

DHANRAJ BAID JAIN COLLEGE (Autonomous)

Co-Educational Minority Institution

Owned & Managed by Tamilnadu Educational and Medical Trust

Approved by Government of Tamil Nadu & Affiliated to University of Madras

Re-Accredited by NAAC with “A” Grade

Thoraipakkam, Chennai – 600 097.

DEPARTMENT OF COMPUTER SCIENCE M.Sc. (Information Technology)



**SYLLABUS
(Choice Based Credit System)
(Effective from the academic year
2026-27)**

**No. of Semesters-04
Total No. of Credits: 91**

CONTENTS

- i. Regulations
- ii. PO and PSO Description
- iii. PG – Template
- iv. Methods of Evaluation & Methods of Assessment
- v. Semester Index.
- vi. Subjects – Core, Elective, Non major, Skill Enhanced, Ability Enhanced, Extension Activity, Environment, Professional Competency
 - 1) Course Lesson Box
 - 2) Course Objectives
 - 3) Units
 - 4) Learning Outcome
 - 5) Reference and Text Books
 - 6) Web Sources
 - 7) PO & PSO Mapping tables

M.Sc. DEGREE COURSE IN INFORMATION TECHNOLOGY

REGULATIONS

Choice Based Credit System

Programme Outcomes:

- The broad objective of the programme is to prepare students for challenging careers in academia and/or computing industry by providing healthy environment for teaching, learning and research in the core and applied areas of the discipline.
- The programme aims to provide an understanding of advanced Information and Computing Technologies.
 - To keep a balance between fundamental concepts, core areas of information technology and specialized skills required to adapt to the needs of the dynamically evolving industry.
- The intent is on providing a strong foundation in theory along with a clear technology focus.
- To learn and evaluate a range of computing technologies, systems and application services.
- To design, analyze, develop and evaluate high-end systems.
- To undertake challenging projects and work as active researchers.
- To identify and learn about recent research and industry trends.
- To equip the student with a basic knowledge of other domains, disciplines and skills, a social and environmental consciousness and a strong value base.

Programme Specific Outcomes:

- Implement the concept of theory and technology with the design and analysis techniques for solving the complex problems in Information Technology.
- Be curious towards learning new and emerging technologies and adapt quickly to changes.
- Design, execute and evaluate computing projects in academia and industry using current technologies.
- Know the contextual knowledge in information technology and communicate effectively with stakeholders and with the society at large for enhancing the quality of life.
- Be honest in upholding the ethical principles and social responsibilities along with socio- economic innovations.

**MASTER DEGREE COURSE
M.Sc. - Information Technology
SEMESTER SYSTEM WITH CREDITS
(Effective from the academic year 2026-2027)**

REGULATIONS

1. ELIGIBILITY FOR ADMISSION

Pass in B.Sc. degree program with Mathematics or Statistics or Business Mathematics or Business Statistics or Mathematical Physics as main or Allied or any other degree course from any other University accepted as equivalent thereto.

2. ELIGIBILITY FOR THE AWARD OF DEGREE

A Candidate shall be eligible for the award of the degree only if he/she has undergone the prescribed course of study in our College which is affiliated to the University of Madras for a period of not less than two academic years, passed the examinations of all the Four Semesters prescribed earning 91 credits and fulfilled such conditions as have been prescribed therefor.

3. DURATION

- a) Each academic year shall be divided into two semesters. The first academic year shall comprise the first and second semesters, the second academic year comprise of the third and fourth semesters. The odd semesters shall consist of the period from June to November of each year and the even semesters from December to April of each year. There shall be not less than 90 working days for each semester.

4. COURSE OF STUDY

The Main Subject of study for Bachelor Degree shall consist of the following

PART-I: CORE COURSES Consisting of (a) Core Course

(b) Elective Course (c) Extra –Disciplinary Course (d) Application Lab and (e) Team Project.

PART-II: Soft skill courses and Internship program.

5. SCHEME OF EXAMINATION

Scheme of Examination shall be enclosed in APPENDIX - I

6. REQUIREMENTS FOR PROCEEDING TO SUBSEQUENT SEMESTER

- I. Candidates shall register their names for the First Semester Examination after the admission in the PG Courses.
- II. Candidates shall be permitted to proceed from the First Semester up to final semester irrespective of their failure in any of the semester examinations subject to the condition that the candidates should register for all the arrear subjects of earlier semesters along with current (subsequent) Semester Subjects.

- III. Candidates shall be eligible to go to subsequent semester, only if they earn, sufficient attendance as prescribed therefore by the college from time to time, provided in case of a candidate earning less than 50% of attendance in any one of the Semesters due to any extraordinary circumstance such as medical grounds, such candidates who shall produce Medical Certificate issued by the Authorised Medical Attendant (AMA), duly certified by the Principal of the College, shall be permitted to proceed to the next semester and to complete the Course of Study. Such candidates shall have to repeat the missed semester by re-joining after completion of Final Semester of the course, after paying the fee for the break of study as prescribed by the college from time to time.

7. PASSING MINIMUM

A candidate shall be declared to have passed in each paper/practical of the Main Subject of study wherever prescribed, if he/she secures NOT LESS THAN 50% of the marks prescribed for the examination. He/she shall be declared to have passed the whole examination, if he/she passes in all the papers and practicals wherever prescribed as per the scheme of examinations earning 91 CREDITS.

8. CLASSIFICATION OF SUCCESSFUL CANDIDATES

i) PART-I: CORE COURSES Consisting of (a) Core Course (b) Elective Course (c) Extra –Disciplinary Course (d) Application Lab and (e) Team Project.

Successful candidates passing the examinations for Core Courses together and securing the marks 1)60 percent and above (2) 50 percent and above but below 60 percent in the aggregate of the marks prescribed for the Core Courses together shall be declared to have passed the examination in the FIRST CLASS (EXEMPLARY/DISTINCTION/FIRST CLASS) and SECOND CLASS respectively.

9. RANKING

Candidates who pass all the examinations prescribed for the course in the FIRST APPEARANCE ITSELF ALONE are eligible for Classification/Ranking/Distinction.

**MASTER DEGREE COURSE
M.Sc. – INFORMATION TECHNOLOGY
SEMESTER SYSTEM WITH CREDITS
(Effective from the academic year 2026-2027)**

LEARNING OUTCOMES-BASED CURRICULUM FRAMEWORK FOR POSTGRADUATE EDUCATION	
Programme	M.Sc., Information Technology
Programme Code	MSCIT2080
Duration	PG - Two Years
Programme Outcomes (POS)	PO1-Critical Thinking: Apply knowledge of Computer Science to identify, analyse problems and to provide effective solution in the area of Computing. PO2 Computing Skills and Ethics: Analyse a problem, and identify and define the computing requirements appropriate to its solution. PO3 Analytical skill: Ability to design, develop algorithms and provide software solutions to cater the industrial needs. PO4 Modern Tool Usage: Use current techniques, skills, and tools necessary for computing practices PO5 Employability Skills: Inculcate skills to excel in the fields of Information Technology and its Enabled services, Government and Private sectors, Teaching and Research. PO6 Ethics: Insists ethical responsibilities, human and professional values and make their contribution to the society. PO7 Individual and team work: Function effectively as an individual, and as a member or a leader in diverse team and multidisciplinary settings. PO8 Individual and team work: Function effectively as an individual, and as a member or a leader in diverse team and multidisciplinary settings. PO9 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. PO10 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.
Programme Specific	PSO1-Implement the concept of theory and technology with

Outcomes (PSOs)	classical and modern techniques for solving the complex problems in Computer Science. PSO2-Be more curious towards learning new and emerging technologies that adapt quickly to changes. PSO3-Design, execute and evaluate computing projects in academia and industries using appropriate technologies. PSO4-Know the contextual knowledge in computing science research and communicate effectively with stakeholders with the society at large for enhancing the quality of life. PSO5-Be honest in upholding the ethical principles and social responsibilities along with socio-economic innovations.
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PG DEPARTMENT OF COMPUTER SCIENCE
M.Sc.Information Technology
(Effective from the academic year 2026-2027)
ALLOCATION OF CREDITS
Credit Distribution for PG Programme

Semester-I	Credit	Semester-II	Credit
Core-1	4	Core-6	4
Core-2	4	Core-7	4
Core – 3	4	Core – 8 Application Lab	2
Core – 4 Application Lab	2	Core-9 Application Lab	2
Core-5 Application Lab	2	Elective-II	3
Elective -I	3	Elective –III	3
Soft Skill –I	2	Soft Skill -II	2
		Soft Skill-III	2
Total	21	Total	22

METHODS OF EVALUATION		
Internal Evaluation	Continuous Internal Assessment Test	40 Marks
	Assignments / Snap Test / Quiz	
	Seminars	
	Attendance and Class Participation	
External Evaluation	End Semester Examination	100 Marks will be converted in to 60 Marks
Total		100 Marks

**EXTERNAL QUESTION PAPER PATTERN-
TOTAL MARKS -100 MARKS
CONDUCTED FOR 100 MARKS –CONVERSION TO 60 MARKS**

SECTION – A (30 words)

Answer Any Ten Questions out of Twelve Questions

10 X 2 = 20 marks

SECTION – B (200 words)

Answer Any FIVE Questions out of Eight Questions

5 x 7 = 35 marks

SECTION – C (500 words)

Answer any THREE Questions out of FIVE

3x 15 = 45 marks

TOTAL = 100 marks

APPENDIX-I
M.Sc. - Information Technology
 Course of Study and scheme of examinations:

FIRST YEAR FIRST SEMESTER

Course components	Name of the Course	Ins. Hour	credits	Exa m.	Max. Marks	
					IA	UE
Core -1	Advanced RDBMS	5	4	3	40	60
Core -2	Advanced Python Programming	5	4	3	40	60
Core -3	Data Structures	5	4	3	40	60
Elective-1	Elective-I: Choose any one from LIST –ELECTIVE-ONE					
		5	3	3	40	60
Core – 4	Practical – I: Advanced RDBMS Lab	4	2	3	40	60
Core – 5	Practical – II: Advanced Python Programming Lab.	4	2	3	40	60
SoftSkill-1	Communication Skills for Software Engineers	2	2	3	40	60
	Total	30	21			

FIRST YEAR SECOND SEMESTER

Course components	Name of Course				Max. Marks		
					CIA	UE	Tot
Core-6	Design & Analysis of Algorithms	5	4	3	40	60	100
Core-7	Programming in Java	5	4	3	40	60	100
Elective -II	Elective – II : Choose any one from Elective List II	4	3	3	40	60	100
Elective -III	Elective – III : Choose any one from Elective-List III	4	3	3	40	60	100
Core-8	Practical – III : Java Programming Lab	4	2	3	40	60	100
Core -9	Practical – IV : Based on Elective III Lab.	4	2	3	40	60	100
Core-9A	Practical –Web Technology Lab						
Core-9B	Practical -.Net Programming Lab						
Core-9C	Practical – Mobile Application Development Lab.						
Core-9D	Practical-Data Mining Lab						
SoftSkill-2	General aptitude for competitive Examinations	2	2	3	40	60	100
Soft skill-3	Team Project	2	2	3	40	60	100
	Internship Training						
	Total	30	22				

Elective – I-

Industrial Internet of Things
 Data Warehousing & Data Mining
 E-Commerce
 Agile Software Engineering

Elective – II-

Block chain Technology
 Cloud Computing
 Software Testing

Soft computing

Elective – III

Web Technology

.Net Programming

Mobile Application Development

Data Mining

QUESTION PAPER PATTERN AND MARKS DISTRIBUTION

SECTION	UNIT-I	UNIT-II	UNIT-III	UNIT-IV	UNIT-V	TOTAL
	THEORY	THEORY	THEORY	THEORY	THEORY	
SECTION A (2 MARKS) ANSWER ANY TEN QUESTIONS 10 X 2 =20 MARKS	3	3	2	2	2	12
SECTION B (5 MARKS) ANSWER ANY FIVE QUESTIONS OUT OF EIGHT 5X 7 =35 MARKS	1	1	2	2	2	08
SECTION C (10 MARKS) ANSWER ANY 3 OUT OF 5 3 X 15=45 MARKS	1	1	1	1	1	05
TOTAL	5	5	5	5	5	25

M.Sc., INFORMATION TECHNOLOGY SYLLABUS

Title of the Course/ Paper	Advanced RDBMS	
Core – 1	I Year & I Semester	Credit: 4

Course Introduction

This course enables the student skills and knowledge to tackle complex database challenges, optimize database performance, and design efficient database solutions using advanced RDBMS.

Course Focus on: Skill Development/ Entrepreneurship / Employability / Research.

Course Outcomes On completion of this course, students will

- CO 1: Proficiency in writing and optimizing complex SQL queries.
- CO 2: Skills in tuning queries, indexing, and monitoring for optimal performance.
- CO 3: Ability to design efficient and scalable database schemas.
- CO 4: Understanding of transaction management and concurrency control.
- CO 5: Proficiency in database security concepts and implementation.

Unit I: File System Vs. DBMS

Introduction to DBMS – File System vs. DBMS – Applications of DBMS – Data Abstraction and Views – Database Languages (DDL, DML, DCL, TCL) – Database Design – ER Model – Relational Model – Database Architecture.

Unit II: Relational Model

Relational Model – Relational Algebra and Calculus – SQL Basics – Data Definition and Manipulation – Set Operations – Aggregate Functions – NULL Values – Joins – Nested Queries – Views – Advanced SQL – Triggers.

Unit III: Functional Dependencies

Functional Dependencies – Database Design Principles – Decomposition – Normalization (1NF, 2NF, 3NF, BCNF) – Multivalued Dependencies – Join Dependencies – Domain-Key Normal Form (DKNF).

Unit IV: Database Storage and Transactions

Physical Storage – File Organization – Indexing – B-Tree and B+ Tree – Hashing – Query Processing – Transaction Management – ACID Properties – Concurrency Control – RAID.

Unit V: Distributed Databases

Distributed Databases – Distributed Transactions – Concurrency Control – Object-Oriented Databases – Structured Types in SQL – XML Basics – XML Schema and Querying – Data Warehousing – Data Mining.

Text Books:

1. Abraham Silberschatz, Henry F. Korth and S. Sudarshan- “Database System Concepts”, Fifth Edition, McGraw-Hill, 2006.
2. Date CJ (2003). An Introduction to Database Systems, 8/e, Pearson Education.

References

1. Raghu Ramakrishnan and Johannes Gehrke, “Database Management Systems”, Tata McGraw-Hill Publishing Company, 2003.
2. Ramez Elmasri and Shamkant B. Navathe, “Fundamental Database Systems”, Third Edition, Pearson Education, 2003.
3. Hector Garcia-Molina, Jeffrey D. Ullman and Jennifer Widom- “Database System Implementation”- Pearson Education- 2000.
4. Narang, “Database Management Systems”, 2nd ed., PHI.

Web Resources:

1. https://www.w3schools.com/sql/sql_ref_mysql.asp
2. <https://learn.microsoft.com/en-us/sql/?view=sql-server-ver16>

Mapping with Programme Outcomes:

Map course outcomes for each course with programme outcomes (PO) in the 3-point scale of Strong, Medium and Low

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	S	S	M	S	S	M	M	S	L
CO2	M	S	M	M	M	S	L	L	M	L
CO3	M	M	S	M	M	S	M	L	M	L
CO4	M	M	S	M	M	M	M	S	M	L
CO5	S	S	S	S	M	S	S	S	S	S

Title of the Course/Paper	Advanced python Programming		
Core–2	I Year & I Semester	Credit: 4	

Course Objectives

- To learn how to use lists, tuples, and dictionaries in Python programs.
- To learn how to identify Python object types.
- To learn how to use files and exception handling in Python programs.

Course Outcomes:

- Design and implement Python programs: Develop the ability to design, code, test, and debug Python programs effectively.
- Apply OOP principles: Demonstrate the ability to use object-oriented programming concepts to solve complex problems.
- Utilize the Python standard library: Become proficient in using the Python standard library and other modules.

Unit-1 : Introduction - History of Python - Getting Started with Python - Programming style and Documentation – Identifiers – Variables - Assignment statements – Expressions - Data Types – Operators – Precedence – Comments - Type Conversions - Common Python Functions - Introduction to Methods and Strings.

Unit-2 : Loops and Functions Introduction – Scope - IF Statements - Types of IF Statements - Conditional Expressions - Loops - While Loops - For Loop - Nested Loops – Functions – Definitions - Default Arguments - Calling a Function - Functions with or without returning values - Passings arguments to a function - Call by Value - Call by Reference – Recursion.

Unit-3 - Classes and Objects Introduction to Object oriented Programming - Need of class and objects - Defining classes - Constructing Objects - Abstraction and Encapsulation - Overriding Methods - Inheritance and Polymorphism - Modules and Packages - Introduction to String Class - String Functions - Formatting Strings.

Unit-4 – Lists - Tuples - Sets. Introduction to Lists - Creation of List - Functions for Lists - Passing List to Functions - Operation on Lists - Searching and Sorting - Multidimensional Lists - Advanced List Processing - Sample programs on Lists - Lotto number and Deck of Cards - Introduction to Tuples - Sets - Creation and Accessing Sets - Dictionary Operations and Methods.

Unit-5 - Files and Exception Handling. Introduction - Structure of File - Opening and Writing Data- Accessing Files - File Dialogs - Retrieving data from web - Introduction to Exceptions - Errors and Exceptions - Command line arguments - Need for Exception - Handling Exceptions - Raising Exceptions - Exception Objects - Custom Exception Classes.

Recommended Texts:

1. Y.Daniel Liang, "Introduction to Programming using Python" 1st edition, Pearson, 2021,
2. Karl Beecher, "Computational Thinking-A beginners guide to problem solving and programming, 2017
3. Allen Downey, "Think Python - How to Think Like a Computer Scientist, Green Tea Press, 2021

Reference Books

1. Mark Lutz, "Learning Python Powerful Object Oriented Programming", O'reilly Media 2018, 5th Edition.
2. Timothy A. Budd, "Exploring Python", Tata McGraw Hill Education Private Limited 2011, 1 st Edition.
3. John Zelle, "Python Programming: An Introduction to Computer Science", Second edition, Course Technology Cengage Learning Publications, 2013, ISBN 978- 1590282410
4. Michel Dawson, "Python Programming for Absolute Beginners", Third Edition, Course Technology Cengage Learning Publications, 2013, ISBN 978-1435455009

Web resources

https://onlinecourses.swayam2.ac.in/cec22_cs20/preview

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	S	L	L	S	L	L	M	L	S
CO2	M	S	L	M	S	M	M	M	S	S
CO3	M	S	M	S	S	M	S	S	M	S
CO4	S	S	S	S	S	S	M	M	S	S
CO5	M	S	S	M	,M	L	L	L	L	L

S-Strong M-Medium L-Low

Title of the Course/Paper	Data Structures		
Core-3	I Year & I Semester	Credit: 4	

Course Objective

- Ability to choose appropriate data structure as applied to specified problem definition.
- To learn data structures-lists, stacks, queues
- To learn Linked list structures and its application
- To learn Tree and graph structures and application of graphs

Course Outcomes:

On completion of this course, students will

- Understand the concept of data structures, Time and space complexity, arrays its representation
- Implement data structure concepts like Linear list, linked lists
- Understand basic data structures such as stacks and queues
- Recognize the non linear data structures like graphs and trees
- Demonstrate different applications of data structures.

Unit-1: Data Structures: Definition - Time & Space Complexity, Arrays: Representation of arrays, Applications of arrays, sparse matrix and its representation.

Unit-2: Linear list: Singly linked list implementation - insertion, deletion and searching operations on linear list - Circular linked list: implementation - Double linked list implementation, insertion, deletion and searching operations - Applications of linked lists - Dynamic Storage management

Unit -3: Stacks: Operations - array and linked representations of stack - stack applications - infix to postfix conversion, postfix expression evaluation - recursion implementation - Queues: operations on queues, array and linked representations. Circular Queue: operations, applications of queues.

Unit 4: Trees: Definitions and Concepts- Representation of binary tree, Binary tree traversals (Inorder, Postorder, preorder), Binary search trees.

Unit-5: Graphs : Representation of Graphs - Types of graphs - Breadth first traversal - Depth first traversal - Applications of graphs.

Recommended Texts:

1. Mark Allen Weiss, - Data Structures and Algorithm, Analysis in C++, Pearson Education 2014, 4th

Edition.

2. Reema Thareja, - Data Structures Using C++, Oxford Universities Press 2014, 2nd Edition.

Reference Books:

1. Thomas H. Cormen, Chales E.Leiserson, Ronald L. Rivest, Clifford Stein, —Introduction to Algorithms, McGrawHill2009, and 3rd Edition.
2. Aho, HopcroftandUllman,—Data Structures and Algorithmsll, Pearson Education 2003

Web Resources

NPTEL & MOOC courses titled Data Structures

<https://nptel.ac.in/courses/106106127/>

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	M	M	M	M	M	M	L
CO2	S	M	S	S	L	S	S	L	M	M
CO3	S	S	S	S	M	L	S	M	L	M
CO4	S	S	M	S	L	S	S	M	M	S
CO5	S	S	M	L	S	S	S	S	S	S

S-Strong M-Medium L-Low

Syllabus of Elective courses.

Industrial Internet of Things (IIOT)

Course Objectives

This course enables the student to explore the foundational principles of grounding in basic and advanced methods to of Industrial Internet of Things (IIOT) Course Focus on: Skill Development/ Entrepreneurship / Employability / Research

Course Outcomes On completion of this course, students will

CO 1: Understand key skills employed in the IIoT&IoRT space building applications

CO 2: Design suitable network architecture and use appropriate learning algorithm.

CO 3: Comprehend IOT protocols

CO 4: Implement IP and Non IP

CO 5: Implement IOT systems for robotics

Unit I: Introduction IIoT; Market Size and Potential

Introduction IIoT –Definition- IoT v IIoT- Next Generation Sensors-Sensor's calibration and validate sensor measurements- placement of IoT devices- sensors, low-cost communication system design- Top application areas include manufacturing-oil & gas, Embedded systems in the Automotive and Transportation market segment.

Unit II: IIoT Methodology

Introduction- IIoT Methodology -Top operating systems used in IIoT deployments- Networking and wireless communication- protocols used in IIoT deployments- Smart Remote Monitoring Unit-components of monitoring system- control and management- Wireless Sensor Networ(WSN).

Unit III: Data driven Analytics of IIoT

Impl Data driven Analytics of IIoT- Implementing of industrial IoT Data flow- big data and how to prepare data for machine learning algorithms- Machine Learning algorithms- supervised learning & Un-supervised learning algorithms- Basics of neural network- activation functions,-back-propagation.

Unit IV: IP and Non-IP Protocols for IoT

Introduction to IP and Non-IP Protocols for IoT- WPAN- IEEE 802.15.4,-Bluetooth- NFC,-LoWPAN- RFID- Zigbee Wireless HART Protocol- MQTT- IP and Non-IP Protocols,-REST,-CoAP.

Unit V: Internet of Robotic Things (IoRT)

Introduction to stationary and mobile robots- Brief introduction to localization,-mapping, planning, and control of robotic systems- Introduction to cloud-enabled robotics- Applications of IIoT in robotics- Architectures for IoRT-Examples and case studies- Open issues and challenges.

Text Books:

1. S. Misra, C. Roy, and A. Mukherjee, Introduction to Industrial Internet of Things and Industry 4.0. CRC Press.2020 3.
2. Dr. Guillaume Girardin , Antoine Bonnabel, Dr. Eric Mounier, 'Technologies Sensors for the Internet of Things Businesses & Market Trends 2014 -2024', Yole Development Copyrights ,2014 4.
3. Peter Waher, 'Learning Internet of Things', Packt Publishing, 2015

Reference Books:

1. “Industry 4.0: The Industrial Internet of Things”, Alasdair Gilchrist, Apress, 2016
2. “Introduction to Industrial Internet of Things and Industry 4.0”, Sudip Misra, Chandana Roy, Anadarup Mukherjee, CRC Press, 2021 3
3. “Hands on Industrial Internet of Things”, Giacomo Veneri, Antonio Capasso, Packt Press, 2018.

Web Resources:

- 1 <https://www.tutorialspoint.com/iiot/>
- 2 iiot.apache.org/

Mapping with Programme outcomes*										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	S	M	L	S	M	L	M	S	L
CO2	S	M	S	M	S	M	M	L	M	L
CO3	M	S	M	S	M	S	L	L	L	M
CO4	S	L	M	M	S	L	L	M	M	S
CO5	S	S	M	S	L	S	M	L	M	L

Title of the Course/ Paper	Data Mining and Data Warehousing		
Elective-1	I Year & I Semester	Credit:3	

Course Objective:

- To understand the principles of Data warehousing and Data Mining.
- To be familiar with the Data warehouse architecture and its Implementation.
- To know the Architecture of a Data Mining system.
- To understand the various Data preprocessing Methods.
- To perform classification and prediction of data.

Course Outcomes:

- Define the scope and necessity of Data Mining & Warehousing for the society.
- Modeling and design of data ware houses.
- Comparing the design of data warehousing techniques so that it can be able to solve the root problem.
- Apply various tools of Data Mining and their techniques to solve the real time problems.
- To analyze and design various algorithms based on data mining tools.
- To evaluate research and design of new Data Mining Techniques.

Unit-1: Data Warehousing and Business Analysis: - Data warehousing Components –Building a Data warehouse –Data Warehouse Architecture – DBMS Schemas for Decision Support – Data Extraction, Cleanup, and Transformation Tools – Metadata – reporting Query tools and Applications – Online Analytical Processing(OLAP) – OLAP and Multidimensional Data Analysis.

Unit-2: Data Mining: - Data Mining Functionalities – Data Preprocessing – Data Cleaning – Data Integration and Transformation – Data Reduction – Data Discretization and Concept Hierarchy Generation- Architecture Of A Typical Data Mining Systems- Classification Of Data Mining

Systems. Association Rule Mining: - Efficient and Scalable Frequent Item set Mining Methods
 –Mining Various Kinds of Association Rules – Association Mining to Correlation Analysis
 –Constraint-Based Association Mining.

Unit-3: Classification and Prediction: - Issues Regarding Classification and Prediction
 –Classification by Decision Tree Introduction – Bayesian Classification – Rule Based Classification – Classification by Back propagation – Support Vector Machines – Associative Classification – Lazy Learners – Other Classification Methods– Prediction– Accuracy and Error Measures – Evaluating the Accuracy of a Classifier or Predictor – Ensemble Methods –Model Section.

Unit-4: Cluster Analysis: - Types of Data in Cluster Analysis – A Categorization of Major Clustering Methods – Partitioning Methods – Hierarchical methods – Density-Based Methods –Grid-Based Methods – Model-Based Clustering Methods – Clustering High-Dimensional Data –Constraint-Based Cluster Analysis– Outlier Analysis.

Unit-5: Mining Object, Spatial, Multimedia, Text and Web Data: Multidimensional Analysis and Descriptive Mining of Complex Data Objects – Spatial Data Mining – Multimedia Data Mining – Text Mining– Mining the World Wide Web.

Recommended Texts:

1. JiaweiHan, Micheline KamberandJianPei “Data Mining Concepts and Techniques”,Third Edition, Elsevier, 2011.

Reference Books:

1. Alex Berson and Stephen J.Smith“Data Warehousing, Data Mining & OLAP”,TataMcGraw–Hill Edition, Tenth Reprint 2007.
2. K.P.Soman, Shyam Diwakarand V.Ajay“Insight into Data mining Theory and Practice”, Easter Economy Edition, PrenticeHallofIndia,2006.
3. G.K.Gupta “Introduction to Data Mining with CaseStudies”,Easter Economy Edition, Prentice Hall of India, 2006.
4. PangNingTan,Michael Steinba chand VipinKumar“Introduction to Data Mining”, Pearson Education, 2007.

E-learning resources:

- <https://nptel.ac.in/courses/106105174>
- https://onlinecourses.nptel.ac.in/noc21_cs06/preview
- https://onlinecourses.swayam2.ac.in/cec20_cs12/preview

Mapping with Programme Outcomes:										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	S	M	L	S	M	L	M	S	L
CO2	S	M	S	M	S	M	M	L	M	L
CO3	M	S	M	S	M	S	L	L	L	M
CO4	S	L	M	M	S	L	L	M	M	S
CO5	S	S	M	S	L	S	M	L	M	L
S-Strong			M-Medium		L-Low					

Title of the Course/Paper	E-Commerce		
Elective-1	I Year & I Semester	Credit:3	

Course Objectives:

- To Learn the E-Commerce Platform and its concepts
- To Understand the Technology, infrastructure and Business in E-Commerce
- To Understand the Security and Challenges in E-Commerce
- To Build an Own E-Commerce using Open Source Frameworks

Course Outcomes:

- Design Website using HTML,CSS and JS
- Design Responsive Sites
- Manage, Maintain and Support Web Apps

Unit-1: Introduction To E-Commerce And Technology Infrastructure : Working of Web - HTML Markup for Structure - Creating simple page - Marking up text - Adding Links - Adding Images - Table Markup - Forms -HTML5.

Unit-2: Building an Commerce website, Mobiles and its apps Systematic approach to build an E-Commerce: Planning, System Analysis, System Design, Building the system, Testing the system, Implementation and Maintenance, Optimize Web Performance – Choosing hardware and software –Other E-Commerce Site tools – Developing a Mobile Website and Mobile App.

Unit-3: E-Commerce security and Payment systems. E-Commerce Security Environment – Security threats in E-Commerce – Technology Solutions: Encryption, Securing Channels of Communication, Protecting Networks, Protecting Servers and Clients – Management Policies, Business Procedure and Public Laws- Payment Systems

Unit-4: Business concepts in e-Commerce. Digital Commerce Marketing and Advertising strategies and tools – Internet Marketing Technologies – Social Marketing – Mobile Marketing – Location based Marketing –Ethical, Social, Political Issues in E-Commerce.

Unit-5: Project Case Study Case Study: Identify Key components, strategy, B2B, B2C Models of E-commerce Business model of any e-commerce website – Mini Project : Develop E-Commerce project in any one of Platforms like Woo-Commerce, Magento or Opencart

Text book:

1. Kenneth C. Laudon,CarolGuercioTraver—E-Commerce,Pearson,10th Edition,2016

References

1. <http://docs.opencart.com/>
2. <http://devdocs.magento.com/>
3. <http://doc.prestashop.com/display/PS15/Developer+tutorials>
4. Robbert Ravens bergen,—Building E-Commerce Solutions with Woo Commerce, PACKT, 2nd Edition

Mapping with Programmers outcomes*										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	S	M	L	S	M	L	M	S	L
CO2	S	M	S	M	S	M	M	L	M	L
CO3	M	S	M	S	M	S	L	L	L	M
CO4	S	L	M	M	S	L	L	M	M	S
CO5	S	S	M	S	L	S	M	L	M	L
S-Strong			M-Medium			L-Low				

Title of the Course/Paper	Agile Software Engineering		
Elective-1	I Year & I Semester	Credit:3	

Course Objectives:

- To provide students with a theoretical as well as practical understanding of agile software development practices and how small teams can apply them to create high-quality software.
- To provide a good understanding of software design and a set of software technologies and APIs.
- To do a detailed examination and demonstration of Agile development and testing techniques.
- To understand the benefits and pitfalls of working in an Agile team.
- To understand Agile development and testing.

Course Outcomes:

- Realize the importance of interacting with business stake holders in determining the requirements for a software system
- Perform iterative software development processes : how to plan them, how to execute them.
- Point out the impact of social aspects on software development success.
- Develop techniques and tools for improving team collaboration and software quality.
- Perform Software process improvement as a non going task for development teams.
- Show how agile approaches can be scaled upto the enterprise level.

Unit-1: Agile Methodology: Theories for Agile Management – Agile Software Development – Traditional Model vs. Agile Model - Classification of Agile Methods –Agile Manifesto and Principles – Agile Project Management – Agile Team Interactions –Ethics in Agile Teams - Agility in Design, Testing – Agile Documentations – Agile Drivers, Capabilities and Values

Unit-2: Agile Processes: Lean Production - SCRUM, Crystal, Feature Driven Development-Adaptive Software Development-Extreme Programming: Method Overview–Lifecycle–Work Products, Roles and Practices.

Unit-3 :Agility and knowledge management: Agile Information Systems – Agile Decision Making - Earl_S Schools of KM – Institutional Knowledge Evolution Cycle–Development, Acquisition, Refinement, Distribution, Deployment, leveraging – KM in Software Engineering –Managing Software Knowledge– Challenges of Migrating to Agile Methodologies – Agile Knowledge Sharing – Role of Story-Cards– Story-Card Maturity Model (SMM).

Unit-4: Agility and requirements engineering: Impact of Agile Processes in RE–Current Agile Practices – Variance – Overview of RE Using Agile –Managing Unstable Requirements – Requirements Elicitation–Agile Requirements Abstraction Model–Requirements Management in Agile Environment, Agile Requirements Prioritization – Agile Requirements Modeling and Generation–Concurrency in Agile Requirements Generation.

Unit-5: Agility and Quality assurance :Agile Product Development–Agile Metrics – Feature Driven Development (FDD) – Financial and Production Metrics in FDD – Agile Approach to Quality Assurance - Test Driven Development – Agile Approach in Global Software Development.

Recommended Texts:

1. David J. Anderson and Eli Schragenheim, —Agile Management for Software Engineering: Applying the Theory of Constraints for Business Results, PrenticeHall,2003.
2. Hazza and Dubin sky,—Agile Software Engineering, Series: Under graduate Topics in Computer Science, Springer, 2009.

Reference Books:

- CraigLarman,—AgileandIterativeDevelopment:AManager_sGuide,Addison-Wesley,2004.
- Kevin C. Desouza,—Agile Information Systems: Conceptualization, Construction, and Management, Butterworth-Heinemann,2007.

Web References:

- <https://www.youtube.com/watch?v=x90kIAFGYKE&t=8s>

Mapping with Programmers outcomes*										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	S	M	S	M	S	L	M	L	L
CO2	S	M	M	S	M	M	S	L	M	L
CO3	L	M	S	L	M	S	M	L	S	M
CO4	S	L	L	M	M	L	L	S	M	S
CO5	M	S	M	L	S	M	M	L	M	L

S-Strong

M-Medium

L-Low

Title of the Course/Paper	Practical– I: Advanced RDBMS Lab		
Core–4	I Year & I Semester	Credit:2	

List of Practical Programs:

1. Practical Based on Data Manipulation.
 - Adding data with Insert, • Modify data with Update, • Deleting records with Delete
2. Practical Based on Implementing the Constraints.
 - NULL and NOT NULL, • Primary Key and Foreign Key Constraint • Unique, Check and Default Constraint
3. Practical for Retrieving Data Using following clauses.
 - Simple select clause, • Accessing specific data with Where, Ordered By, Distinct and Group By
4. Practical Based on Aggregate Functions.
 - AVG, • COUNT, • MAX, • MIN, • SUM, • CUBE
5. Practical Based on implementing all String functions.
6. Practical Based on implementing Date and Time Functions.
7. Practical Based on implementing use of union, intersection, set difference.
8. Implement Nested Queries & JOIN operation.

Mapping with Programmers outcomes*										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	S	S	M	S	L	M	L	L
CO2	S	S	M	S	M	L	L	L	M	L
CO3	L	M	S	L	M	S	S	L	S	M
CO4	S	L	L	M	L	L	M	S	M	S
CO5	M	S	M	L	S	S	M	L	M	L

S-Strong

M-Medium

L-Low

Title of the Course/Paper	Practical.-II:Python Programming Lab		
Core-5	I Year & I Semester	Credit:2	

Course Objective:

- To implement the python programming features in practical applications.
- To write, test, and debug simple Python programs.
- To implement Python programs with conditionals and loops.
- Use functions for structuring Python programs.
- Represent compound data using Python lists, tuples, dictionaries, turtles, Files and modules.

Course Outcomes:

- Understand the numeric or real life application problems and solve them
- Apply a solution clearly and accurately in a program using Python.
- Apply the best features available in Python to solve the situational problems

List of Exercise:

1. Design a script in Scratch to make a sprite to draw geometrical shapes such as Circle, Triangle, Square, and Pentagon.
2. Design a script in Scratch to make a sprite to ask the user to enter two different numbers and an arithmetic operator and then calculate and display the result
3. Design a Python Script to convert a given number to words
4. Design a Python script to convert a Binary number to Decimal number and verify if it is a Perfect number.
5. Design a Python script to sort numbers specified in a text file using lists.
6. Design a Python script to determine the difference in date for given two dates in YYYY: MM: DD format $0 \leq YYYY \leq 9999$, $1 \leq MM \leq 12$, $1 \leq DD \leq 31$ following the leap year rules.
7. Design a Python Script to determine the Square Root of a given number without using inbuilt functions in Python
8. Design a Python Script to generate the frequency count of words in a text file.
9. Design a Python Script to print a spiral pattern for a 2 dimensional matrix
10. Write a Python program to create a dictionary grouping a sequence of key-value pairs into a dictionary of lists. Original list: [('yellow', 1), ('blue', 2), ('yellow', 3), ('blue', 4), ('red', 1)] Grouping a sequence of key-value pairs into a dictionary of lists: {'yellow': [1, 3], 'blue': [2, 4], 'red': [1]}

11. Design a Python script to generate statistical reports (Minimum, Maximum, Count, Average & Sum) on public datasets
12. Write a Python program to check that a string contains only a certain set of characters in this case a-z, A-Z and 0-9
13. Write a Python program to find the occurrence and position of the substrings within a string.

Mapping with Programmers outcomes*										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	M	S	M	M	L	M	L	L
CO2	S	S	M	S	S	M	L	L	M	L
CO3	M	M	S	L	L	S	S	L	S	M
CO4	S	L	L	M	M	L	L	S	M	S
CO5	M	S	M	L	S	M	M	L	M	L

S-Strong
M-Medium
L-Low

Syllabus of Soft Skill Courses

Title of the Course/Paper	Communication Skills for Software Engineers		
Soft Skill -1	I Year– I-Semester		Credit:2

Course Objectives:

- Understand the need of current soft skills
- Generalize self development and implementation procedures
- Demonstrate narration skills
- Design simple comprehension with given requirements
- Develop implementations in latest technologies
- Demonstrate the applications with varied soft skills like debate, oration, tell about yourself etc.

Course Outcomes:

- Enumerate varied soft skills needed for employment
- Identify the lack in one self and improve it
- Learn the current technical implementations
- Summarize the different requirements for employability
- Calculate self performance, Generalize narration, oration and debate skills
- Conceptualize the representation of current technologies

1. Basics of Communication

Definition and process of communication

Types of communication-formal and informal, oral and written, verbal and non-verbal

Communications barriers and how to overcome them

Barriers to Communication, Tools of Communication

2. Application of Grammar

Parts of Speech(Noun, verb, adjective, adverb)and modals

Sentences and its types

Tenses

Active and Passive Voice

Punctuation

Direct and Indirect Speech

3. Reading Skill

Unseen passage for comprehension (one word substitution, prefixes, suffixes, antonyms, synonyms etc. based upon the passage to be covered under this topic)

4. Writing Skill

a. Picture composition

b. Writing paragraph

c. Notice writing

5. Listening and Speaking Exercises

1. Self and peer introduction
2. Newspaper reading
3. Just a minute session-Extempore
4. Greeting and starting a conversation
5. Leave taking
6. Thanking
7. Wishing well
8. Talking about likes and dislikes
9. Group Discussion
10. Listening Exercises.

- Student should be encouraged to participate in role play and other student centered activities in class room and actively participate in listening exercises
- Assignments and quiz/class tests, mid-semester and end-semester written tests—Actual practical work, exercises and viva-voce—Presentation and viva-voce.

Recommended Texts:

1. Communicating Effectively in English, Book-I by Revathi Srinivas; Abhishek Publications, Chandigarh.
2. Communication Techniques and Skills by R. K. Chadha; Dhanpat Rai Publications, New Delhi.

Reference Books:

1. High School English Grammar and Composition by Wren & Martin; S. Chand & Company Ltd., Delhi.
2. Excellent General English- R.B. Varshney, R.K. Bansal, Mittal Book Depot, Malhotra
3. The Functional aspects of Communication Skills – Dr.P.Prasad, S.K.Katria & Sons, New Delhi
4. Q. Skills for success—Level & Margaret Books, Oxford University Press.
5. e-books/e-tools/relevant software to be used as recommended by AICTE/NITTTR, Chandigarh.

WebReferences:

1. <http://www.mindtools.com>
2. <http://www.letstalk.com.in>
3. <http://www.englishlearning.com>
4. <http://learnenglish.britishcouncil.org/en/>
5. <http://swayam.gov.in>

Mapping with Programmers outcomes*										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	L	L	M	S	M	S	L	S	S	M
CO2	S	M	L	M	L	S	M	L	M	S
CO3	M	S	S	L	M	S	L	M	S	M
CO4	S	L	S	M	S	L	L	M	M	S
CO5	S	M	L	S	L	M	S	L	M	S

S-Strong

M-Medium

L-Low

FIRST YEAR SECOND SEMESTER

Title of the Course/Paper	Design and Analysis of Algorithms		
Core-6	I Year & II Semester	Credit:4	

Course Objectives:

- To define the term Algorithm in the context of problem solving. To make students understand the design and analysis process of algorithms for simple problems.
- Understand various algorithm design methods, apply them for problem solving and analyze the complexity for simple problems.
- Study algorithm design methods for complex problems and compare and analyze the complexity of approximate and exact algorithms.
- Calculate and measure the performance of algorithms and compare the results. Critically assess the performance.
- Differentiate the concepts studied with certain selected examples and compare and generalize.

Course Outcomes:

- Learn about simple problems and complexity of their solutions.
- To understand the role of algorithms in problem solving. Learn and understand the asymptotic analysis of algorithms.
- Learn and analyze various algorithm design methods through general principles and with selected set of example problems.
- Conceptualize and use these methods to solve complex real world problems particularly problems involved in industrial projects.
- Critically analyze and compare the algorithms for a set of selected example problems which are hard in nature with design approaches like greedy, dynamic programming and branch and bound etc.

Unit-1: Introduction – Definition of Algorithm – pseudo code conventions – recursive algorithms – time and space complexity – big-“oh” notation – exponentiation – practical complexities – randomized algorithms – repeated element – primality testing – Disjoint Sets-disjoint set operations, union and find algorithms.

Unit-2: Divide and Conquer: General Method - Finding maximum and minimum - merge sort –Quick sort, Selection, Strassen's matrix multiplication.

Unit-3: Greedy Method: General Method–knap sack problem – Tree vertex splitting - minimum

cost spanning trees - Job sequencing with deadlines – single source shortest paths. Dynamic Programming: General Method - multistage graphs – all pairs shortest paths — 0/1 knapsack.

Unit-4: Search techniques for graphs – DFS – BFS – connected components – Spanning trees – bi connected components. Back Tracking: General Method – 8 – queens – Sum of subsets – Graph Coloring – Hamiltonian cycles.

Unit-5: Branch and Bound: General Method - Job sequencing with deadlines – 0/1 knap sack problem- Traveling Sales person problem. – Basic Concepts of NP-Hard and NP-Complete problems.

Recommended Texts:

1. E. Horowitz, S. Sahni and S. Rajasekaran, 2008, Computer Algorithms, 2nd Edition, Universities Press, India.

Reference Books

1. G. Brassard and P. Bratley, 1997, Fundamentals of Algorithms, PHI, New Delhi.
2. A. V. Aho, J. E. Hopcroft, J. D. Ullmann, 1974, The Design and Analysis of Computer Algorithms, Addison Wesley, Boston.
3. S. E. Goodman and S. T. Hedetniemi, 1977, Introduction to the Design and Analysis of Algorithms, Tata McGraw Hill Int. Edn, New Delhi.

E-learning resources

1. <http://www.cise.ufl.edu/~raj/BOOK.html>

Mapping with Programmers outcomes*										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	M	S	M	M	L	M	L	L
CO2	S	S	M	S	M	M	L	L	M	L
CO3	L	M	S	L	M	S	S	L	S	M
CO4	S	L	L	M	M	L	L	S	M	S
CO5	M	S	M	L	S	M	M	L	M	L

S-Strong

M-Medium

L-Low

Title of the Course/Paper	Programming in Java		
Core-7	I Year & II Semester	Credit:4	

Course Objectives:

- To understand the concepts of Object Oriented Programming.
- To learn about the control structures, class with attributes and methods used in Java

Course Outcomes:

- Knowledge of the structure and model of the Java programming language.
- Understand the basic principles of creating Java applications with GUI.
- Demonstrate use of string and String Buffers, develop multithreaded programs in Java

Unit-I: The History and Evolution of Java – Object Oriented Programming - Data Types, Variables and Arrays-Operators – Control Statements.

Unit-II: Introducing Classes-Class Fundamentals–Declaring Objects–Introducing Methods-Constructors – this Keyword - Garbage Collection – Finalize() Method – Methods and Classes –Inheritance– Packages and Interfaces.

Unit-III: Exception Handling–The Java Thread Model–Enumeration Fundamentals–String Handling–The Stream Classes– Byte Stream–Character Streams.

Unit-IV: The Applet Class – Event Handling Introducing the AWT: Working with Windows, Graphics and Text –AWT Controls, Layout Managers and Menus - Networking.

Unit-V: JavaBeans – Advantages of JavaBean – Introducing Swing – Swing Buttons – Servlets – JDBC - Applications on databases –Multimedia streaming applications –Java Media Framework.

Text Book

1. The Complete Reference - Java – Seventh Edition ,HerbtSchildt- ISBN 978-0-07-163177-8

Reference Book

1. Hortsman&Cornell, “CoreJava2AdvancedFeatures, Vol II”, Pearson Education, 2002.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

1. <http://java.sun.com>; <http://www.roseindia.net>; <http://docs.oracle.com>
2. www.tutorialspoint.com; www.easywayserver.com; www.download.oracle.com
3. www.java2s.com; www.coreservlets.com

Mapping with Programmers outcomes*										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	M	S	M	M	L	M	L	L
CO2	S	S	M	S	S	M	L	L	M	L
CO3	L	M	S	L	M	S	S	L	S	M
CO4	S	L	L	M	M	L	L	S	M	S
CO5	M	S	M	L	S	M	M	L	M	L
S-Strong			M-Medium			L-Low				

Title of the Course/Paper	BLOCK CHAIN TECHNOLOGY	
Elective-II	I Year & II Semester	Credit:3

COURSE OBJECTIVES:

This course is intended to study the basics of Blockchain technology.

During this course the learner will explore various aspects of Blockchain technology like application in various domains.

By implementing, learners will have idea about private and public Blockchain, and smart contract.

COURSE OUTCOMES:

After the completion of this course, student will be able to

CO1: Understand and explore the working of Blockchain technology

CO2: Analyze the working of Smart Contracts

CO3: Understand and analyze the working of Hyperledger

CO4: Apply the learning of solidity to build de-centralized apps on Ethereum

CO5: Develop applications on Blockchain

UNIT I INTRODUCTION OF CRYPTOGRAPHY AND BLOCKCHAIN

Introduction to 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

Introduction to 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

Introduction to Ethereum, Consensus Mechanisms, Metamask Setup, Ethereum Accounts, , Transactions, Receiving Ethers, Smart Contracts.

UNIT-IV INTRODUCTION TO HYPERLEDGER AND SOLIDITY PROGRAMMING

Introduction to Hyperledger, Distributed Ledger Technology & its Challenges, Hyperledger& Distributed Ledger Technology, Hyperledger Fabric, Hyperledger Composer. 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.

UNIT V -BLOCKCHAIN APPLICATIONS

M.Sc.Information Technology-(Syllabus Effective from the academic year 2026-2027)

Internet of Things, Medical Record Management System, Domain Name Service and Future of Blockchain, Alt Coins.

Text Book

1.Imran Bashir, “Mastering Blockchain: Distributed Ledger Technology, Decentralization, and Smart Contracts Explained”, Second Edition, Packt Publishing, 2018.

Reference Books

1. Narayanan, J. Bonneau, E. Felten, A. Miller, S. Goldfeder, “Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction” Princeton University Press, 2016

2.Antonopoulos, Mastering Bitcoin, O’Reilly Publishing, 2014. .

3.Antonopoulos and G. Wood, “Mastering Ethereum: Building Smart Contracts and Dapps”, O’Reilly Publishing,2018.

4.D. Drescher, Blockchain Basics. Apress, 2017.

Web references

NPTEL online course :<https://nptel.ac.in/courses/106/104/106104220/#>

Udemy: <https://www.udemy.com/course/build-your-blockchain-az/>

EDUXLABS Online training :<https://eduxlabs.com/courses/blockchain-technology-training/?tab=tabcurriculum>

Title of the Course/Paper	Cloud Computing	
Elective-II	I Year & II Semester	Credit:3

Course Objectives:

- To introduce the cloud computing concepts and map reduce programming model.
- To provide skills and knowledge about operations and management in cloud technologies so as to implement large scale systems.
- To provide skills to design suitable cloud infrastructure that meets the business services and customer needs.
- To provide Knowledge of different CPU, memory and I/O virtualization techniques that serve in offering software, computation and storage services on the cloud; Software Defined Networks(SDN) and Software Defined Storage(SDS); cloud storage technologies and relevant distributed file systems, No SQL databases and object storage;
- To introduce the variety of programming models and develop working experience in several of them.

Course Outcomes:

- Understand the evolution, principles, and benefits of Cloud Computing in order to assess existing cloud infrastructures to choose an appropriate architecture that meets business needs.
- Decide a suitable model to capture the business needs by interpreting different service delivery and deployment models.
- Understand virtualization foundations to cater the needs of elasticity, portability and resilience by cloud service providers.
- Infer architectural style, work flow of real-world applications and to implement the cloud applications using map reduce programming models.
- Compare operation and economic models of various trending cloud platforms prevailing in IT industry.

Unit-1: Foundations of cloud: Inception and need for cloud computing: Motivations from distributed computing predecessors – Evolution – Characteristics –Business Benefits – Challenges in cloud computing - Exploring the Cloud Computing Stack – Fundamental Cloud Architectures – Advanced Cloud Architectures - Specialized Cloud Architectures.

Unit-2 :Service Delivery and Deployment Models: Service Model (XaaS):Infrastructure as a Service(IaaS)-Platform as a Service (PaaS)-Software as a Service(SaaS)-Deployment Models: Types of cloud-Public cloud-Private cloud-Hybrid cloud–Service level agreements – Types of SLA – Lifecycle of SLA – SLA Management.

Unit-3: Cloud Resource Virtualization: Virtualization as Foundation of Cloud – Understanding Hypervisors – Understanding Machine Image and Instances – Managing Instances–Virtual Machine Provisioning and Service Migrations Cloud Computing Applications and Paradigms: Existing Cloud Applications and Opportunities for New Applications - Architectural Styles for Cloud Applications - Workflows: Coordination of Multiple Activities - Coordination Based on a State Machine Model: The Zoo Keeper –The Map Reduce Programming Model –A Case Study: The Grep The Web Application.

Unit-4: Resource Management and Scheduling in Cloud: Policies and Mechanisms for Resource Management – Stability of a Two-Level Resource Allocation Architecture-Feedback Control Based on Dynamic Thresholds – Coordination of Specialized Autonomic Performance Managers –A Utility-Based Model for Cloud – Based Web Services –Resource Bundling: Combinatorial Auctions for Cloud Resources – Scheduling Algorithms for Computing Clouds - Resource Management and Dynamic Application Scaling.

Unit-5: Cloud Platforms and Application Development: Comparing Amazon web services, Google App Engine, Microsoft Azure from the perspective of architecture (Compute, Storage Communication) services and cost models. Cloud application development using third party APIs, Working with EC2 API – Google App Engine API –Facebook API, TwitterAPI. Advances in Cloud: Media Clouds- Security Clouds-Computing Clouds-Mobile Clouds–Federated Clouds –Hybrid Clouds.

Recommended Texts:

1. Rajkumar Buyya, James Broberg, Andrzej, M. Goscinski, Cloud Computing: Principles and Paradigms, Wiley, 1st Edition, 2013.
2. Sosinski, Barrie, Cloud Computing Bible, John Wiley & Sons, 1st Edition, 2011.

Reference Books:

1. Marinescu, Dan C. Cloud Computing: Theory and Practice. Morgan Kaufmann, 2017.
2. Toby Velte, Anthony Velte, Robert Elsenpeter, Cloud Computing: A Practical Approach, McGraw Hill Education, 1st Edition, 2017.
3. Buyya, Rajkumar, Christian Vecchiola, and S. Thamarai Selvi. Mastering Cloud Computing: Foundations and Applications Programming, Tata McGraw Hill, 1st Edition, 2017.

Web References:

- <https://www.youtube.com/watch?v=-8O32k26RWA>

Mapping with Programmers outcomes*										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	M	M	S	M	L	L	S	L
CO2	S	M	S	M	S	L	M	L	M	L
CO3	M	S	M	S	M	S	L	L	L	M
CO4	S	L	M	S	S	L	L	M	M	S
CO5	S	S	M	S	L	M	M	L	M	L
S-Strong			M-Medium			L-Low				

Title of the Course/ Paper	Software Testing	
Elective-II	I Year & II Semester	Credit:3

Course Objectives:

- To understand the principles of Software Testing and tools..
- Enable the students to learn about the principle and tools of Software testing.
- Improve knowledge in software testing tools.

Outcomes:

- Understand the fundamentals of software testing.
- Gain software testing experience by applying software testing knowledge and method to practice – oriented software testing projects.
- Analyze path testing concept. Analyze state testing concept. Execute programs and test data in Client-Server Architecture.
- Able to debug the project and to test the entire computer based systems at all levels.
- Able to apply quality and reliability metrics to ensure the performance of the software.
- Able to evaluate the web applications using bug tracking tools.

Unit-1: Purpose of Software testing – Some Dichotomies – a model for testing – Playing pool and consulting oracles – Is complete testing possible – The Consequence of bugs – Taxonomy of Bugs.

Unit-2: Testing Fundamentals– Test case Design – Introduction of Black Box Testing and White Box testing – Flow Graphs and Path testing – Path testing Basics -Predicates, Path Predicates and Achievable Paths – Path Sensitizing – Path Instrumentation–Implementation and Application of Path Testing.

Unit-3: Transaction Flow testing – Transaction Flows – techniques – Implementation Comments – Data Flow Testing – Basics – Strategies – Applications, Tools and effectiveness – Syntax Testing– Why, What, How– Grammar for formats–Implementation – Tips.

Unit -4: Logic Based Testing – Motivational Overview – Decision tables– Path Expressions –KV Charts – Specifications – States, State Graphs and transition Testing – State Graphs – Good & bad states – state testing Metrics and Complexity.

Unit-5: Testing Types -Testing GUIs – Testing Client – Server Architecture – Testing for Real-time System – A Strategic Approach to Software testing – issues – unit testing – Integration Testing–Validation testing– System testing– Theart of Debugging.

Recommended Texts:

1. BorisBeizer,Software testing techniques, Dream TechPress, Second Edition –2003.

2. Myers and Glenford.J., The Art of Software Testing, John-Wiley&Sons,1979.

Reference Books:

1. Roger.S.Pressman,SoftwareEngineering A Practitioner's Approach, McGrawHill, 5th edition, 2001.
2. Marnie.L.Hutcheson,SoftwareTestingFundamentals, Wiley-India,2007.

E-learningresources:

- https://www.tutorialspoint.com/software_testing/index.htm
- <https://www.guru99.com/software-testing-introduction-importance.html>
- <https://nptel.ac.in/courses/106/105/106105150/Course>

Mapping with Programmers outcomes*										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	M	M	S	M	L	L	S	L
CO2	S	M	S	M	S	L	M	L	M	L
CO3	M	S	M	S	M	S	L	L	L	M
CO4	S	L	M	S	S	L	L	M	M	S
CO5	S	S	M	S	L	M	M	L	M	L

S-Strong

M-Medium

L-Low

Title of the Course/ Paper	Soft Computing	
Elective-II	I Year & II Semester	Credit:3

Course Objective:

- Understand Neural Networks
- Learn Fuzzy Logic
- Analyze and Apply to Adaptive Neuro Fuzzy Inference System, Classification and Regression Trees, Data Clustering Algorithms.
- Analyze and Apply to Algorithms.
- Learn Artificial Intelligence

Course Outcomes:

- Understand the fundamental concepts and components of e techniques such as **fuzzy logic, neural networks, and genetic algorithms.**
- Apply **fuzzy logic** and **fuzzy set theory** to solve real-world problems involving uncertainty and imprecision
- Design and implement **artificial neural networks** to learn from data and solve classification or regression problems.

Unit-1: Neural Networks : Introduction to ANS- adaline- BPN- Hopfield network- Boltzman machine- Self Organizing maps.

Unit-2: Fuzzy Logic : Fuzzy sets – Fuzzy rules and fuzzy reasoning – Fuzzy inference system – Mamdani fuzzy model – Sugeno fuzzy model – Tsukamoto fuzzy model.

Unit-3: Adaptive Neuro Fuzzy Inference System- Co active Neuro Fuzzy modelling- Classification and Regression Trees- Data Clustering Algorithms- Rule based structure-Neuro Fuzzy control 1-Neuro Fuzzy control 2- Fuzzy Decision Making.

Unit-4: Genetic Algorithms : Introduction- Implementation of GA- Reproduction- Cross over- Mutation- Coding- Fitness Scaling- Applications of GA.

Unit-5: ARTIFICIAL INTELLIGENCE: Introduction – Searching techniques – First order Logic – Forward reasoning – Backward reasoning –Semantic – Frames.

Text books:

1. James A. Freeman, David M. Skapura, "neural networks, algorithms, applications and programming techniques, Pearson Education, 1991

2. S.N. Sivanandam & S.N. Deepa, Principles of Soft Computing, Wiley Publications, 2nd Edition, 2011.
3. S. Rajasekaran & G.A. Vijayalakshmi Pai, Neural Networks, Fuzzy Logic & Genetic Algorithms, Synthesis & applications, PHI Publication, 1st Edition, 2009.
4. Jang, sun, Mizutani, "Neuro Fuzzy and Soft computing", Prentice Hall India, 2006.
5. Stuart J. Russell, Peter Norvig, "Artificial intelligence- a novel approach". 2nd Edition, Pearson Education, 2003.

Reference Books

1. John A. Bullinaria Introduction to Neural Networks : Lecture 16, SOM fundamentals, 2004.
2. Jang, sun, Mizutani, "Neuro Fuzzy and Soft computing", Prentice Hall India, 2006.
3. David E. Goldberg, "In Search optimization and machine learning", Pearson Education, 2005.
4. Eiben. A.E and Smith J.E, "Introduction to Evolutionary Computing, Genetic Algorithms".

Web Resources:

- <http://lcn.epfl.ch/tutorial/english/perceptron/html/learning.html>
- <https://en.wikipedia.org>
- <http://www.cs.bham.ac.uk/~jxb/NN/116.pdf>
- <https://www.calvin.edu/~pribeiro/othrlnks/Fuzzy/fuzzydecisions.htm>
- http://cse.unl.edu/~sscott/research/html/hga_conf/node3.shtml
- <http://geneticprogramming.com/ga/GAsoftware.html>
- www.cs.vu.nl/~gusz/ecbook/slides/Genetic_Algorithms.ppt
- <https://www.calvin.edu/~pribeiro/othrlnks/Fuzzy/fuzzydecisions.htm>

Mapping with Programmers outcomes*										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S		S	M				L
CO2	S	M		S	S	L			M	M
CO3	S			S	M	L			M	M
CO4	S	S	M	S		L			M	S
CO5	S	S	M	S	L	M			L	S

Title of the Course/Paper	Web Technology	
Elective-III	I Year & II Semester	Credit:3

Course Objectives:

- To understand the basics of Javascript and to acquire the knowledge about XML, Web services and ASP .NET in Web technology
- To understand about the internet technologies and Client side programming javascript
- To Empower the websites with use of XML and web services
- To Identify the Basics of ASP.Net Framework Architecture and its controls
- To Learn the Database connection architecture using ADO.net

Course Outcome:

- Acquire vast knowledge of Javascript and Internet Technologies
- Understand and explore various Features of ASP.Net Framework
- Understand the details of XML and Web services
- Apply the knowledge of ASP .NET object, ADO.NET data access to develop a client server model

Unit-1: Understanding Internet, Difference between websites and web server, Internet technologies Overview. Understanding websites and web servers: Understanding the difference between internet and intranet. Web 2.0: Basics, RIA Rich Internet Applications, collaboration tools. HTML and CSS: HTML5.0, XHTML, CSS3. An introduction to JavaScript, JavaScript DOM Model- Built-in objects, Date and Objects -Regular Expressions -Exception Handling, Validation. Event Handling, DHTML with JavaScript.

Unit-2: XML: Introduction to XML, DTD, CSS, Namespace, Schema, XSD, XSL- Introduction to Web Services: The Web Services Type System, Data Type Mappings -SOAP: Communication on the Web -WSDL: Describing Web Services.

Unit-3: Understanding ASP.NET Controls: Web forms, Buttons, Text Box, Labels, Checkbox, Radio Buttons, List Box etc. Running a web Application, creating a multiform web project.

Unit-4: Form Validation Controls- Required Field, Compare, Range. Calendar Control, AdRotator Control, State Management –View State, Session State, Application State.

Unit-5: Architecture Of ADO.NET, Connected and Disconnected Database, Create Connection Using ADO.NET Object Model, Connection Class, Command Class, Data Reader Class, Data adapter Class, Dataset Class. Display Data on Bound Controls and Grid view. Database

Accessing on Web Applications: Insert records in database, delete and update records from database, Display a particular record and all records on web form.

Textbook:

1. Deitel, Deitel and Nieto, Internet and World Wide Web : How to Program, 5 th Edition, 2012, Prentice Hall, ISBN-13: 978-0-13-215100-9
2. Jeffrey C. Jackson, “Web Technologies A Computer Science Perspective”, 2011, Pearson, ISBN 9780133001976.
3. Beginning XML by David Hunter, Andrew Watt (Wrox Publication)
4. Teach yourself ASP programming in 21 days – Fleet, Warren, Hen Stojanovic, Techmedia.
5. ASP.NET 2.0 Black Book by Rudraksh Batra, Charul Shukla (Dream Tech Press)
6. ASP.NET Bible by Mridula Parihar and et al. (Hungry Minds, New York)

Reference book:

1. XML, Web Services, and the Data Revolution, F.P. Coyle, Pearson Education.
2. ASP.NET Developer's Guide by GBuezek (TMH)

Web References:

- <https://www.w3schools.com/js/>
- https://www.w3schools.com/xml/xml_serves.asp
- <https://www.tutorialspoint.com/asp.net/index.htm>

Mapping with Programmers outcomes*										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	S	M	S	M	L	L	S	L
CO2	S	M	S	M	S	L	M	L	M	L
CO3	S	S	M	S	M	S	L	M	L	M
CO4	S	L	M	S	S	L	M	M	M	S
CO5	S	S	M	S	L	M	M	L	M	L
S-Strong			M-Medium			L-Low				

Title of the Course/Paper	.NET Programming		
Elective-III	I Year & II Semester	Credit: 3	

Course Objectives

- To learn the fundamentals of data models and to represent a database system using ER diagrams.
- To study SQL and relational database design.
- To understand the internal storage structures using different file and indexing techniques which will help in physical DB design.
- To understand the fundamental concepts of transaction processing-concurrency control techniques and recovery procedures.
- To have an introductory knowledge about the Storage and Query processing Techniques

Course Outcomes:

- Classify the modern and futuristic database applications based on size and complexity
- MapER model to Relational model to perform database design effectively
- Write queries using normalization criteria and optimize queries
- Compare and contrast various indexing strategies in different database systems
- Appraise how advanced databases differ from traditional databases.
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UNIT I: Introduction to .NET Framework, CLR – Overview of C#, Literals, Variables, Data Types, Operators and Expressions, Branching, Looping, Methods, Arrays.

UNIT II: Classes, Objects, Inheritance, Interfaces, Structures, Enumerations, Errors and Exceptions.

UNIT III: Programming Web Applications with Web Forms – Standard Web server Controls – Label, Textbox, Button, Link Button, Image, CheckBox and Radio button. Rich controls – Calendar, Ad Rotator. List Controls – Check box list, Radio button list, Drop down list, List Box.

UNIT IV: Data controls – Data grid, Repeater. Validation Controls-Compare Validator, Range Validator, Regular Expression, Required Field, Validation summary.

Working with Data – OLEDB connection class, command class, data adaptor class, data reader – data set class.

UNIT V: Session & Application Object: global.asa file, Webconfig files, Application Object – creating & reading application variables. Session object – Introduction, storing session-information, contents and identifying session, controlling when session ends. Cookies-Creating &reading cookies.

TEXT BOOKS:

1. E Balagurusamy (2004). Programming in C# (3rd edition), Tata McGraw-Hill India. ISBN 9780070702073
2. Stephen Walter (2006). Asp.net 2.0 Unleashed, (1st edition), Pearson Education, ISBN 978-8131703236
3. Greg Buczek (2010). ASP.NET Developer's guide (1st edition), Tata McGraw-Hill India, ISBN 978-

0070499171

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- REFERENCE BOOKS:
- 1. Herbert Schildt (2010). The Complete Reference: C#4.0, Tata McGraw-Hill Education India ISBN: 9780070703681.
- 2. Mathew Macdonald (2017). ASP.NET: The Complete Reference, McGraw Hill Education, ISBN 978-0070495364
- 3. Bill Evjen, Scott Hanselman, Devin Rader (2008). Professional ASP.NET 3.5 In C# and VB (Pap/Psc edition), Wrox publishers, ISBN 978-0470187579
- 4. Dino Sposito (2019). Programming ASP.NET Core, PHI learning | Microsoft Press, ISBN 978-9388028431
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- E- REFERENCES:
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- 1. <http://www.csharp-station.com/tutorial.aspx>
- 2. <http://www.tutorialspoint.com/csharp>
- 3. <http://asp.net-tutorials.com>
- 4. <http://www.aspnetbook.com>

Text Books:

1. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, — Database System Concepts, Sixth Edition, Tata McGraw Hill, 2011.
2. Ramez Elmasri, Shamkant B. Navathe, — Fundamentals of Database Systems II, Sixth Edition, Pearson Education, 2011.

References:

1. C.J. Date, A. Kannan, S. Swamynathan, — An Introduction to Database Systems II, Eighth Edition, Pearson Education, 2006.
2. Raghu Ramakrishnan, — Database Management Systems II, Fourth Edition, McGraw-Hill College Publications, 2015.
3. G.K. Gupta, "Database Management Systems II, Tata McGraw Hill, 2011.

Mapping with Programmers outcomes*										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	M	S	M	S	L	M	L	L
CO2	S	M	L	S	M	S	M	L	M	M
CO3	L	M	S	L	M	M	S	L	S	M
CO4	S	M	L	M	L	L	M	M	M	S
CO5	M	S	M	S	S	S	M	L	M	L
-Strong			M-Medium			L-Low				

Title of the Course/Paper	Mobile Application Development	
Elective-III	I Year &II Semester	Credit:3

Course Objectives:

- To facilitate students to understand android SDK
- To help students to gain a basic understanding of Android application development
- To inculcate working knowledge of Android Studio development tool

Course Outcomes:

- Identify various concepts of mobile programming that make it unique from programming for other platforms.
- Critique mobile applications on their design pros and cons.
- Utilize rapid prototyping techniques to design and develop sophisticated mobile interfaces
- Program mobile applications for the Android operating system that use basic and advanced phone features
- Deploy applications to the Android market place for distribution.

Unit-1: Introduction- The Mobile Ecosystem: Operators - Networks - Devices - Platforms – Operating Systems - Application Frameworks - Applications – Services- Mobile Devices Profiles - Optionsfor development - Categories of Mobile Applications: SMS - Mobile Websites - Mobile WebWidgets - Native Applications - Games - Utility Apps- Location, Based Services(LBS) Apps –Informative Apps- Enterprise Apps

Unit-2: Mobile Information Architecture: Introduction - Sitemaps - Click Streams - Wireframes - Prototyping - Architecture for Different Devices. Mobile Design: Interpreting Design – Elements of Mobile Design-Mobile Design Tools-Designing for Different Device/Screens

Unit–3: Introduction to Android: The Android Platform-Android SDK-Eclipse Installation-Android Installation-Building you First Android application-Understanding Anatomy of Android Application-Android Manifest file

Unit–4: Android Application Design Essentials: Anatomy of an Android applications-Android

Terminologies – Application Context – Activities – Services - Intents-Receiving and Broad casting Intents – Android Manifest File and its common settings-Using Intent Filter-Permissions.

Unit–5: Android User Interface Design Essentials: User Interface Screen elements-Designing User Interfaces with Layouts-Drawing and Working with Animation-Testing Android applications: Publishing Android application-Using Android preferences-Managing Application resources in a hierarchy – working with different types of resources.

Textbooks:

1. Mobile Design and Development by Brian Fling, O'Reilly Media, Inc 2009
2. Lauren Darcey and Shane Conder, "Android Wireless Application Development", Pearson Education, 2nd ed. (2011)
3. J2ME: The Complete Reference, James Keogh, Tata McGraw Hill 2003

REFERENCE BOOKS:

1. Reto Meier, "Professional Android 2 Application Development", Wiley India Pvt Ltd
2. Mark L Murphy, "Beginning Android", Wiley India Pvt Ltd
3. Android Application Development All in one for Dummies by Barry Burd, Edition: I

E-Resource:

- https://www.tutorialspoint.com/android/android_resources.htm

Mapping with Programmers outcomes*										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	S	M	S	M	L	L	S	L
CO2	S	M	S	M	S	L	M	L	M	L
CO3	S	S	M	S	M	S	L	M	L	M
CO4	S	L	M	S	S	L	M	M	M	S
CO5	S	S	M	S	L	M	M	L	M	L
S-Strong			M-Medium			L-Low				

Title of the Course/Paper	Practical– III: Java Programming Lab.		
Core–8	I Year & II Semester	Credit:2	

Course Objectives:

- To write programs using abstract classes.
- To write programs that connects database using JDBC
- To write multithreaded programs.
- To write GUI programs using AWT controls in Java.
- To impart hands on experience with java programming.

Course Outcomes:

- Develop program using OOPS concept of Java
- Develop program using GUI framework(AWT and Swing)
- Handle events of AWT and Swing Components.
- Develop programs to handle events in Java Programming.
- Develop Java Programs using Networking Concepts.
- Develop programs using Database.
- Develop programs using Servlets.

List of Exercise:

1. Write a Java program to find area and perimeter of different shapes.
2. Write a java Program to find sum of n prime numbers.
3. Write a java program to find simple and compound Interest using this keyword.
4. Write a Java program to create a class account using the inheritance and static that show all function of the bank (Withdrawal, Deposit) .
5. Write a Java program to perform different string manipulation.
6. Write a Java program to handle exception using try and multiple catch block.
7. Write a java program that connects to a data base using JDBC and perform add, deletes, modify and retrieve operations
8. Write a program to demonstrate the use of AWT components like Label, Text field, Text Area, Button, Checkbox, Radio Button etc
9. Write a program using AWT to create a menu bar where menu bar contains menu items such as File, Edit, View and create a sub menu under the File menu: New and Open.
10. Develop an Applet that receives an integer in one text field & compute its factorial value & returns it in another text field when the button “Compute” is clicked.
11. Write a program to demonstrate status of key on Applet window such as Key pressed, Key Released, Key Up, Key Down

12. Write a program to demonstrate various mouse events using Mouse Listener and Mouse Motion Listener interface
13. Write a Servlet program to send username and password using HTML forms and authenticate the user

Mapping with Programmers outcomes*										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	M	S	S	M	L	M	L	L
CO2	S	S	M	S	S	M	L	L	M	L
CO3	L	M	S	L	M	S	S	L	S	M
CO4	S	L	L	M	M	L	L	S	M	S
CO5	M	S	M	L	S	M	M	L	M	L

S-Strong
M-Medium
L-Lo

Title of the Course/Paper	Practical– IV: Web Technology Lab		
Core–9A	I Year & II Semester	Credit:2	

Objectives

- To explore about Java Script objects
- To implement XML and Web services
- Explain how to create dynamic Web pages by using ASP.NET.
- Create a user interface on an ASP.NET page by using standard Web server controls.
- Create a user control and a custom server control and add them to an ASP.NET page.
- Display dynamic data from a data source by using ADO.Net

Outcomes:

At the end of this Lab course students will be able to

- Create Web Pages using Javascript object
- Design web pages using xml and web services
- Create user interactive web pages using ASP.Net.
- Creates implement data binding applications using ADO. Net connectivity.

List of programs:

1. Validate the Registration, user login and payment by credit card pages using JavaScript.
2. Write a Java Script to design a simple calculator to perform the following operations: sum, product, difference and quotient
3. Write a program to implement XML Document Creation
4. Write a program to implement Internal DTD Creation
5. Write a program to implement External DTD Creation
6. Write a program to implement XML Schema Creation
7. Write a program to implement WSDL Service (Hello Service. WSDL File)
8. Write a program the service provider can be implement a single getprice(), static
9. Write a program to implement to create a simple web service that converts the temperature from Fahrenheit to Celsius (using HTTP Post Protocol)
10. Write a program to study the Validation controls in asp.net.
11. Write a program to study the grid view control in asp.net.
12. Write a program to study the ADO.net and Stored procedure in asp.net.
13. Write a program to access data sources through ADO.NET

Mapping with Programmers outcomes*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	M	S	M	M	L	M	L	L
CO2	S	S	M	S	S	M	L	L	M	L
CO3	L	M	S	L	M	S	S	L	S	M
CO4	S	M	S	M	M	L	L	S	L	S
CO5	M	S	M	L	S	M	M	L	M	L

S-Strong

M-Medium

L-Low

Title of the Course/Paper	Practical– II: .NET Programming Lab.		
Core–9B	I Year & II Semester	Credit: 2	
Course Objective			
LO1	To develop ASP.NET Web application using standard controls.		
LO2	To create rich database applications using ADO.NET.		
LO3	To implement file handling operations.		
LO4	To utilize ASP.NET security features for authenticating the web site.		
LO5	To handles SQL Server Database using ADO.NET.		
Sl.No	Details		
1.	Create an exposure of Web applications and tools		
2.	Implement the Html Controls		
3.	Implement the Server Controls		
4.	Web application using Web controls.		
5.	Web application using List controls.		
6.	Web Page design using Rich control. Validate user input using Validation controls. Working with File concepts.		
7.	Create Employee database and develop a web application to Add, Update, View and Delete records from database using in Gridview control.		

8	Data binding with Web controls.	
9	Data binding with Data Controls.	
10	Create a web form for Online Library data entry and manipulate Database application to perform insert, update and delete operations.	
11	Create Student database and develop a web application to Add, Update, View and Delete records from database	
12	Ticket reservation using ADO.NET controls.	
13.	Online examination using ADO.NET controls	
14.	Design a web page to display the XML content.	
15.	Implement Authentication – Authorization.	
Course Outcomes		Programme Outcome
1	To identify and understand the goals and objectives of the .NET framework and ASP.NET with C# language.	PO1,PO4,PO5
2	To develop web application using various controls.	PO1,PO4,PO8
3	To analyze C# programming techniques in developing web applications.	PO1,PO3,PO6
4	To assess a Web application using Microsoft ADO.NET.	PO3,PO4
5	To develop a software to solve real-world problems using ASP.NET	PO1,PO5,PO6
Text Book		
1	SvetlinNakov,VeselinKolev& Co, Fundamentals of Computer Programming with C#,Faber publication, 2019.	
2	Mathew, Mac Donald, The Complete Reference ASP.NET, Tata McGraw-Hill ,2015.	
Reference Books		
1	Herbert Schildt, The Complete Reference C#.NET, Tata McGraw-Hill,2017.	
2.	Kogent Learning Solutions, C# 2012 Programming Covers .NET 4.5 Black Book, Dreamtech pres,2013.	
3.	Anne Boehm, Joel Murach, Murach’s C# 2015, Mike Murach& Associates Inc 2016.	
4.	DenielleOtey, Michael Otey, ADO.NET: The Complete reference, McGraw Hill,2008.	
5.	Matthew MacDonald, Beginning ASP.NET 4 in C# 2010, APRESS,2010.	

Web Resources	
1.	Web resources from NDL Library, E-content from open-source libraries

Mapping with Programmers outcomes*										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	M	S	M	S	L	M	L	L
CO2	S	S	M	S	M	M	L	L	M	L
CO3	L	M	S	L	M	S	S	L	S	M
CO4	S	L	L	M	M	L	M	S	M	S
CO5	M	S	M	L	S	S	M	L	M	L
S-Strong			M-Medium			L-Low				

Title of the Course/Paper	Practical– IV: Mobile Application Development Lab.		
Core–9C	I Year & II Semester	Credit:2	

Objectives:

- Design and implement user-friendly and responsive interfaces for mobile apps.
- Utilize layout managers, input controls, and navigation components.
- Use built-in APIs (e.g., camera, location, sensors).

Outcomes:

After the completion of the course the student can able to:

- Understand complexity of android application and techniques and their limitations.
- Capable of confidently applying common android application in practice and implementing their own.
- Capable of performing experiments in android application using virtual games.

List of Exercise:

1. Develop an application that uses GUI components, Font and Colors.
2. Develop an application that uses Layout Managers and event listeners.
3. Develop an active calculator application.
4. Write an application that draws basic graphical primitives on the screen.
5. Develop an application that makes use of database.
6. Implement an application that implements Multithreading.
7. Develop an active application that uses GPS location information.
8. Implement an application that writes data to the SD card.
9. Implement an application that creates an alert upon receiving a message.
10. Write a mobile application that creates alarm clock.

Mapping with Programmers outcomes*										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	M	S	M	M	L	M	L	L
CO2	S	S	M	S	S	M	L	L	M	L
CO3	M	M	S	L	L	S	S	L	S	M
CO4	S	L	L	M	M	L	L	S	M	S
CO5	M	S	M	L	S	M	M	L	M	L
S-Strong			M-Medium			L-Low				

Title of the Course/Paper	General aptitude for competitive Examinations		
Basic knowledge in numerical ability	I Year II Semester		Credit:2

Course Objective:

- To improve the quantitative skills of the students
- To prepare the students for various competitive exams

Course Outcome:

- To gain knowledge on LCM and HCF and its related problems
- To get an idea of age, profit and loss related problem solving.
- Able to understand time series simple and compound interests
- Understanding the problem related to probability, and series

Unit-1: Numbers - HCF and LCM of numbers - Decimal fractions - Simplification - Square roots and cube roots - Average - problems on Numbers

Unit-2: Problems on Ages - Surds and Indices - percentage - profits and loss - ratio and proportion - partnership - Chain rule.

Unit-3: Time and work - pipes and cisterns - Time and Distance - problems on trains - Boats and streams - simple interest - compound interest - Logarithms - Area - Volume and surface area - races and Games of skill.

Unit-4: Permutation and combination - probability - True Discount - Bankers Discount-Height and Distances - Odd man out & Series.

Unit-5: Calendar - Clocks - stocks and shares - Data representation - Tabulation - Bar Graphs - Pie charts – Line graphs.

Learning Resources:

- **Recommended Texts**

1. . “Quantitative Aptitude”, R.S. AGGARWAL., S. Chand & Company Ltd.,

Web resources: Authentic Web resources related to Competitive examinations

Title of the Course/Paper	Team Project		
Soft skill	I Year-II Semester		Credit: 2

Objectives:

- Understand programming language concepts, particularly object-oriented concepts or go through research activities.
- Plan, analyze, design and implement a software project or gather knowledge over the field of research and designor plan about the proposed work.
- Learn to work as a team and to focus on getting a working project done on time with each student being held accountable for their part of the project.
- Learn about and go through the software develop ment cycle with emphasis on different processes - requirements,design, and implementation phases.

Outcomes:

- Demonstrate the ability to locate and use technical information from multipl e sources.
- Demonstrate the ability to communicate effectively in speech and writing
- To demonstrate a depth of knowledge of modern technology.
- To do the Project Scheduling, tracking, Risk analysis, Quality management and Project Cost estimation using different techniques.
- To complete an independent research project, resulting in at least a thesis publication, and research outputs interms of publications in high impact factor journals, conference proceedings.

Project:

- Any Computer related project has to be developed using latest software as a team.
- The project must be presented for viva-voce at the end of the semester.
- Students will write up a project report, which is an essay to provide a complete recordo fall the work carried out in their projects.
- The student project reports will be assessed solely according to academic marking guidelines by the supervisor(s) of the student project.
- If the work of the candidate is found to be insufficient and plagiarism, the supervisor(s) will decide the further process.

S-Strong

M-Medium

L-Low

Mapping with Programmers outcomes*										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	L	L	M	S	M	S	L	S	S	M
CO2	S	M	L	M	L	S	M	L	M	S
CO3	L	S	S	L	M	L	M	S	S	M
CO4	S	L	S	M	S	L	L	M	M	S
CO5	S	M	L	S	L	M	S	L	M	S