimization: On-page SEO-Off- page SEO.

Total Hours: 60

REFERENCES :

1. Internet and World Wide Web: How to Program (Third Edition), Deitel and Goldberg Pearson Prentice Hall ISBN 0-13-124682-8
2. Programming the WWW Third Edition, Robert W. Sebesta, Pearson Prentice Hall.

WEB REFERENCES

1. <https://www.coursera.org/learn/html-css-javascript-for-web-developers>
2. <https://www.edx.org/course/introduction-to-bootstrap-a-tutorial>
3. https://onlinecourses.swayam2.ac.in/ugc19_hs26/
4. <https://www.w3schools.in/>
5. <https://www.tutorialspoint.com/>
6. <https://www.lynda.com/WordPress-tutorials/Welcome/504072/533857-4.html>

CourseOutcomes:

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

- Have knowledge in advanced techniques necessary for the development of web-based applications.
- Apply stylesheets for processing, identifying, and presenting of information in web pages.
- Develop well-formed web browser-based documents utilizing XML and website using bootstrap
- Use scripting languages to transfer data and add interactive components to web pages.
- Design a basic web site using Word press.

CO-PO Mapping and Matrix

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PSO 1	PSO 2	PSO 3
CO 1	H	-	M	M	M	L	M	M	-	M	M	H	H	M
CO 2	H	-	M	M	M	L	M	M	-	M	M	H	H	M
CO 3	H	-	M	M	M	L	M	M	-	M	M	H	H	M
CO 4	H	-	M	M	M	L	M	M	-	M	M	H	H	M
CO 5	H	-	M	M	M	L	M	M	-	M	M	L	H	M

Open Source Technologies

Semester II
23MITC10

Hours of Instruction/week: 4
No of credits: 4

Course Objectives:

1. To give an exposure to PHP programming concepts.
2. To explore MySQL Environment.
3. To understand the fundamentals of Python Programming.
4. To gain advanced knowledge in Python Programming
5. To enable students to gain knowledge in modern web Databases.

12

UNIT- I PHP

Basic Syntax of PHP – programming in web environment - Common PHP Script Elements - Using Variables - Constants – Data types - Operators ; Statements – Flow Control functions – Dates and Times - Working With Arrays -Using Functions – Object oriented Programming in PHP - String Manipulation and Regular Expression - File and Directory Handling - Working With Forms

12

UNIT-II MySQL

Data Types - Primary Keys and Auto Increment Fields – Operators - Create Database and Tables – MYSQLQueries: Select; insert; update; delete; limit, Aggregate functions; Sorting; Joins- Establishing and Closing a Connection - Connecting to MySQL with PHP, Inserting data with PHP, Retrieving data with PHP.

12

UNIT-III PYTHON – Introduction

Variables - Data types – Strings - Operators – Control Statements - Loops - Sequences: Lists – Tuples - Sets – Dictionaries - Object oriented Programming in Python

12

UNIT-IV PYTHON – FILES, EXCEPTIONS AND DATABASE CONNECTIVITY

File Handling -Exception – Handling exception — Connecting Python with MySQL: Inserting; Updating; deleting; Sorting and Searching records in MySQL database.

12

UNIT-V MONGODB:

Introduction to MongoDB :key features, MongoDB Core tools, MongoDB Data types, Creating and Dropping Database, Creating and Dropping collections, MongoDB Documents: Inserting, Querying, Updating and Deleting Documents – Limiting Records- Sorting Records – MongoDB Aggregation. Connecting MongoDB with Python: Inserting; Updating; deleting; and Searching Documents in MongoDB database

Total Hours: 60

REFERENCES

1. Chris DiBona, Danese Cooper and Mark stone O'Reilly, "Open Sources 2.0-The Continuing Evolution", First Edition, 2005.
2. Elliot White III, Jonathan.D.Eisenhamer, "PHP 5 in practice" pearson Education,2007.
3. Mark Lutz, O'Reilly, "Programming Python 4E" ,2011.
4. Paul Du Bois,O'ReillyPublishers,"My SQL- Cookbook",Second Edition,2010.

WEB REFERENCES

1. https://swayam.gov.in/nd2_aic20_sp32/preview
2. https://swayam.gov.in/nd2_aic20_sp33/preview

CourseOutcomes:

On successful completion of this course, the student will be able to

1. Have knowledge in advanced techniques necessary for the development of applications using PHP.
2. Develop programs connecting MySQL database with PHP.
3. Use Python for developing Open source applications.
4. Implement Python and MySQL database Connectivity.
5. Create database applications using Python and Mongo DB.

CO-PO Mapping and Matrix

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PSO 1	PSO 2	PSO 3
CO 1	H	L	H	M	M	M	M	M	M	M	L	H	L	M
CO 2	H	L	H	M	M	M	M	M	M	M	L	H	L	M
CO 3	H	L	H	M	H	M	M	M	M	M	M	H	M	M
CO 4	H	L	H	H	H	M	M	M	M	M	M	H	H	M
CO 5	H	L	H	H	H	M	M	M	M	M	M	H	H	M

Web Technologies -Practical II (Open Book)

Semester II

23MITC11

Hours of Instruction/week: 3

No of credits: 3

CourseObjectives:

1. To gain knowledge in fundamental techniques for the development of web-based applications.
2. To impart students with essential knowledge in HTML, CSS, XML and DTD.
3. To be able to write simple JavaScript, jQuery and Angular JS programs.
4. To understand the importance of Bootstrap and use it to create Web pages.
5. To develop websites using WordPress as a Content Management System.

List of Programs:

1. Create a static Web page using HTML tags for Information Technology Department.
2. i) Create a HTML table to provide the layout of the university infrastructure.
ii) Design a mark sheet and display all your marks with subjects in a table
iii) Design a webpage to List a table of content and navigate within the pages.
3. Create a college website using html 5 and embed audio, video content.
4. Create a web page using Inline, Internal and external CSS.
5. Write an XML file which will display the Food Menu information and validate it with DTD
6. Programs using XML and CSS
7. Programs using XML DOM
8. Design an employee login form, registration form and validate its field using java script.
9. Create a web page with jQuery effects
10. Create a shopping list using Angular JS features.
11. Create an Animal museum Website using Bootstrap
12. Create a book store website using Bootstrap
13. Design a photography website using Word Press.
 - i) Create home page of your website using Elementor plug in.
 - ii) Add a new post and pages to your website, a topic should be related to your Website.
 - iii) Create top Menu of your website
14. Design a website using Word Press
 - i) Add a contact us form in the website (Use Contact Form 7 Plug-in).
 - ii) Add Slider to any page of your website

iii) Add Social media plugins in the website

15. Word Press SEO tools: Install Yoast SEO Plug-in. Perform SEO Analysis and readability analysis of the post that you created in previous exercise.

Total Hours :45

Course Outcomes:

On successful completion of this course, the student will be able to

1. Create web pages using several technologies such as HTML, CSS and XML.
2. Apply inline, internal and external style sheets in web page development.
3. State the technological differences between static web sites and dynamic web sites.
4. Construct the website using bootstrap
5. Build simple and easy to maintain website using Word Press.

CO-PO Mapping and Matrix

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PSO 1	PSO 2	PSO 3
CO 1	H	H	H	M	M	H	M	H	H	M	M	H	H	M
CO 2	H	M	H	M	M	H	M	H	H	M	M	H	H	M
CO 3	H	H	H	M	M	H	M	H	H	M	M	H	H	M
CO 4	H	M	H	M	M	H	M	H	H	M	M	H	H	M
CO 5	H	M	H	M	M	H	M	H	H	M	M	L	H	M

Open Source -Practical III

Semester II
23MITC12

Hours of Instruction/week: 4
No of credits: 3

CourseObjectives:

1. To provide skills and knowledge necessary to create dynamic database-driven websites using PHP, PYTHON, MySQL and Mongo DB.
2. To understand PHP and MYSQL data types, logic controls, built-in and user-defined functions.
3. To gain knowledge on working .with form data
4. To retrieve, insert, update, and delete data from MySQL in PHP and Python environment.
5. To retrieve, insert, update, and delete data from Mongo DB in PHP and Python environment.

List of Programs:

1. Use of conditional and looping statements in PHP
2. File manipulation using PHP
3. Creation of sessions and cookies
4. Creating forms and form validation using PHP
5. Insertion, Updation and Deletion of rows in MYSQL tables using PHP
6. Searching of data and sorting by different criteria using PHP and MySQL
7. Joining tables using PHP and MySQL
8. Use of Functions in Python
9. String manipulation using python
10. File manipulation using python
11. Plotting graphs using python
12. Insertion, Updation and Deletion of rows in MYSQL tables using Python
13. Searching of data and sorting by different criteria using Python and MySQL
14. Insertion, Updation and Deletion of rows in Mongo DB using Python
15. Searching of data using Python and Mongo DB

Total Hours :60

Course outcomes:

On successful completion of this course, the student will be able to

1. Validate input using PHP.
2. Construct cookies and sessions.
3. Develop Web applications using PHP and Python
4. Create tables and Test various MySQL database queries.
5. Establish PHP and MYSQL and Python - MySQL/MongoDB database connectivity.

CO-PO Mapping and Matrix

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PSO 1	PSO 2	PSO 3
CO 1	H	-	H	M	L	M	-	H	M	H	H	H	M	H
CO 2	H	-	H	H	M	H	-	H	M	H	H	H	H	H
CO 3	H	H	H	H	H	H	-	H	M	H	H	H	H	H
CO 4	H	-	H	M	M	L	-	H	M	H	H	H	H	H
CO 5	H	-	H	M	M	M	-	H	M	H	H	H	H	H

Technical Communication

Semester III

23MITC14

Hours of Instruction/week: 3

No of credits: 3

Course Objectives:

1. To acquire basic knowledge about technical communication.
2. To explain the active listening skills and their types.
3. To gain knowledge about the fundamentals of effective writing.
4. To recite about the technical reports and their importance.
5. To devise interviews and their characteristics

UNIT-I BASICS OF TECHNICAL COMMUNICATION

9

Process, Characteristics, Levels, Flow, Networks and Importance. Barriers to Communication: Interpersonal, Intrapersonal, and Organizational. Non Verbal Communication: Kinesics, Proxemics, Paralinguistics, Chronemics. Technology in Communication: Software for Creating, Messages, Software for writing Documents, Software for Presenting Documents, and Transmitting Documents

UNIT-II ACTIVE LISTENING

9

Types, Traits of a good Listener, Active versus Passive Listening, and Implications of Effective Listening. Fundamentals of Effective Writing: Words and Phrases, Sentences and Paragraphs

UNIT-III FUNDAMENTALS OF EFFECTIVE WRITING

9

Art of Condensation, Reading Comprehension. Effective Presentation Strategies: Analyzing Audience, Organizing Contents, Preparing an outline, Visual aids, Types of Delivery.

UNIT-IV TECHNICAL REPORTS

9

Importance, Preparatory Steps and Structure. Letters, Memos and E-mails: Structure, Principles, Types. Group Communication: Group Discussions, Meetings and Conferences.

UNIT-V INTERVIEWS

9

Types, Preparation, Success and Failure Factors. Technical Proposals: Definition, Types, Structure and Style. Research Paper, Dissertation and Thesis: Definition, Characteristics Style and Presentation. Referencing Conventions: Preparing List of References and Bibliography. Instruction Manuals and Technical Description: Structure, Importance and style.

Total Hours: 45

REFERENCES

1. Raman, Meenakshi and Sangeeta Sharma, Technical Communication: Principles and Practice, Oxford University Press, 2nd Edition, 2011.
2. Sharma Sangeeta and Binod Mishra, Communication Skills for Engineers and Scientist, Pearson Education, 2009.
3. Kumar, Sharma and PushpLata, Communication Skills, New Delhi: Oxford University Press, 2012.

Course Outcomes:

On successful completion of this course, the student will be able to

1. Read, understand and trace the fundamentals of effective listening and writing.
2. Implement effective listening.
3. Relate and apply presentation strategies.
4. Assess the group communication.
5. Demonstrate using technical description.

CO-PO Mapping and Matrix

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PSO 1	PSO 2	PSO 3
CO 1	-	L	-	-	-	-	-	H	H	M	H	-	-	H
CO 2	-	L	-	-	-	-	-	H	H	M	H	-	-	H
CO 3	-	L	-	-	-	-	-	H	H	M	H	-	-	H
CO 4	-	L	-	-	-	-	-	H	H	M	H	-	-	H
CO 5	-	L	-	-	-	-	-	H	H	M	H	-	-	H

Big Data Analytics

Semester III

23MITC15

Hours of Instruction/week: 4

No of credits: 5

Course Objectives:

1. To explore the Big Data fundamentals and learn about Big Data Analytical process.
2. To Describe the Hadoop Eco System and HDFS.
3. To understand the MapReduce programming and serialization.
4. To identify the difference between Pig and Hive and learn the frameworks
5. To gain knowledge of applying tools and techniques for real big data problems.

UNIT-I INTRODUCTION TO HADOOP AND BIG DATA ANALYTICS

12

Introduction to big data:Data, Characteristics of data and Types of digital data,Sources of data, Working with unstructured data, Evolution and Definition of big data, Characteristics and Need of big data, Challenges of big data

Big data analytics:Overview of business intelligence, Data science and Analytics, Meaning and Characteristics of big data analytics, Need of big data analytics, Classification of analytics, Challenges to big data analytics, Importance of big data analytics, Basic terminologies in big data environment

UNIT-II INTRODUCTION TO HADOOP

12

Introducing Hadoop, need of Hadoop, limitations of RDBMS, RDBMS versus Hadoop, Distributed Computing Challenges, History of Hadoop , Hadoop Overview, Use Case of Hadoop, Hadoop Distributors, HDFS (Hadoop Distributed File System) , Processing Data with Hadoop, Managing Resources and Applications with Hadoop YARN (Yet another Resource Negotiator), Interacting with Hadoop Ecosystem

UNIT-III INTRODUCTION TO MAPREDUCE PROGRAMMING

12

Introduction , Mapper, Reducer, Combiner, Partitioner, Searching, Sorting , Compression, Real time applications using MapReduce, Data serialization and Working with common serialization formats, Big data serialization formats

UNIT-IV: INTRODUCTION TO HIVE AND PIG

12

HIVE: Introduction to Hive, Hive Architecture, Hive Data Types, Hive File Format, Hive Query Language (HQL), User-Defined Function (UDF) in Hive.

PIG: Introduction to Pig, The Anatomy of Pig, Pig on Hadoop, Pig Philosophy, Use Case for Pig: ETL Processing, Pig Latin Overview, Data Types in Pig, Running Pig, Execution Modes of Pig, HDFS Commands, Relational Operators, Piggy Bank, Word Count Example using Pig , Pig at Yahoo!, Pig versus Hive

UNIT-V SPARK

Introduction to data analytics with Spark, What is Apache Spark, A Unified Stack, Downloading Spark, Spark's Python and Scala Shells, Core Spark concepts, Programming with RDDs, RDD Basics, RDD Operations, Passing functions to Spark, Working with key/value pairs, Data Partitioning, Loading and Saving your Data, File Formats

Total Hours: 60

REFERENCES

1. Big Data Analytics, Seema Acharya, SubhashiniChellappan, Wiley
2. Learning Spark: Lightning-Fast Big Data Analysis, Holden Karau, Andy Konwinski, Patrick Wendell, MateiZaharia, O'Reilly Media, Inc.
3. Boris lublinsky, Kevin t. Smith, AlexeyYakubovich, "Professional Hadoop Solutions", Wiley, ISBN: 9788126551071, 2015.
4. Chris Eaton,Dirkderooset al. , "Understanding Big data ", McGraw Hill, 2012.
5. Tom White, "HADOOP: The definitive Guide", O Reilly 2012.
6. VigneshPrajapati, "Big Data Analyticswith R andHadoop", Packet Publishing 2013.

WEB REFERENCES

1. <http://www.bigdatauniversity.com/>
2. <https://www.coursera.org/courses?query=big%20data%20analytics>

Course Outcomes:

On successful completion of this course,the student will able to,

1. Analyze the difference between structured, semi-structured and unstructured data.
2. Summarize the challenges of big data and how to deal with the same.
3. Recognize the significance of NoSQL databases.
4. Formulate about Hadoop Ecosystem and MapReduce programming.
5. Distinguish between Pig and Hive and other frameworks.

CO-PO Mapping and Matrix

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PSO 1	PSO 2	PSO 3
CO 1	-	-	-	-	-	-	-	-	-	-	-	H	H	-
CO 2	-	M	-	-	-	M	-	M	-	-	M	H	H	-
CO 3	-	M	-	-	-	M	-	M	-	-	M	M	M	-
CO 4	H	H	M	M	M	M	M	H	H	H	H	H	H	H
CO 5	H	H	M	M	M	M	M	H	H	H	H	H	H	H

Essentials of Cyber Security

Semester III

Hours of Instruction/week: 5

23MITC16

No of credits: 5

Course Objectives

1. To understand the fundamental terminologies related to Cyber Security and current Cyber Security threats.
2. To understand about various cyber-attacks and cybercrimes.
3. To be aware of cyber laws in India and other countries.
4. To educate the aspects related to personal data privacy and security
5. To comprehend the components of Cyber Security audit and compliance..

UNIT-I OVERVIEW OF CYBER SECURITY

15

Cyber Security increasing threat landscape, Cyber Security terminologies:- Cyberspace, attack and its types, attack vector, attack surface, threat, risk, vulnerability, exploit, exploitation, hacker., Non-state actors, Cyber terrorism, Protection of end user machine, Critical IT and National Critical Infrastructure, Cyber warfare.

UNIT-II CYBER CRIMES

15

Cybercrimes targeting Computer systems and Mobiles - data diddling attacks, spyware, logic bombs, DoS, DDoS, APTs, virus, Trojans, ransomware, data breach., Online scams and frauds email scams, Phishing, Vishing, Smishing, Online job fraud, Online sextortion, Debit/credit card fraud, Online payment fraud, Cyber bullying, website defacement, Cyber-squatting, Pharming, Cyber espionage, Cryptojacking, Darknet- illegal trades, drug trafficking, human trafficking., Social Media Scams & Frauds impersonation, identity theft, job scams, misinformation, fake news., **Cybercrime against persons**- cyber grooming, child pornography, cyber stalking., Social Engineering attacks, Crime reporting procedures and Checklist for reporting cybercrime online.

UNIT-III CYBER LAW

15

Cybercrime and legal landscape around the world, Information Technology Act, 2000 and its amendments. Cybercrime and punishments, Cyber Laws and Legal and ethical aspects related to new technologies. AI/ML, IoT, Blockchain, Darknet and Social media, Cyber Laws of other countries.

UNIT-IV DATA PRIVACY AND DATA SECURITY

15

Defining data, meta-data, big data, and non-personal data. Data protection, Data privacy and data security, Personal data protection bill and its compliance, Data protection principles, Big data security issues and challenges, Data protection regulations of other countries:- General Data Protection Regulations(GDPR), 2016 Personal Information Protection and Electronic Documents Act (PIPEDA)., Social media- data privacy and security issues and Registering compliant on a Social media platform

UNIT-V CYBER SECURITY MANAGEMENT, COMPLIANCE AND GOVERNANCE

15

Cyber Security Plan- Cyber Security policy, cyber crises management plan., Business continuity, Risk assessment, Types of security controls and their goals, Cyber Security audit and compliance, National Cyber Security policy and strategy.

Total Hours: 75

REFERENCES

1. **Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives** by Sumit Belapure and Nina Godbole, Wiley India Pvt. Ltd.
2. **Information Warfare and Security** by Dorothy F. Denning, Addison Wesley
3. **Security in the Digital Age: Social Media Security Threats and Vulnerabilities** by Henry A. Oliver, Create Space Independent Publishing Platform.
4. **Data Privacy Principles and Practice** by Natraj Venkataramanan and Ashwin Shriram, CRC Press.
5. **Information Security Governance, Guidance for Information Security Managers** by W. KragBrothy, 1st Edition, Wiley Publication.
6. **Auditing IT Infrastructures for Compliance** By Martin Weiss, Michael G. Solomon, 2nd Edition, Jones Bartlett Learning.

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1. <https://www.coursera.org/learn/introduction-to-cybersecurity-essentials>
2. https://onlinecourses.swayam2.ac.in/nou19_cs08/preview
3. https://onlinecourses.swayam2.ac.in/cec21_cs09/preview

Course Outcomes:

On successful completion of this course, the student will able to,

1. Understand the basic terminologies related to Cyber Security and current Cyber Security threat landscape. They will also develop understanding about the Cyberwarfare and necessity to strengthen the Cyber Security of end user machine, critical IT and national critical infrastructure.
2. Have complete understanding of the cyber-attacks that target computers, mobiles and persons. They will also develop understanding about the type and nature of cybercrimes and as to how report these crimes through the prescribed legal and Government channels.
3. Understand the legal framework that exist in India for cybercrimes and penalties and punishments for such crimes, It will also expose students to limitations of existing IT Act,2000 legal framework that is followed in other countries and legal and ethical aspects related to new technologies.
4. Understand the aspects related to personal data privacy and security. They will also get insight into the Data Protection Bill,2019 and data privacy and security issues related to Social media platforms.
5. Understand the main components of Cyber Security plan. They will also get insight into risk-based assessment, requirements of security controls and need for cyber security audit and compliance.

CO-PO Mapping and Matrix

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PSO 1	PSO 2	PSO 3
CO 1	M	M	-	L	M	H	M	-	M	M	-	-	M	H
CO 2	M	M	-	L	M	H	M	-	M	M	-	-	M	H
CO 3	M	M	-	M	H	H	M	-	M	M	M	-	H	H
CO 4	H	H	-	M	H	H	M	-	M	H	M	-	H	H
CO 5	H	H	-	H	H	H	M	-	M	H	M	-	H	H

Digital Image Processing

Semester III
23MITC17

Hours of Instruction/week: 4
No of credits: 4

Course Objectives:

1. To explain basic principles and application of digital image processing.
2. To provide knowledge image transformation and Enhancement techniques.
3. To give understanding about image restoration techniques.
4. To differentiate various compression techniques and standards.
5. To apply different approaches to segmentation of digital image

UNIT-I DIGITAL IMAGE FUNDAMENTALS

12

Introduction-applications-Steps in digital image processing – components of image processing system, Elements of Visual Perception, Light and electromagnetic spectrum, Image Sensing and Acquisition – Image Sampling and Quantization – Relationships between pixels - color models RGB, CMY, HIS.

UNIT- II IMAGE TRANSFORMATION & ENHANCEMENT

12

Spatial Domain: Gray level transformations – Histogram processing – Basics of Spatial Filtering–Smoothing and Sharpening Spatial Filtering – Frequency Domain: Introduction to Fourier Transform – Smoothing and Sharpening frequency domain filters – Ideal, Butterworth and Gaussian filters- Color image transformation and enhancement.

UNIT-III IMAGE RESTORATION

12

Image Restoration – Image degradation model and restoration process, Noise models – Mean Filters – Order Statistics – Adaptive filters – Band reject Filters – Band pass Filters – Notch Filters – Optimum Notch Filtering – Linear, Position Invariant Degradation -Inverse Filtering – Wiener filtering-Geometric Mean Filter.

UNIT-IV IMAGE COMPRESSION

12

Fundamentals of compression– Image Compression models – Error Free Compression – Variable Length Coding – Huffman coding – Arithmetic coding – Bit-Plane Coding – Lossless Predictive Coding – Lossy Compression – Lossy Predictive Coding – Transform coding - JPEG and MPEG coding .

UNIT-V IMAGE SEGMENTATION

Morphological processing- erosion and dilation- opening and closing- Morphological algorithms- Boundary Extraction, Region Filling- Extraction of connected components- Convex Hull-Thinning-Thickening-Skeleton-Pruning- Edge detection, Edge linking via Hough transform – Thresholding - Region based segmentation – Region growing – Region splitting and merging .

Total Hours: 60

TEXT BOOK

1. Gonzalez R.C and Woods R. E, “Digital image processing “Addison Wesley
2. Anil K Jain Fundamentals of Digital image processing, Prentice Hall.

REFERENCES

1. S.Annadurai and R.Shanmugalakshmi, “Fundamentals of Digital Image Processing”, Pearson Education.
2. Anil.K.Jain, “Fundamentals of Image Processing”, Prentice Hall.
3. Maher.A.SidAhmad, “Image Processing-Theory, Algorithms and Architectures”, McGraw Hill Education Private Limited.
4. Chris Solomon , Toby Breckon , “ Fundamentals of Digital Image Processing , A Practical approach with Examples in Matlab” ,A John Wiley & Sons , Ltd, Publications.
5. <https://nptel.ac.in/courses/117105079/>

Course Outcomes:

On successful completion of this course, the student will be able to

1. Understand the principles and application of digital image processing.
2. Gain knowledge various image transformation and enhancement techniques.
3. Evaluate various image restoration techniques.
4. Analyze various compression techniques and standards.
5. Use different segmentation approaches to digital image processing.

CO-PO Mapping and Matrix

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PSO 1	PSO 2	PSO 3
CO 1	H	M	L	H	L	L	M	H	H	M	L	-	H	H
CO 2	H	M	L	H	L	L	M	H	H	M	L	-	H	H
CO 3	H	M	L	H	L	L	M	H	H	M	L	-	H	H
CO 4	H	M	L	H	L	L	M	H	H	M	L	-	H	H
CO 5	H	M	L	H	L	L	M	H	H	M	L	-	H	H

Data Analytics –Practical IV

Semester III

23MITC18

Hours of Instruction/week:6

No of credits: 3

Course Objectives:

1. To Observe and work with Tableau.
2. To Describe Data Connection with Data Source, Text Files and Microsoft Excel.
3. To Demonstrate Data Extraction, Joining and Sorting.
4. To Apply various types of Operators, and Functions.
5. To Create Charts and Maps.

List of Programs

1. Installation and Configuration of Tableau
2. Tableau Data Aggregation
 - a) Sum, Average, Count, Count Distinct, Median, Minimum, Maximum, Attribute and Dimension
 - b) Variance, Variance of Population, Standard Deviation and Standard Deviation of Population
3. Tableau Data Connection- I
 - a) With Data Sources
 - b) With Text File
 - c) With Microsoft Excel
 - d) Extracting Data
Creating an Extract, Applying Extract Filters, and Adding New Data to Extract
4. Tableau Data Connection -II
 - a) Editing Meta Data
Checking the Meta Data, Changing the Data Type, Renaming and Hiding
 - b) Data Joining
Cross, Inner, Natural, Outer, and Self Joins; Creating a Join; Edit a Join Type and Join Fields
 - c) Data Blending
How to add secondary data source, Blending the Data
 - d) Data Sorting
Manual and Computed Sorting; Sort from an Axis, Header, Field Label, Toolbar, Drag and Drop
 - e) Replacing Data Source
5. Tableau Calculations
 - a) Calculations
 - b) Operators
General, Arithmetic, Relational and Logical Operators
 - c) Functions
 - d) Numeric Calculations

- e) String Calculations
- f) Date Calculations
- g) Table Calculations
- 6. Tableau Filter Data
 - a) Basic Filters
 - Dimensions, Measures and Dates
 - b) Filter Operations
 - Create Filters, Create Filters for Measures and Dimensions, Clear Filters
 - c) Extract Filters
 - d) Quick Filters
 - e) Context Filters
 - f) Condition Filters
 - g) Data Source Filters
 - h) Top Filters
- 7. Tableau Build
 - a) Build Groups
 - b) Build Hierarchy
 - c) Build Sets
- 8. Tableau Data Charts
 - a) Bar Chart
 - b) Line Chart
 - c) Pie Chart
 - d) Bubble Chart
 - e) Bump Chart
 - f) Gantt Chart
 - g) Crosstab Chart
 - h) Motion Chart
 - i) Waterfall Chart
 - j) Bullet Chart
 - k) Area Chart
 - l) Pareto Chart
 - m) Axis Chart
- 9. Tableau Maps
 - a) Heat Map
 - b) Tree Map
- 10. Tableau Box Plot, Scatter Plot and Histogram

Total Hours : 90

Course Outcomes:

On successful completion of this course, the student will be able to

1. Recognize Basic operation of Tableau like Aggregation
2. Interpret Meta Data and Data Blending
3. Produce numeric, string, date and table Calculations
4. Assess Data Filters operations
5. Construct Data Visualization methods

CO-PO Mapping and Matrix

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PSO 1	PSO 2	PSO 3
CO 1	-	-	-	-	L	-	-	H	-	-	-	M	M	L
CO 2	M	L	L	L	L	-	-	H	-	-	L	H	H	M
CO 3	M	L	M	M	M	L	-	H	L	L	M	H	H	M
CO 4	M	L	M	H	M	L	L	H	M	M	M	H	H	M
CO 5	H	M	M	H	M	M	M	H	H	M	M	H	H	M

Digital Image Processing -Practical V

Semester III

23MITC19

Hours of Instruction/week:5

No of credits: 3

CourseObjectives:

- 1.To provide the students a general understanding of the fundamentals of digital image processing.
2. To introduce the student the analytical tools currently used in digital image processing
3. To develop the students ability to apply matlab tools in the laboratory for image restoration, enhancement.
4. To illustrate compression techniques on images
5. To experiment edge detection and segmentation techniques in image processing

List of Programs

1. Implement a Program to Perform the Bit-Slicing technique and Extract/Display the Resulting Plane as Separate Matlab Images. Consider Displaying a Mosaic of Several Different Bit-Planes from an Image Using the Subplot function.
2. Implement a Matlab Program to Display the Individual Hue, Saturation and Value Channels of a Given RGB Colour Image and also Display Individual Red, Green and Blue Channel.
3. Implement a Matlab Program to Perform Blurring and De-Blurring techniques on an Image
4. Implement a Matlab Program to Remove Different Noises from an Image Using filtering techniques
5. Implement a Matlab Program for Image Enhancement using Smoothing Techniques
6. Implement a Matlab Program to Enhance the Image using Histogram Equalization Techniques
7. Implement a Matlab Program to Implement Image Restoration Techniques
8. Implement a Matlab Program for Image Compression
9. Implement a Matlab Program for Color Image Processing
10. Implement Morphological Operation on Images Using Matlab
11. Implement and Analyse Different Edge Detection Algorithms
12. Implement a Program to Perform Segment Objects in an Image.

Total Hours : 75

Course Outcomes:

On successful completion of this course, the student will be able to

1. Use matlab tools to solve image processing problems.
2. Write mi function using matlab tool box
3. Develop application-specific algorithms for image processing.
4. Have a practical and visual understanding of the image enhancement and restoration
4. Gain knowledge on compression, edge detection and segmentation techniques in image processing

CO-PO Mapping and Matrix

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PSO 1	PSO 2	PSO 3
CO 1	H	M	M	H	M	L	M	H	H	M	L	M	H	H
CO 2	H	M	M	H	M	L	M	H	H	M	L	M	H	H
CO 3	H	M	M	H	M	L	M	H	H	M	L	M	H	H
CO 4	H	M	M	H	M	L	M	H	H	M	L	M	H	H
CO 5	H	M	M	H	M	L	M	H	H	M	L	M	H	H

Software Project Management (Self Study)

Semester III

23MITC20

Hours of Instruction/week: 1

No of credits: 4

Course Objectives:

1. To define basics of software project management.
2. To understand the software evaluation and costing.
3. To learn about software estimation techniques.
4. To apply Risk Management.
5. To experiment software quality management.

UNIT-I SOFTWARE PROJECT MANAGEMENT CONCEPTS

3

Introduction to Software Project Management: An Overview of Project Planning: Select Project, Identifying Project scope and objectives, infrastructure, project products and Characteristics. Estimate efforts, Identify activity risks, and Allocate resources.

UNIT-II SOFTWARE EVALUATION AND COSTING

3

Project Evaluation: Strategic Assessment, Technical Assessment, cost-benefit analysis, Cash flow forecasting, cost-benefit evaluation techniques, Risk Evaluation. Selection of Appropriate Project approach: Choosing technologies, choice of process models, Structured methods.

UNIT-III SOFTWARE ESTIMATION TECHNIQUES

3

Software Effort Estimation: Problems with over and under estimations, Basis of software Estimation, Software estimation techniques, expert Judgment, Estimating by analogy. Activity Planning: Project schedules, projects and activities, sequencing and scheduling Activities, networks planning models, formulating a network model.

UNIT-IV RISK MANAGEMENT

3

Risk Management: Nature of Risk, Managing Risk, Risk Identification and Analysis, Reducing the Risk. Resource Allocation: Scheduling resources, Critical Paths, Cost scheduling, Monitoring and Control: Creating Framework, cost monitoring, prioritizing monitoring.

UNIT-V SOFTWARE QUALITY MANAGEMENT

3

TQM, Six Sigma, Software Quality: defining software quality, External Standards, Comparison of project management software's: dot Project, Launch pad, openProj. Case study: PRINCE2

Total Hours: 15

TEXT BOOK

1. Bob Hughes & Mike Cotterell, "Software Project Management", Tata McGraw- Hill Publications, Fifth Edition 2012.

REFERENCES

1. S. A. Kelkar, "Software Project Management" PHI, New Delhi, Third Edition ,2013.
2. Richard H.Thayer "Software Engineering Project Management," : IEEE Computer Society
3. Futrell , "Quality Software Project Management", Pearson Education India, 2008
4. http://en.wikipedia.org/wiki/Comparison_of_project_management_software
5. http://www.ogc.gov.uk/methods_prince_2.asp

Course Outcomes:

On successful completion of this course, the student will be able to

1. Describe the basics of project planning.
2. Relate and apply project evaluation and approach.
3. Extend the software estimation to project planning.
4. Demonstrate how to manage risk and resource allocation.
5. Infer the software quality.

CO-PO Mapping and Matrix

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PSO 1	PSO 2	PSO 3
CO 1	H	M	H	M	-	-	M	M	H	H	-	M	M	H
CO 2	H	H	H	M	-	-	M	M	H	H	-	M	M	H
CO 3	H	H	H	M	-	-	M	M	H	H	-	M	M	H
CO 4	H	H	H	M	-	-	M	M	H	H	-	M	M	H
CO 5	H	M	H	M	-	-	M	M	H	H	-	M	M	H