APPENDIX – 16(R&S)
UNIVERSITY OF MADRAS

Two Year MCA Programme
With effect from 2022-2023

Programme Outcomes:

- 1. The broad objective of the programme is to prepare students for challenging careers in computer industry by providing conducive environment of teaching, learning and research in the core and applied areas of the computer applications.
- 2. To provide an understanding of advanced computer application technologies.
- 3.To keep a balance between fundamental concepts, core areas of computer science and specialized application oriented skills required to adapt to the needs of the constantly evolving computing industry.
- 4. To carryout project development in the emerging areas of Computer Applications.
- 5. The syllabus is focused on providing a strong foundation in theory and applications along with a latest technologies.
- 6. To learn and evaluate a range of computing technologies, systems and application services.
- 7. To design, develop and analyze industrial projects and evaluate performance.
- 8. To undertake challenging research problems and work as active researchers.
- 9. To identify recent Research / Industry trends.
- 10. To equip the student with basic knowledge of other domains, disciplines and skills, social and environmental consciousness and a strong value base.

Programme Specific Outcomes:

- 1 Implement the concept of theory and technology with modern techniques for solving the complex problems in Computer Applications.
- 2 The learners would to be curious towards learning new and emerging technologies and adapt quickly to changes.
- 3 Design, execute and evaluate computing and application projects in academia and industries using appropriate emerging technologies.
- 4 Know the contextual knowledge in computing science and applications research and communicate effectively with stakeholders of the society at large for enhancing the quality of life.
- 5 Be honest in upholding the ethical principles and social responsibilities along with socio-economic innovations.

Course Structure:

Two Weeks Bridge Courses for MCA

1. Programming in C
2. Problem Solving Techniques
3. Mathematical Foundations of Computer Science.
4. Information Technology
5. Coding Practices

a. The Departments offering M.C.A. program are encouraged to offer need based bridge courses and foundation courses to meet prerequisite requirements and academic needs.
b. Based on the qualifications of the students admitted, the mentoring team of the department shall recommend to carry out the bridge and foundation courses as mandatory courses for that candidate.
c. Two week bridge courses need to be organized before the commencement of the first semester.
d. Nurturing and evaluation process of bridge and foundation courses is left the respective academic units.

First Semester

Course components	Name of Course	Ins. hours	Credits	Exam. Hours	Max.Marks		TOTAL
					CIA	UE	
Core– 1	C++ & Data Structures	4	4	3	25	75	100
Core- 2	Introduction to Computer Architecture	4	4	3	25	75	100
Core- 3	Relational Database Management Systems	4	4	3	25	75	100
Core- 4	Practical–I: Data Structures using C++ Lab.	4	2	3	40	60	100
Core- 5	Practical–II: RDBMS Lab.	4	2	3	40	60	100
Extra – Disciplinary- I	Accounting & Financial Management	3	3	3	25	75	100
Elective I	Choose any one from Elective – I List	3	3	3	25	75	100
Soft Skill-1	Choose any one	2	2	3	40	60	100

Second Semester

Course components	Name of Course	Ins. hours	Credits	Exam. Hours	Max. Marks		TOTAL
					CIA	UE	
Core – 6	Design and Analysis of Algorithms	4	4	3	25	75	100
Core – 7	Agile Software Engineering	4	4	3	25	75	100
Core – 8	Computer Networks	4	4	3	25	75	100
Elective II	Choose any one from Elective – II List	3	3	3	25	75	100
Core – 9	Practical – III: Algorithms Lab	4	2	3	40	60	100
Core – 10	Practical–IV: Web Based Application Development Lab.	4	2	3	40	60	100
Extra–Disciplinary - II	Web Based Application Development	3	3	3	25	75	100
Soft Skill-2	Choose any one from Soft Skills List	2	2	3	40	60	100
Soft Skill-3	Choose any one from Soft Skills List	2	2	3	40	60	100
Internship	During I year summer vacation 4 to 6 weeks – Evaluation will be at the end of third semester.		2				

Third Semester

Course components	Name of Course	Ins. hours	Credits	Exam. Hours	Max. Marks		TOTAL
					CIA	UE	
Core – 11	Machine Learning	5	4	3	25	75	100
Elective III	Choose any one from Elective – III List	4	3	3	25	75	100
Elective IV	Choose any one from Elective – IV List	4	3	3	25	75	100
Elective V	Choose any one from Elective – V List	4	3	3	25	75	100
Core– 12	Practical – V: Machine Learning Lab	4	2	3	40	60	100
Core -13	Practical – VI: Mini Project	4	2	3	40	60	100
Soft Skill-4	Choose any one	2	2	3	40	60	100
Internship	During I year summer vacation 4 to 6 weeks		2				100

Fourth Semester

Course components	Name of Course	Credits	Max. Marks		TOTAL
			CIA	UE	
Core-14	Project & viva-voce	20	20	60+20	100

* CIA = Continuous Internal Assessment, UE = University Examination

List of Electives

Elective –I: Choose any one
Operating Systems
Theory of Computation
Data Mining and Data Warehousing

Elective –II: Choose any one
Cyber Security
Cloud Computing
Soft Computing

Elective – III: Choose any one
Natural Language Processing
Mobile Application Development
Data Visualization

Elective –IV: Choose any one
Data Analytics
Artificial Intelligence
Deep Learning and Neural Networks

Elective –V: Choose any one
Internet of Things
Software Testing
Information Security

List of Soft Skill Courses

1. Communication Skills for Software Engineers – I
2. Communication Skills for Software Engineers – II
3. Programming in Python
4. Programming in Java
5. Personality Development and other Soft Skills for Software Engineers

6. Document Preparation and Interview skills for Software Engineers
7. Team Project

Students are encouraged to do courses from the resources like SWAYM , NPTEL etc

* Operation systems,
* Principles of Programming Languages,
*Compiler design,
*Natural Language Processing
*Software Engineering
* Software testing
*Bigdata Analytics,
*Robotics,
*Robotics Process Automation
*Organizational Behaviors
* Other electives or soft skills.

The credits earned through online courses from the platforms SWAYM, NPTEL shall be transferred as per the University Policy.

Learning Outcome Index: Mapping of program outcome with courses

Table 1														
Program Outcomes	Core Courses													
	CO1	CO2	CO3	CO4	CO5	CO6	CO7	CO8	CO9	CO10	CO11	CO12	CO13	CO14
Outcomes 1	X	X	X			X	X				X			X
Outcomes 2		X			X	X			X		X	X		X
Outcomes 3	X		X	X	X		X			X	X		X	
Outcomes 4	X	X	X		X	X		X	X					X
Outcomes 5	X		X	X		X	X	X		X	X			
Outcomes 6		X		X	X			X	X	X		X		X
Outcomes 7	X					X	X		X	X		X	X	X
Outcomes	X		X	X		X	X					X	X	

8														
Outcomes 9		X	X	X	X			X	X		X		X	X

CO i – ith Core Course

Table 2		
Program Outcomes	Extra-Disciplinary Courses	
	Course 1	Course 2
Outcomes 1	X	
Outcomes 2		X
Outcomes3		X
Outcomes 4	X	
Outcomes 5		X
Outcomes 6	X	
Outcomes 7	X	
Outcomes 8		X
Outcomes 9	X	X

Table 3															
Program Outcomes	Elective Courses														
	CO 1	CO 2	CO 3	CO 4	CO 5	CO 6	CO 7	CO 8	CO 9	CO10	CO11	CO12	CO13	CO14	CO15
Outcomes 1	X	X	X			X					X			X	
Outcomes 2		X			X				X		X	X		X	
Outcomes3	X		X	X			X			X	X		X		X
Outcomes 4		X	X		X			X	X						X
Outcomes 5	X		X			X	X	X		X	X				

Outcomes 6		X		X	X			X		X		X		X	
Outcomes 7	X					X	X		X	X		X	X		X
Outcomes 8	X			X		X	X					X	X		X
Outcomes 9		X	X	X	X			X	X		X		X	X	

CO i – ith Elective Course

Table 4							
Program Outcomes	Soft Skill Courses						
	Course 1	Course 2	Course 3	Course 4	Course 5	Course 6	Course 7
Outcomes 1	X		X	X			
Outcomes 2		X		X	X		X
Outcomes3		X					
Outcomes 4	X				X	X	X
Outcomes 5		X	X				
Outcomes 6	X			X	X	X	
Outcomes 7	X		X				X
Outcomes 8		X		X	X	X	
Outcomes 9	X	X	X			X	X

APPENDIX – 16(S)
UNIVERSITY OF MADRAS
MASTER OF COMPUTER APPLICATIONS (M.C.A.)
REVISED SYLLABUS
(Effective from the academic year 2022-2023 onwards)

Title of the Course/ Paper	C++ and Data Structures		
Core – 1	I Year & I Semester	Credit: 4	

Objectives:

- Object oriented concepts, C++ language.
- Classes & Objects, Inheritance, Polymorphism.
- Templates, Streams, Files.
- Able to Design & implement various forms of inheritance, String class.
- To teach efficient storage mechanisms of data for an easy access.
- To design and implementation of various basic and advanced data structures.
- To introduce various techniques for representation of the data in the real world.
- To develop application using data structures.

Outcomes:

- learn Object Oriented concepts, C++ language.
- Learn and analyze various problems using C++ program.
- Learn to choose appropriate data structure as applied to specified problem definition.
- Learn to handle operations like searching, insertion, deletion, traversing mechanism.
- Able to use linear and non-linear data structures like stacks, queues, and linked list.

Unit 1: Introduction to C++; Tokens, Keywords, Identifiers, Variables, Operators, Manipulators, Expressions and Control Structures in C++; Pointers - Functions in C++ - Main Function -Function Prototyping - Parameters Passing in Functions - Values Return by Functions - Inline Functions - Friend and Virtual Functions

Unit-2: Classes and Objects; Constructors and Destructors; and Operator Overloading and Type Conversions - Type of Constructors - Function overloading. Inheritance : Single Inheritance - Multilevel Inheritance - Multiple Inheritance - Hierarchical Inheritance - Hybrid Inheritance. Pointers, Virtual Functions and Polymorphism; Managing Console I/O operations.

Unit 3: Working with Files: Classes for File Stream Operations - Opening and Closing a File - End-of-File Deduction - File Pointers - Updating a File - Error Handling during File Operations - Command-line Arguments. Data Structures: Definition of a Data structure - primitive and composite Data Types, Asymptotic notations, Arrays, Operations on Arrays,

Order lists.

Unit-4:Stacks - Applications of Stack - Infix to Postfix Conversion, Recursion, Maze Problems - Queues- Operations on Queues, Queue Applications, Circular Queue. Singly Linked List- Operations, Application - Representation of a Polynomial, Polynomial Addition; Doubly Linked List - Operations, Applications.

Unit-5 : Trees and Graphs: Binary Trees - Conversion of Forest to Binary Tree, Operations - Tree Traversals; Graph - Definition, Types of Graphs, Hashing Tables and Hashing Functions, Traversal - Shortest Path; Dijkstra's Algorithm.

Recommended Texts :

1. E. Horowitz, S. Sahni and Mehta, 1999, Fundamentals of Data Structures in C++, Galgotia.
2. Herbert Schildt, 1999, C++ - The complete Reference, Third Edition, Tata McGraw – Hill.

Reference Books:

1. GregoryL.Heileman, 1996, Data Structures , Algorithms and Object Oriented Programming – Mc-Graw Hill International Editions.
2. A.V.Aho, J.D. Ullman, J.E. Hopcraft: Data Structures and Algorithms-Adisson Wesley Pub.

E-learning resources:

1. https://nptel.ac.in/courses/106105151
2. https://onlinecourses.nptel.ac.in/noc21_cs02/preview
3. https://nptel.ac.in/courses/106101208
4. https://nptel.ac.in/courses/106102064
5. https://nptel.ac.in/courses/106106127

Mapping with Programme Outcomes:

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**
CO 1	S	S	S	M	M	M	M	M	M	L
CO 2	S	M	S	S	L	S	S	L	M	M
CO 3	S	S	S	S	S	L	S	M	L	M
CO 4	S	S	M	S	L	S	S	M	M	S
CO 5	S	S	M	L	S	M	S	S	L	S

S-Strong M-Medium L-Low

Title of the Course/ Paper	Introduction to Computer Architecture		
Core – 2	I Year & I Semester	Credit: 4	

Objectives:

- The objective of this course is to provide the fundamental concepts associated with the digital logic and circuit design.
- To introduce the basic concepts and laws involved in the Boolean algebra and logic families and digital circuits.
- To familiarize with the different number systems, logic gates, and combinational and sequential circuits utilized in the different digital circuits and systems.
- The course will help in design and analysis of the digital circuit and system.

Outcomes:

- Became familiar with the digital signal, positive and negative logic, Boolean algebra, logic gates, logical variables, the truth table, number systems, codes, and their conversion from to others.
- Learn the minimization techniques to simply the hardware requirements of digital circuits, implement it, design and apply for real time digital systems.
- Understand the working mechanism and design guidelines of different combinational, sequential circuits and their role in the digital system design

Unit – I Data and Information Features of Digital Systems, Number Systems. Decimal, Binary, Octal, Hexadecimal and their inter conversions, Representation of Data: Signed Magnitude, one's complement and two's complement, Binary Arithmetic, Fixed point representation and Floating point representation of numbers. Codes BCD, XS-3, Gray code, hamming code, alphanumeric codes (ASCII, EBCDIC, UNICODE), Error detecting and error correcting codes.

Unit- II Boolean Algebra: Basic gates (AND, OR, NOT gates), Universal gates (NAND and NOR gates), other gates (XOR, XNOR gates). Boolean identities, De Morgan Laws. Karnaugh maps: SOP and POS forms, Quine McClusky method.

Unit -III Combinational Circuits: Half adder, full adder, code converters, combinational circuit design, Multiplexers and demultiplexers, encoders, decoders, Combinational design using mux and demux, PLA.

Unit - IV Sequential Circuit Design: Flip flops RS, Clocked RS, D, JK, JK Master Slave, T, Counters, Shift registers and their types, Counters: Synchronous and Asynchronous counters.

Unit- V: ALU Structure – Memory: ROM, RAM, PROM, EPROM, EEPROM, Secondary Memory: Hard Disk and optical Disk, Cache Memory, I/O devices.

Text books:

1. Modern Digital Electronics by R. P. Jain, 3rd Edition, McGraw Hill
2. Digital Design and Computer Organisation by Dr. N. S. Gill and J. B. Dixit, University Science Press
3. Linux Commands by Bryan Pfaffaenberger BPB Publications
4. UNIX by Sumitabha Das, TMH

References Books:

1. Digital Principles and Applications by Malvino and Leach, McGrawHill
2. Introduction to Computers by Peter Norton, McGraw Hill
3. Introduction to Computers by Balagurusamy

Mapping with Programme Outcomes:

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	S	L	S	S	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	S	S	S	S	M	L	M	S

S-Strong M-Medium L-Low

Title of the Course/ Paper	Relational Database Management System		
Core – 3	I Year & I Semester	Credit: 3-1-2-4	

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

OUTCOMES: Upon completion of the course, the students will be able to:

- Classify the modern and futuristic database applications based on size and complexity
- Map ER 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.

UNIT I: RELATIONAL DATABASES: Purpose of Database System – Views of data – Data Models – Database System Architecture – Introduction to relational databases – Relational Model – Keys – Relational Algebra – SQL fundamentals – Advanced SQL features – Embedded SQL– Dynamic SQL

UNIT II: DATABASE DESIGN: Entity-Relationship model – E-R Diagrams – Enhanced-ER Model – ER-to-Relational Mapping – Functional Dependencies – Non-loss Decomposition – First, Second, Third Normal Forms, Dependency Preservation – Boyce/Codd Normal Form – Multi-valued Dependencies and Fourth Normal Form – Join Dependencies and Fifth Normal Form

UNIT III: TRANSACTIONS: Transaction Concepts – ACID Properties – Schedules – Serializability – Concurrency Control – Need for Concurrency – Locking Protocols – Two Phase Locking – Deadlock – Transaction Recovery - Save Points – Isolation Levels – SQL Facilities for Concurrency and Recovery.

UNIT IV: IMPLEMENTATION TECHNIQUES RAID: – File Organization – Organization of Records in Files – Indexing and Hashing –Ordered Indices – B+ tree Index Files – B tree Index Files – Static Hashing – Dynamic Hashing – Query Processing Overview – Algorithms for SELECT and JOIN operations – Query optimization using Heuristics and Cost Estimation.

UNIT V: ADVANCED TOPICS: Distributed Databases: Architecture, Data Storage, Transaction Processing – Object-based Databases: Object Database Concepts, Object-Relational features, ODMG Object Model, ODL, OQL - XML Databases: XML Hierarchical Model, DTD, XML Schema, XQuery – Information Retrieval: IR Concepts, Retrieval Models, Queries in IR systems.

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‖, Sixth Edition, Pearson Education, 2011.

REFERENCES:

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

Mapping with Programme Outcomes:

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

S-Strong M-Medium L-Low

Title of the Course/ Paper	Accounting & Financial Management		
Extra Disciplinary-1	I Year & I Semester	Credit: 3	

Objectives:

- To provide knowledge to analyze and record transactions, construct financial statements, and close the books for the accounting period and will have the ability to adjust and correct errors in the process of accounting.
- understand the fall in value of assets and use of accounting packages identify and analyze the costing systems adopted in the business organizations and can demonstrate mastery of costing systems, cost management systems appreciate budgeting systems and performance and critically analyze and provide recommendations to improve the operations of organizations demonstrate the need for appropriate decision making, control and performance evaluation of an organization.
- To develop critical thinking and problem solving competencies, at both the individual and group levels, of financial statement analysis, financial planning, principles of valuation, capital budgeting.

Outcomes:

- On completion of the course the student will be able to analyze and record transactions, construct financial statements, and close the books for the accounting period and will have the ability to adjust and correct errors in the process of accounting; understand the fall in value of assets and use of accounting packages.
- Identify and analyze the costing systems adopted in the business organizations and can demonstrate mastery of costing systems, cost management systems; Appreciate budgeting

systems and performance and critically analyze and provide recommendations to improve the operations of organizations; Demonstrate the need for appropriate decision making, control and performance evaluation of an organization.

- Understand the accounting process, recording, classifying, summarizing of transactions.
- Acquire the knowledge in accounting, system of maintenance of accounts, journal, ledger, bill of exchange, account current, average due date and bank reconciliation statement.
- Understanding of financial statements be able to evaluate and analyze cash flows statements.

Unit 1: Principles of Accounting: Principles of double entry -Assets and Liabilities - Accounting records and systems - Trial balance and preparation of financial statements - Trading, Manufacturing, Profit and Loss accounts, Balance Sheet including adjustments(Simple problems only).

Unit 2: Analysis and Interpreting Accounts and Financial Statements: Ratio analysis - Use of ratios in interpreting the final accounts (trading accounts and loss a/c and balance sheet) - final accounts to ratios as well as ratios to final accounts.

Unit 3: Break-even analysis and Marginal Costing: Meaning of variable cost and fixed cost – Cost-Volume -Profit analysis – calculation of breakeven point, Profit planning, sales planning and other decision – making analysis involving break - even analysis - Computer Accounting and algorithm.(differential cost analysis to be omitted)

Unit 4: Budget/Forecasting: preparation of and Characteristics of functional budgets, Production, sales, Purchases, cash and flexible budgets.

Unit 5 : Project Appraisal: Method of capital investment decision making: Payback method , ARR method - Discounted cash flows - Net Present values - Internal rate of return - Sensitivity analysis - Cost of capital.

Text and Reference Books

1. Shukla M.C. & T.S. Grewal, 1991, Advanced Accounts, S.Chand & Co. New Delhi.
2. Gupta R.L. & M. Radhaswamy, 1991, Advanced Accounts Vol. II, Sultan Chand & Sons, New Delhi.
3. Man Mohan & S.N. Goyal, 1987, Principles of Management Accounting, Arya Sahithya Bhawan.
4. Kuchhal, S.C., 1980, Financial Management, Chaitanya, Allahabad.
5. Hingorani, N.L. & Ramanthan, A.R, 1992, Management Accounting, 5th edition, Sultan Chand, New Delhi.
6. S.N. Maheswari, 2021, “Principles of Management Accounting “, Sultan Chand, New Delhi.

E-learning resources:

1. https://nptel.ac.in/courses/110101131
2. https://onlinecourses.nptel.ac.in/noc19_mg37/preview

3. https://archive.nptel.ac.in/courses/110/101/110101131/
4. https://nptel.ac.in/courses/110101003

Mapping with Programme Outcomes:

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	L	S	M	M	L	L	M	L
CO3	L	M	S	L	M	M	S	L	S	M
CO4	S	S	L	M	L	L	M	S	M	S
CO5	M	S	M	S	S	S	M	L	M	L

S-Strong M-Medium L-Low

Title of the Course/ Paper	Practical – I: Data Structures using C++ Lab		
Core – 4	I Year & I Semester	Credit: 2	

Objectives:

- The course is designed to develop skills to design and analyze simple linear and non linear data structures. It strengthen the ability to the students to identify and apply the suitable data structure for the given real world problem. It enables them to gain knowledge in practical applications of data structures

Outcomes:

At the end of this lab session, the student will

- Be able to design and analyze the time and space efficiency of the data structure
- Be capable to identity the appropriate data structure for given problem
- Have practical knowledge on the applications of data structures

For the implementation of the following problems, the students are advised to use all possible object oriented features. The implementation based on structured concepts will not accepted.

1. Implementation of Arrays (Single and Multi-Dimensional)
2. Polynomial Object and necessary overloaded operators.
3. Singly Linked Lists.
4. Circular Linked Lists.
5. Doubly Linked Lists.
6. Implementation of Stack (using Arrays and Pointers)
7. Implementation of Queue (Using Arrays and Pointers)

8. Implementation of Circular Queue (using Arrays and Pointers)
9. Evaluation of Expressions.
10. Binary Tree implementations and Traversals.
11. Binary Search Trees.

Mapping with Programme Outcomes:

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: RDBMS Lab.		
Core – 5	I Year & I Semester	Credit: 0-0-4-2	

OBJECTIVES:

- To understand data definitions and data manipulation commands
- To learn the use of nested and join queries
- To understand functions, procedures and procedural extensions of data bases
- To be familiar with the use of a front end tool
- To understand design and implementation of typical database applications

OUTCOMES: Upon completion of the course, the students will be able to:

- Use typical data definitions and manipulation commands.
- Design applications to test Nested and Join Queries
- Implement simple applications that use Views
- Implement applications that require a Front-end Tool
- Critically analyze the use of Tables, Views, Functions and Procedures

1. Data Definition Commands, Data Manipulation Commands for inserting, deleting, updating and retrieving Tables and Transaction Control statements
2. Database Querying – Simple queries, Nested queries, Sub queries and Joins
3. Views, Sequences, Synonyms
4. Database Programming: Implicit and Explicit Cursors

5. Procedures and Functions
6. Triggers
7. Exception Handling
8. Database Design using ER modeling, normalization and Implementation for any application
9. Database Connectivity with Front End Tools
10. Case Study using real life database applications.

i. Library Information Processing.
ii. Students Mark sheet processing using images.
iii. Bank Transactions (SB).
iv. Pay roll processing.
v. Inventory
vi. Purchase order processing.

Mapping with Programme Outcomes:

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	Design and Analysis of Algorithms		
Core – 6	I Year & II Semester	Credit: 4	

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.

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.

Unit 1: Introduction - Definition of Algorithm – pseudocode 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 - Quicksort, Selection, Strassen's matrix multiplication.

Unit 3: – Greedy Method: General Method – knapsack 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– biconnected 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 knapsack problem - Traveling Salesperson 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.
4. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein, 2022, "Introduction to Algorithms", Fourth Edition, MIT Press.

E-learning resources

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

Mapping with Programme Outcomes:

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	Agile Software Engineering		
Core – 7	I Year & II Semester	Credit: 4	

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.

Outcomes:

- Upon completion of the course, the students will be able to:
- Realize the importance of interacting with business stakeholders 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 an ongoing task for development teams.
- Show how agile approaches can be scaled up to the enterprise level.

UNIT I 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 II AGILE PROCESSES: Lean Production - SCRUM, Crystal, Feature Driven Development- Adaptive Software Development - Extreme Programming: Method Overview – Lifecycle – Work Products, Roles and Practices.

UNIT III 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 IV 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 V 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, 2003, Agile Management for Software Engineering: Applying the Theory of Constraints for Business Results, Prentice Hall.
2. Hazza and Dubinsky, 2009, Agile Software Engineering, Series: Undergraduate Topics in Computer Science , Springer.

Reference Books:

1. Craig Larman, 2004,Agile and Iterative Development: A Manager_s Guide, Addison-Wesley.
2. Kevin C. Desouza, 2007, Agile Information Systems: Conceptualization, Construction, and Management, Butterworth-Heinemann.

E-learning resources

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

Mapping with Programme Outcomes:

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	Computer Networks		
Core – 8	I Year & II Semester	Credit: 4	

Course Outcomes:

- Learn and understand the basic concepts of networking and its applications. To understand well established layered architectures in computer networks
- Understand the concepts of the transmission medium, modulation and multiplexing techniques
- Learn and understand well established error detection and correction codes and various protocols used in dealing with point to point and broad cast communications systems data link layer.
- Comprehend the design issues and to assess the routing and congestion control algorithms.
- Enumerate the transport layer service, conceptualize the internet transport protocols and the network security.

Course Objectives

- To define the computer networks and identify the taxonomy of computer networks in terms of its transmission technology and scalability. Outline the features of the OSI and TCP/IP network architectures
- Critically understand and assess various transmission media and algorithms for modulation and multiplexing.
- Understand , apply and analyze various algorithms used for error correction and detection and transmission protocols in point to point for broad cast communication systems.
- Understand and evaluate well known algorithms used for routing packets and avoid congestion in complex internetworks.

- Conceptually understand the protocols used in end to end communication to establish, and release connection and segment transmission to provide reliable service to applications. Create sample protocols and evaluate the performance.

Unit 1: Introduction - Uses of networks - Network architectures - OSI and TCP/IP reference model and services – Example Networks.
Unit 2: Physical layer - Transmission media - Guided and wireless – Digital Modulation and multiplexing – Public switched Telephone network.
Unit 3: Data link layer Design issues - error detection and correction - elementary data link protocols - sliding window protocols - Packet over SONET- ADSL. MAC sublayer protocols.
Unit 4: Network layer-design issues – Routing and congestion control algorithms, Quality of service, internetworking – Network layer in the INTERNET.
Unit 5: Transport layer – transport service - Addressing, Establishing & Releasing a connection, Multiplexing, Crash Recovery, Internet transport protocol TCP, Network security-cryptography.

Text book:

1. A. S. Tanenbaum, N. Feamster and D.J. Wetherall, 2021, Computer Networks, 6th Edition, Pearson Education.

Reference books:

1. D. Bertsekas and R. Gallagher, 1992, Data Networks, Prentice hall of India, New Delhi.
2. L. L Peterson and B. S Davie, 2012, "Computer Networks – A Systems Approach", MK Publishers, Fifth Edition.
3. J. F Kurose and K. W Ross, 2021, "Computer Networking – A Top Down Approach", Eighth Edition, Pearson Education.

E-learning resources

1. https://nptel.ac.in/courses/106/105/106105183/
2. https://nptel.ac.in/courses/106/105/106105081/
3. https://nptel.ac.in/courses/106/105/106105080/
4. http://intronetworks.cs.luc.edu/current/ComputerNetworks.pdf
5. Linux Network Administrators Guide, http://tldp.org/LDP/nag2/index.html

Mapping with Programme Outcomes:

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	M	S	M	M	L	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	S	S	M	L	S	M	M	L	M	L

S-Strong M-Medium L-Low

Title of the Course/ Paper	Algorithms Lab		
Core – 9	I Year & II Semester	Credit: 2	

Course Outcomes

- Learn about programming skills by implementing algorithms for simple problems and measure the performance.
- To understand the asymptotic performance solutions simple problems.
- Learn and analyze the implementation process of various algorithm design methods.
- Conceptualize and use these methods to solve complex real world problems particularly problems involved in simple industrial projects and their implementation.
- Critically analyze and compare the implementation methods for various design approaches like greedy, dynamic programming and branch and bound etc.

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 to compare the results. Critically assess the performance.
- Differentiate the concepts studied with certain selected examples and compare and generalize.

1. Simple sorting algorithms
2. Recursion: Towers of Hanoi, permutation generation - run time computation and comparison.
3. Repeated squaring for computing x^n and primality test.
4. Mergesort and Hoare's partition algorithm and quick sort – tree of recursive calls.
5. Graphs: – representation, breadth first search and depth first search with spanning trees,
6. Bi-connected components.
7. Greedy methods: – general knapsack, minimum cost spanning tree - Prim's and Kruskal, Dijkstra's single source shortest path algorithm.
8. Dynamic Programming: 0/1 knapsack problem, All pairs shortest path problem.
9. Backtracking: N-queens problem, Sum of Subsets problem
10. Branch and bound: Job scheduling and 0/1 knapsack problem.

Recommended Texts:

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

Reference Books

1. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein, 2022, "Introduction to Algorithms", Fourth Edition, MIT Press.

Mapping with Programme Outcomes:

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	M	S	M	S	L	S	L	M	L
CO3	L	M	S	M	M	S	L	L	S	M
CO4	S	L	L	M	M	L	M	S	M	S
CO5	S	S	M	L	S	M	M	L	M	L

S-Strong M-Medium L-Low

Title of the Course/ Paper	Practical – IV: Web Based Application Development Lab.		
Core – 10	I Year & II Semester	Credit: 2	

Objectives:

- To ensure responsiveness of applications
- To work alongside graphic designers for web design features
- To manage a project from conception to finished product
- To meet both technical and consumer needs for a web development project
- To learn to research new methods of development in web applications and programming languages

Outcomes:

- Structure and implement HTML/CSS.
- Apply intermediate and advanced web development practices.
- Develop a fully functioning website and deploy on a web server.
- Create webpages that function using external data.
- Identify mobile strategies and design for multiple operating systems.
- Distinguishing trends in multi-device implementation.

1.. Create a Simple Login form with validations and verification using java script and PHP respectively
2. Create a student mark entry form with validation and verification using java script and PHP respectively
3. Create a employee payroll form with validation and verification using java script and PHP respectively
4. Create a simple web page for counting the number of visitors and number of times a single user visited the page.
5. Build a navigation menu that highlights the selected entry using Angular's directives
6. Create a simple inline editor - clicking a paragraph will show a tooltip with a text field using angularJS
6. Switch between different layout modes (grid or list) with a click of a button.
7. Create a simple application for online shopping using AngularJS and PHP session.
8. Create a Simple Login form with validations and verification using AngularJS PHP respectively
9. Create a student mark entry form with validation and verification using AngularJS and PHP respectively
10. Create a employee payroll form with validation and verification using AngularJS and PHP respectively

Recommended Texts:

1. Ravi Kant Soni, 2017, Full Stack AngularJS for Java Developers: Build a Full-Featured Web Application from Scratch Using AngularJS with Spring RESTful, Apress; 1st ed.

Reference Books:

1. Ken Williamson, 2015, Learning AngularJS: A Guide to AngularJS Development, ,O' Reilly.

Web References:

1. https://www.youtube.com/watch?v=9b9pLgaSQuI

Mapping with Programme Outcomes:

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	M	M	S	S	L	S	L	M	L
CO3	M	M	S	M	S	S	L	L	S	M
CO4	S	L	L	M	M	L	M	S	M	S
CO5	S	S	M	L	S	M	M	L	M	L

S-Strong M-Medium L-Low

Title of the Course/ Paper	Web Based Application Development		
Extra – Disciplinary-II	I Year & II Semester	Credit: 3	

Objectives:

- To provide knowledge and abilities to develop web sites for the internet
- To provide basic design principles to present ideas, information, products, and services on websites
- To induce basic programming principles to the construction of websites
- To make effectively manage website projects using available resources
- To inculcate full front end website architecture Knowledge

Outcomes:

- Design user interactions on web pages
- Develop back end website applications
- Create servers and databases for functionality
- Develop adaptive content for multiple devices (cell phone, tablets, etc.) Ensure cross-platform optimization for mobile phones
- Design and develop Application Programming Interfaces (APIs)

Unit I: Introduction to Dynamic Web Content-Three-tier architecture-architecture for client-server applications-Introduction to HTML5-Structural Elements-Paving the Way for Web Applications:HTML5 forms-The HTML5 Canvas-Audio and Video

Unit II: Introduction to CSS-Advanced CSS with CSS3-Accessing CSS from JavaScript-Exploring JavaScript-Expressions and Control Flow in JavaScript-JavaScript Functions, Objects, and Arrays.

Unit III: Introduction to PHP. -Expressions and Control Flow in PHP. -PHP Functions and Objects-PHP Arrays-Cookies, Sessions, and Authentication-Accessing MySQL Using PHP

Unit IV: Introduction to AngularJS, -AngularJS - Overview- Environment Setup- MVC Architecture- Directives- Expressions- Controllers – Filters - Tables

Unit V: HTML DOM – Modules – Forms – Includes – AJAX – Views – Scopes – Services -Dependency Injection - Custom Directives - Fetching Data From a PHP Server Running MySQL

Recommended Texts:

1. Robin Nixon, 2014, Learning PHP, MySQL, JavaScript, CSS & HTML5, Third Edition, O'Reilly Media.
2. Ken Williamson,2015, Learning Angular JS, O'Reilly Media

Reference Books:

1. Ravi Kant Soni, 2017, Full Stack Angular JS for Java Developers: Build a Full-Featured Web Application from Scratch Using Angular JS with Spring RESTful, Apress; 1st ed.

Web References:

1. https://www.alvinisd.net/cms/lib03/TX01001897/Centricity/Domain/1077/beginning_html5_and_css3.pdf
2. https://www.tutorialspoint.com/angularjs/index.htm
3. https://www.youtube.com/watch?v=9b9pLgaSQuI

Mapping with Programme Outcomes:

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	M	M	M	S	L	S	L	M	L
CO3	M	S	S	M	S	S	L	L	L	M
CO4	S	L	L	M	M	L	M	S	M	S
CO5	S	S	M	L	S	M	M	L	M	L

S-Strong M-Medium L-Low

Title of the Course/ Paper	Machine Learning		
Core – 11	II Year & III Semester	Credit: 4	

Objectives:

- To provide mathematical base for Machine learning
- To provide theoretical knowledge on setting hypothesis for pattern recognition.
- To impart Knowledge of machine learning techniques for data handling
- To provide the skill to evaluate the performance of algorithms and to provide solution for various real-world applications.
- To impart the knowledge of identifying similarities and differences in various patterns of data

Outcomes:

- Recognize the characteristics of machine learning strategies.
- Apply various supervised learning methods to appropriate problems.
- Identify and integrate more than one technique to enhance the performance of learning.
- Create probabilistic and unsupervised learning models for handling unknown pattern.
- Analyze the co-occurrence of data to find interesting frequent patterns.

- Preprocess the data before applying to any real-world problem and can evaluate its performance.

Unit 1: The Fundamentals of Machine Learning: The Machine Learning Landscape - Types of Machine Learning Systems - Main Challenges of Machine Learning - Testing and Validating. End-to-End Machine Learning Project - Look at the Big Picture - Get the Data - Discover and Visualize the Data to Gain Insights - Prepare the Data for Machine Learning Algorithms - Select and Train a Model - Fine-Tune Your Model - Launch, Monitor, and Maintain Your System.

Unit 2: Ingredients of machine learning: Tasks – Models – Features. Supervised Learning: Classification – Binary classification and related tasks – Scoring and ranking – class probability estimation – Multi-class classification. Unsupervised Learning: Regression – Unsupervised and descriptive learning. Concept Learning: The hypothesis space – paths through the hypothesis space – beyond conjunctive concepts – learnability.

Unit 3: Tree Models: Decision trees – Ranking and probability estimation trees – tree learning as variance reduction. Rule Models: Learning ordered rule lists – learning unordered rule sets – descriptive rule learning – first–order rule learning. Linear Models: The least-squares method – The perceptron – Support vector machines.

Unit 4: Distance-based Models: Neighbours and exemplars – Nearest-neighbour classification – Distance-based clustering – K-Means algorithm – Hierarchical clustering. Probabilistic Models: The normal distribution and its geometric interpretations – probabilistic models for categorical data – Naïve Bayes model for classification – probabilistic models with hidden values – Expectation-Maximization.

Unit 5: Features: Kinds of features – Feature transformations – Feature construction and selection. Model ensembles: Bagging and random forests – Boosting – Mapping the ensemble landscape. Machine Learning experiments: What to measure – How to measure it – How to interpret it.

Text Books:

1. Flach, P, 2012, “Machine Learning: The Art and Science of Algorithms that Make Sense of Data”, Cambridge University Press.
2. Aurélien Géron, 2017, “Hands-On Machine Learning with Scikit-Learn and Tensor Flow: Concepts, Tools, and Techniques to Build Intelligent Systems”, First Edition. (Chapters 1 and 2)

References

1. John D. Kelleher, Brian Mac Namee, Aoife D'Arcy, 2012, “Fundamentals of Machine Learning for Predictive Data Analytics: Algorithms, Worked Examples, and Case Studies”, The MIT Press, First Edition.
2. Kevin P. Murphy, 2012, “Machine Learning: A Probabilistic Perspective”, MIT Press.
3. Ethem Alpaydin, 2014, “Introduction to Machine Learning”, MIT Press, Third Edition.
4. Tom Mitchell, 1997, "Machine Learning", McGraw-Hill.

5. Stephen Marsland, 2014, "Machine Learning - An Algorithmic Perspective", Chapman and Hall/CRC Press, Second Edition.

E-Learning Resources:

1. https://www.youtube.com/watch?v=r4sgKrRL2Ys&list=PL1xHD4vteKYVpaIiy295pg6_SY5qznc77

Mapping with Programme Outcomes:

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

S-Strong M-Medium L-Low

Title of the Course/ Paper	Practical – V: Machine Learning Lab.		
Core – 12	II Year & III Semester	Credit: 2	

Objectives:

- Make use of Data sets in implementing the machine learning algorithms
- Implement the machine learning concepts and algorithms in any suitable language of choice.
- The programs can be implemented in either JAVA or Python.
- For Problems 1 to 6 and 10, programs are to be developed without using the builtin classes or APIs of Java/Python.
- Data sets can be taken from standard repositories (https://archive.ics.uci.edu/ml/datasets.html) or constructed by the students.

Outcomes:

- Understand the implementation procedures for the machine learning algorithms.
- Design Java/Python programs for various Learning algorithms.
- Apply appropriate data sets to the Machine Learning algorithms.
- Identify and apply Machine Learning algorithms to solve real world problems.
- be capable of confidently applying common Machine Learning algorithms in practice and implementing their own;

1. Implement and demonstrate the FIND-S algorithm for finding the most specific hypothesis based on a given set of training data samples. Read the training data from a .CSV file

2. For a given set of training data examples stored in a .CSV file, implement and demonstrate the Candidate-Elimination algorithm to output a description of the set of all hypotheses consistent with the training examples.

3. Write a program to demonstrate the working of the decision tree based ID3 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample.

4. Build an Artificial Neural Network by implementing the Backpropagation algorithm and test the same using appropriate data sets.

5. Write a program to implement the naïve Bayesian classifier for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets.

6. Assuming a set of documents that need to be classified, use the naïve Bayesian Classifier model to perform this task. Built-in Java classes/API can be used to write the program. Calculate the accuracy, precision, and recall for your data set.

7. Write a program to construct a Bayesian network considering medical data. Use this model to demonstrate the diagnosis of heart patients using standard Heart Disease Data Set. You can use Java/Python ML library classes/API.

8. Apply EM algorithm to cluster a set of data stored in a .CSV file. Use the same data set for clustering using k-Means algorithm. Compare the results of these two algorithms and comment on the quality of clustering. You can add Java/Python ML library classes/API in the program.

9. Write a program to implement k-Nearest Neighbor algorithm to classify the iris data set. Print both correct and wrong predictions. Java/Python ML library classes can be used for this problem.

10. Implement the non-parametric Locally Weighted Regression algorithm in order to fit data points. Select appropriate data set for your experiment and draw graphs.

Recommended Texts:

1. Kamlesh Namdev, 2021, Lab manual of Machine Learning: Machine Learning Practicals in Python, LAP LAMBERT Academic Publishing.

Reference Books:

1. Andreas C. Müller, Sarah Guido, 2016, Introduction to Machine Learning with Python, O'Reilly Media.

E-Learning Resources:

1. https://www.youtube.com/watch?v=RnFGwxJwx-0

Mapping with Programme Outcomes:

Mapping with Programmers outcomes*										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	S	L	S	M	L	M	L	L
CO2	S	M	S	S	S	M	M	L	M	L
CO3	M	S	M	M	S	S	L	L	L	M
CO4	S	L	M	M	M	L	M	L	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 – X: Mini Project		
Core – 13	II Year & III Semester	Credit: 2	

Objectives:

- To provide the hands on experience in analyzing, designing and implementing various projects.
- To assign minor projects based on the languages they have learned so far.
- To comprehend technical literature and document project work
- To create test cases and implement different testing strategies
- To provide software development skill for a given problem

Outcomes:

- Apply the software engineering principles on a real software project
- Develop a software product using the methodologies applied in the industry.
- Work with different version control system.
- Apply technology tools to analyze, design, develop and test the application
- Design a system, model, component or a process to meet desired/industrial needs

Mini Project: Each student will develop and implement application software based on any emerging latest technologies.

Mapping with Programme Outcomes:

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

S-Strong M-Medium L-Low

Title of the Course/ Paper	Project & Viva-Voce		
Core- 14	II Year & IV Semester	Credit: 20	

Objectives:

- To make the project an extended piece of individual work.
- To work on a topic that interests the student
- To have regular meetings with their supervisor and/or external project provider to discuss progress
- To produce dissertations that contain some element of original work.
- To encourage and reward individual inventiveness and application of effort

Outcomes:

- Construct a project from initial ideas;
- Plan, schedule, monitor and control their own work;
- Defend their ideas in discussions and presentations;
- Use libraries and other information resources;
- Apply tools and techniques from taught courses
- Communicate their findings through a written report.

Project: The project work is to be carried out either in a software industry or in an academic institution for the entire semester and the report of work done is to be submitted to the University.

Mapping with Programme Outcomes:

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

S-Strong M-Medium L-Low

List of Electives

Title of the Course/ Paper	Operating Systems		
Elective – I	I Year & I Semester	Credit: 3	

OBJECTIVES

- To understand the basic concepts and functions of operating systems
- To understand Processes and Threads
- To analyze Scheduling algorithms.
- To understand the concept of Deadlocks.
- To analyze various memory management schemes.
- To understand I/O management and File systems.

OUTCOMES

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

- Analyze various scheduling algorithms.
- Understand deadlock, prevention and avoidance algorithms.
- Compare and contrast various memory management schemes.
- Understand the functionality of file systems.

Unit I: Introduction- Operating Systems- Computer System Architecture- Operating System Structure- Operating System Services- User and Operating System Interface- System Calls- Types of System Calls- System Programs- Operating System Debugging –Operating System Generation- System Boot- Process - Process Scheduling- Interprocess Communication- Examples of IPC Systems- Communication in Client– Server Systems.

Unit II: Threads- Multicore Programming- Multithreading Model- Threading Issues- Process Synchronization- The Critical-Section Problem- Peterson's Solution- Synchronization Hardware - Mutex Locks- Semaphores- Monitors- CPU Scheduling- Scheduling Criteria- Scheduling Algorithm- Thread Scheduling- Multiple Processor Scheduling- System Model- Methods for Handling Deadlocks- Deadlock Prevention- Deadlock Avoidance- Deadlock Detection.

Unit III:Main Memory- Swapping- Contiguous Memory Allocation- Segmentation- Paging- Structure of the Page Table- Example: ARM Architecture- Virtual Memory- Demand Paging- Page Replacement- Thrashing- Memory-Mapped Files- Allocating Kernel Memory

Unit IV: Mass-Storage Structure- Disk Structure-Disk Attachment-Disk Scheduling -Disk Management –Swap Space Management RAID Structure – Stable Storage Implementation- File Concept -Access Methods -Directory and Disk Structure - File-System Mounting - File Sharing – Protection- File-System Structure File System Implementation-Directory Implementation- Allocation Methods - Free Space Management Efficiency and Performance - Recovery – NFS- I/O Hardware -Application I/O Interface- Kernel I/O Subsystem - Transforming I/O Requests to Hardware Operations.

Unit V: Protection- Goals of Protection-Principles of Protection-Domain of Protection-Access Matrix- Implementation of the Access Matrix-Access Control -Revocation of Access Rights- Capability-Based Systems-Language Based Protection- The Security Problem-Program Threats- System and Network Threats -Cryptography as a Security Tool -User Authentication-Implementing Security Defenses-Firewalling to Protect Systems and Networks -Computer Security Classifications

TEXT BOOK :

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, ―Operating System Concepts‖, 9th Edition, John Wiley and Sons Inc., 2012.

REFERENCES :

1. RamazElmasri, A. Gil Carrick, David Levine, ―Operating Systems – A Spiral Approach‖, Tata McGraw Hill Edition, 2010. os Notes
2. AchyutS.Godbole, AtulKahate, ―Operating Systems‖, McGraw Hill Education, 2016.
3. Andrew S. Tanenbaum, ―Modern Operating Systems‖, Second Edition, Pearson Education, 2004. CS8493 Notes Operating Systems
4. Gary Nutt, ―Operating Systems‖, Third Edition, Pearson Education, 2004.

E-Resources:

https://applied-programming.github.io/Operating-Systems-Notes/
https://ecomputernotes.com/fundamental/disk-operating-system/what-is-operating-system

Mapping with Programme Outcomes:

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	Theory of Computation		
Elective - 1	I Year & I Semester	Credit: 3	

Objectives:

- To give an overview of the theoretical foundations of computer science from the perspective of formal languages
- To illustrate finite state machines to solve problems in computing
- To explain the hierarchy of problems arising in the computer sciences.
- To familiarize Regular grammars, context frees grammar.
- To use basic concepts of formal languages of finite automata techniques

Outcomes:

- Use the concepts and techniques of discrete mathematics for theoretical computer science
- Design Finite Automata's for different Regular Expressions and Languages
- Identify and use different formal languages and their relationship.
- To solve various problems of applying normal form techniques, push down automata and Turing Machines
- Analyze various concepts of undecidability and Computable Function and Discuss analytically and intuitively for problem-solving situation

Unit I: Review of Mathematical Theory

COMBINATORICS Review of Permutation and Combination - Mathematical Induction - Pigeon hole principle - Principle of Inclusion and Exclusion - generating function - Recurrence relations. Statements – Connectives – Truth Tables – Normal forms – Predicate calculus – Inference – Theory for Statement Calculus and Predicate Calculus

Unit-II: Regular Languages and Finite Automata

Regular Expressions, Regular Languages, Application of Finite Automata, Automata with output - Moore machine & Mealy machine, Finite Automata, Memory requirement in a

recognizer, Definitions, union- intersection and complement of regular languages, Non Deterministic Finite Automata, Conversion from NFA to FA, ??- Non Deterministic Finite Automata, Conversion of NFA- ? to NFA, Kleene's Theorem, Minimization of Finite automata, Regular And Non Regular Languages – pumping lemma.?

Unit-III: Context free grammar (CFG)

Definitions and Examples, Unions Concatenations And Kleene's of Context free language, Regular Grammar for Regular Language, Derivations and Ambiguity , Unambiguous CFG and Algebraic Expressions, BacosNaur Form (BNF), Normal Form – CNF.

Unit-IV: Pushdown Automata, CFL And NCFL

Definitions, Deterministic PDA, Equivalence of CFG and PDA & Conversion, Pumping lemma for CFL, Intersections and Complements of CFL, Non-CFL.

Unit-V: Turing Machine (TM)

TM Definition, Model Of Computation, Turing Machine as Language Acceptor, TM that Compute Partial Function, Church Turning Thesis, Combining TM, Variations Of TM, Non Deterministic TM, Universal TM, Recursively and Enumerable Languages, Context sensitive languages and Chomsky hierarchy.

Recommended Texts:

1. John E. Hopcroft, Rajeev Motwani, Jeffrey D. Ullman (2007), Introduction to Automata Theory Languages and Computation, 3rdedition, Pearson Education, India.

Reference Books:

1. K. L. P Mishra, N. Chandrashekaran (2003), Theory of Computer Science-Automata Languages and Computation, 2nd edition, Prentice Hall of India, India.

Web References:

1. https://www.youtube.com/playlist?list=PLbtzT1TYeoMjNOGEiaRmm_vMIwUAidnQz
2. https://nptel.ac.in/courses/106106049

Mapping with Programme Outcomes:

Mapping with Programmers outcomes*										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	M	L	S	M	L	M	S	L
CO2	S	M	S	M	S	S	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	Data Mining and Data Warehousing		
Elective-1	I Year & I Semester	Credit: 3	

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.

Outcomes:

- Define the scope and necessity of Data Mining & Warehousing for the society.
- Modeling and design of data warehouses.
- 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) Jiawei Han, Micheline Kamber and Jian Pei, 2011,"Data Mining Concepts and Techniques", Third Edition, Elsevier.

Reference Books:

1) Alex Berson and Stephen J. Smith, 2007, "Data Warehousing, Data Mining & OLAP", Tata McGraw – Hill Edition, Tenth Reprint.
2) K.P. Soman, Shyam Diwakar and V. Ajay 2006, "Insight into Data mining Theory and Practice", Eastern Economy Edition, Prentice Hall of India.
3) G. K. Gupta, 2006, "Introduction to Data Mining with Case Studies", Eastern Economy Edition, Prentice Hall of India.
4) Pang-Ning Tan, Michael Steinbach and Vipin Kumar, 2007, "Introduction to Data Mining", Pearson Education.

E-learning resources:

1) https://nptel.ac.in/courses/106105174
2) https://onlinecourses.nptel.ac.in/noc21_cs06/preview
3) https://onlinecourses.swayam2.ac.in/cec20_cs12/preview

Mapping with Programme Outcomes:

Mapping with Programmers outcomes*										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	M	L	S	M	L	M	S	L
CO2	S	M	S	M	S	S	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	**Cyber Security**		
Elective - 2	I Year - II Semester		Credit: 3

Objectives:

- To understand various types of cyber-attacks and cyber-crimes
- To learn threats and risks within context of the cyber security
- To have an overview of the cyber laws & concepts of cyber forensics
- To study the defensive techniques against these attacks
- To describe various legal responses to cybercrime

Outcomes:

- Analyze cyber-attacks, types of cybercrimes, cyber laws and also how to protect them self and ultimately the entire Internet community from such attacks.
- Interpret and forensically investigate security incidents
- Apply policies and procedures to manage Privacy issues
- Design and develop secure software modules
- Understand different forms of hacking techniques

UNIT -I Introduction to Cyber Security: Basic Cyber Security Concepts, layers of security, Vulnerability, threat, Harmful acts, Internet Governance – Challenges and Constraints, Computer Criminals, CIA Triad, Assets and Threat, motive of attackers, active attacks, passive attacks, Software attacks, hardware attacks, Cyber Threats-Cyber Warfare, Cyber Crime, Cyber terrorism, Cyber Espionage, etc., Comprehensive Cyber Security Policy.

UNIT - II Cyberspace and the Law & Cyber Forensics: Introduction, Cyber Security Regulations, Roles of International Law. The INDIAN Cyberspace, National Cyber Security Policy. Introduction, Historical background of Cyber forensics, Digital Forensics Science, The Need for Computer Forensics, Cyber Forensics and Digital evidence, Forensics Analysis of Email, Digital Forensics Lifecycle, Forensics Investigation, Challenges in Computer Forensics

UNIT - III Cybercrime: Mobile and Wireless Devices: Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Registry Settings for Mobile Devices, Authentication service Security, Attacks on Mobile/Cell Phones, Organizational security Policies and Measures in Mobile Computing Era, Laptops.

UNIT- IV Cyber Security: Organizational Implications: Introduction, cost of cybercrimes and IPR issues, web threats for organizations, security and privacy implications, social media marketing: security risks and perils for organizations, social computing and the associated challenges for organizations.

UNIT - V Privacy Issues: Basic Data Privacy Concepts: Fundamental Concepts, Data Privacy Attacks, Datalinking and profiling, privacy policies and their specifications, privacy policy languages, privacy in different domains- medical, financial, etc. Cybercrime: Case studies on recent threats and attacks.

Recommended Texts:

1. Nina Godbole and Sunit Belapure, 2011, Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Wiley

Reference Books:

1. B.B. Gupta, D.P. Agrawal, Haoxiang Wang, 2018, Computer and Cyber Security: Principles, Algorithm, Applications, and Perspectives, CRC Press.
2. James Graham, Richard Howard and Ryan Otson, 2011, Cyber Security Essentials, ,CRC Press.
3. Chwan-Hwa(John) Wu, J. David Irwin, 2016, Introduction to Cyber Security, CRC Press T&F Group.

Web References:

1. https://www.youtube.com/watch?v=6wi5DI6du-4&list=PL_uaeekrhGzJlB8XQBxU3z__hDwT95xlk

Mapping with Programme Outcomes:

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	**Cloud Computing**		
Elective - 2	I Year - II Semester		Credit: 3

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, NoSQL databases and object storage;
- To introduce the variety of programming models and develop working experience in several of them.

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 I: 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 II: Service Delivery and Deployment Models: Service Models (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 III: 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 ZooKeeper - The MapReduce Programming Model - A Case Study: The Grep The Web Application

Unit IV: 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 V: Cloud Platforms and Application Development: Comparing Amazon web services, Google AppEngine, 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, Twitter API. Advances is 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. Sosinsk, 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, Mc Graw 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:

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

Mapping with Programme Outcomes:

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 – 2	I Year & II Semester	Credit: 3	

Objective:

- To introduce the students the following areas of knowledge that is important for research in Computer Science.
- To expose to Fuzzy set theory, Optimization, Artificial neural networks, neuro-fuzzy modeling and computational intelligence.

Outcomes:

- The students would have gathered knowledge in the following areas; Fuzzy set theory, Optimization, Artificial neural networks, neuro-fuzzy modeling and computational intelligence.
- Analyze various neural network architectures.
- Understand perceptrons and counter propagation networks.
- Define the fuzzy systems.

UNIT – I: Fuzzy set theory : Introduction to Neuro – Fuzzy and Soft Computing – Fuzzy Sets – Basic Definition and Terminology – Set-theoretic Operations – Member Function Formulation and Parameterization – Fuzzy Rules and Fuzzy Reasoning – Extension Principle and Fuzzy Relations – Fuzzy If-Then Rules – Fuzzy Reasoning – Fuzzy Inference Systems – Mamdani Fuzzy Models – Sugeno Fuzzy Models – Tsukamoto Fuzzy Models – Input Space Partitioning and Fuzzy Modeling

UNIT – II: Optimization : Derivative-based Optimization – Descent Methods – The Method of Steepest Descent – Classical Newton's Method – Step Size Determination – Derivative-free Optimization – Genetic Algorithms – Simulated Annealing – Random Search – Downhill Simplex Search.

UNIT – III: Neural Networks : Supervised Learning Neural Networks – Perceptrons - Adaline – Backpropagation Mutilayer Perceptrons – Radial Basis Function Networks – Unsupervised Learning Neural Networks – Competitive Learning Networks – Kohonen Self-Organizing Networks – Learning Vector Quantization – Hebbian Learning.

UNIT – IV:Neuro Fuzzy Modeling : Adaptive Neuro-Fuzzy Inference Systems – Architecture – Hybrid Learning Algorithm – Learning Methods that Cross-fertilize ANFIS and RBFN – Coactive Neuro Fuzzy Modeling – Framework Neuron Functions for Adaptive Networks – Neuro Fuzzy Spectrum

UNIT – V: Applications of Computational Intelligence : Printed Character Recognition – Inverse Kinematics Problems – Automobile Fuel Efficiency Prediction – Soft Computing for Color Recipe Prediction

TEXT BOOK :

1. J.S.R. Jang, C.T. Sun and E. Mizutani, "Neuro-Fuzzy and Soft Computing", 1st ed., PHI, Pearson Education, 2004.

REFERENCES BOOKS :

1. Timothy J. Ross, "Fuzzy Logic with Engineering Applications", 2nd ed., McGraw-Hill, 1997.
2. Davis E. Goldberg, "Genetic Algorithms: Search, Optimization and Machine Learning", 1st ed., Addison Wesley, N.Y., 1989.
3. S. Rajasekaran and G.A.V. Pai, "Neural Networks, Fuzzy Logic and Genetic Algorithms", 1st ed.,PHI, 2003.
4. R. Eberhart, P. Simpson and R. Dobbins, "Computational Intelligence - PC Tools", 1st ed., AP Professional, Boston, 1996.

Other references:

1. http://www.scholarpedia.org/article/Particle_swarm_optimization
2. http://msdn.microsoft.com/en-us/magazine/hh335067.aspx
3. http://www.scholarpedia.org/article/Biologically_inspired_robotics
4. http://ocw.mit.edu/courses

Mapping with Programme Outcomes:

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	**Natural Language Processing**		
Elective - 3	II Year -III Semester		Credit: 3

Objectives:

- To learn the fundamentals of natural language processing
- To understand the use of CFG and PCFG in NLP
- To understand the role of semantics of sentences and pragmatics
- To apply the NLP techniques to IR applications

Outcomes:

- To tag a given text with basic Language features
- To design an innovative application using NLP components
- To implement a rule-based system to tackle morphology/syntax of a language
- To design a tag set to be used for statistical processing for real-time applications
- To compare and contrast the use of different statistical approaches for different types of NLP applications.

UNIT I INTRODUCTION: Origins and challenges of NLP – Language Modeling: Grammar-based LM, Statistical LM - Regular Expressions, Finite-State Automata – English Morphology, Transducers for lexicon and rules, Tokenization, Detecting and Correcting Spelling Errors, Minimum Edit Distance

UNIT II WORD LEVEL ANALYSIS: Unsmoothed N-grams, Evaluating N-grams, Smoothing, Interpolation and Backoff – Word Classes, Part-of-Speech Tagging, Rule-based, Stochastic and Transformation-based tagging, Issues in PoS tagging – Hidden Markov and Maximum Entropy models.

UNIT III SYNTACTIC ANALYSIS: Context-Free Grammars, Grammar rules for English, Treebanks, Normal Forms for grammar – Dependency Grammar – Syntactic Parsing, Ambiguity, Dynamic Programming parsing – Shallow parsing – Probabilistic CFG, Probabilistic CYK, Probabilistic Lexicalized CFGs - Feature structures, Unification of feature structures.

UNIT IV SEMANTICS AND PRAGMATICS: Requirements for representation, First-Order Logic, Description Logics – Syntax-Driven Semantic analysis, Semantic attachments – Word Senses, Relations between Senses, Thematic Roles, selection restrictions – Word Sense Disambiguation, WSD using Supervised, Dictionary & Thesaurus, Bootstrapping methods – Word Similarity using Thesaurus and Distributional methods.

UNIT V DISCOURSE ANALYSIS AND LEXICAL RESOURCES: Discourse segmentation, Coherence – Reference Phenomena, Anaphora Resolution using Hobbs and Centering Algorithm – Coreference Resolution – Resources: Porter Stemmer, Lemmatizer, Penn Treebank, Brill's Tagger, WordNet, PropBank, FrameNet, Brown Corpus, British National Corpus (BNC).

Recommended Texts:

1. Daniel Jurafsky, James H. Martin―Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics and Speech, Pearson Publication, 2014.
2. Steven Bird, Ewan Klein and Edward Loper, ―Natural Language Processing with Python , First Edition, O_Reilly Media, 2009.

Reference Books:

1. Breck Baldwin, ―Language Processing with Java and LingPipe Cookbook, Atlantic Publisher, 2015.
2. Richard M Reese, ―Natural Language Processing with Java , O_Reilly Media, 2015.
3. Nitin Indurkhya and Fred J. Damerau, ―Handbook of Natural Language Processing, Second Edition, Chapman and Hall/CRC Press, 2010.
4. Tanveer Siddiqui, U.S. Tiwary, ―Natural Language Processing and Information Retrieval, Oxford University Press, 2008.

Web References:

1. https://www.youtube.com/watch?v=oWsMIW-5xUc&list=PLLssT5z_DsK8HbD2sPcUIDfQ7zmBarMYv

Mapping with Programme Outcomes:

Mapping with Programmers outcomes*										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	M	S	S	M	L	S	L	L
CO2	S	M	S	M	S	S	M	L	M	L
CO3	M	S	S	S	M	S	L	M	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	Mobile Applications Development		
Elective – 3	II Year & III Semester	Credit: 3	

Objective:

- To understand the mobile device software development methodologies and programming principles.
- It provides students with the opportunity to design, develop, deploy and debug applications for the Android platform, enhancing their understanding of mobile development.
- Analysis the judgment of the effectiveness of different development techniques.

Outcomes:

- Distinguish between mobile, web and desktop design considerations and describe android's programming framework.

- Utilize rapid application prototyping and development techniques to design interactive and effective user interfaces.
- Develop programming skills for the Android operating system using basic and more advanced techniques.
- Explain the deployment and distribution applications process on the Android market place.

UNIT – I: Mobile Application Development - Mobile Applications and Device Platforms - Alternatives for Building Mobile Apps -Comparing Native vs. Hybrid Applications -The Mobile Application Development Life cycle-The Mobile Application Front-End-The Mobile Application Back-End-Key Mobile Application Services-What is Android-Android version history-Obtaining the Required Tools- Launching Your First Android Application-Exploring the IDE-Debugging Your Application-Publishing Your Application

UNIT – II: Understanding Activities-Linking Activities Using Intents-Fragments-Displaying Notifications- Understanding the Components of a Screen-Adapting to Display Orientation-Managing Changes to Screen Orientation- Utilizing the Action Bar-Creating the User Interface Programmatically Listening for UI Notifications

UNIT – III: Using Basic Views-Using Picker Views -Using List Views to Display Long Lists-Understanding Specialized Fragments - Using Image Views to Display Pictures -Using Menus with Views-Using WebView- Saving and Loading User Preferences-Persisting Data to Files-Creating and Using Databases.

UNIT – IV: Sharing Data in Android-Creating Your Own Content Providers -Using the Content Provider- SMS Messaging -Sending Email-Displaying Maps- Getting Location Data- Monitoring a Location.

UNIT – V: Consuming Web Services Using HTTP-Consuming JSON Services- Creating Your Own Services - Binding Activities to Services -Understanding Threading - Developing simple applications that uses radio button, image button, Alert dialog box, Layout managers and to display personal details using GUI components etc.

TEXT BOOK:

1. Jerome DiMarzio, “Beginning Android Programming with Android Studio”, 4thEdition, 2016.

REFERENCE BOOKS:

1. Dawn Griffiths, David Griffiths, “Head First Android Development: A Brain-Friendly Guide”, 2017.
2. Neil Smyth, “Android Studio 3.0 Development Essentials: Android”, 8th Edition, 2017.
3. Pradeep Kothari, “Android Application Development (With Kitkat Support)”, Black Book 2014.

WEB REFERENCES:

1. https://developer.android.com/guide
2. https://en.wikipedia.org/wiki/Android_10
3. Develop App for Free
4. https://flutter.dev/
5. http://ai2.appinventor.mit.edu
6. https://aws.amazon.com/mobile/mobile-application-development/ (Unit 1)
7. https://flutter.dev/ (Applications)
8. http://ai2.appinventor.mit.edu (Applications)

Mapping with Programme Outcomes:

Mapping with Programmers outcomes*										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	M	S	S	M	L	S	L	L
CO2	S	M	S	M	S	S	M	L	M	L
CO3	M	S	S	S	M	S	L	M	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	Data Visualization		
Elective - III	II Year & III Semester	Credit: 3	

Course Objectives:

- To understand the various types of data, apply and evaluate the principles of data visualization
- Acquire skills to apply visualization techniques to a problem and its associated dataset
- To apply structured approach to create effective visualizations
- To learn how to bring valuable insight from the massive dataset using visualization
- To learn how to build visualization dashboard to support decision making
- 6.To create interactive visualization for better insight using various visualization tools

Expected Course Outcome:

After successfully completing the course the student should be able to

- Identify the different data types, visualization types to bring out the insight.
- Relate the visualization towards the problem based on the dataset to analyze and bring out valuable insight on large dataset.
- Design visualization dashboard to support the decision making on large scale data.

- Demonstrate the analysis of large dataset using various visualization techniques and tools.

Unit I: Introduction to Data Visualization and Visualization techniques: Overview of data visualization - Data Abstraction - Task Abstraction - Analysis: Four Levels for Validation. Visualization Techniques -Scalar and point techniques – colour maps – Contouring – Height Plots - Vector visualization techniques – Vector properties – Vector Glyphs – Vector Color Coding. Visual Analytics: Visual Variables- Networks and Trees –Tables - Map Color and Other Channels- Manipulate View.

Unit II: Visualization Tools: Fundamentals of R- Visualization using R library -Introduction to various data visualization tool: tableau

Unit III: Geo spatial visualization: Geo spatial data and visualization techniques : Chloropleth map, Hexagonal Binning, Dot map, Cluster map, cartogram map

Unit IV: Diverse Types Of Visual Analysis: Time- Series data visualization – Text data visualization – Matrix visualization techniques – Heat Map- Multivariate data visualization and case studies. Visualization of Streaming Data: Introduction to Data Streaming, processing and presenting of streaming data, streaming visualization techniques, streaming analysis.

Unit V: Visualization Dashboard Creations: Dashboard creation using visualization tools for the use cases: Finance-marketing-insurance healthcare etc., Recent Trends.

Text Books

1. Tamara Munzer, Visualization Analysis and Design, CRC Press 2014.
2. Aragues, Anthony. Visualizing Streaming Data: Interactive Analysis Beyond Static Limits. O"Reilly Media, Inc., 2018

Reference Books

1. Chun-hauh Chen, W.K.Hardle, A.Unwin, Hand book of Data Visualization, Springer publication, 2016.
2. Christian Toninski, Heidrun Schumann, Interactive Visual Data Analysis, CRC press publication,2020
3. Alexandru C. Telea, Data Visualization: Principles and Practice, AK Peters, 2014.

Mapping with Programme Outcomes:

Mapping with Programmers outcomes*										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	M	S	S	M	L	S	L	L
CO2	S	M	S	M	S	S	M	L	M	L
CO3	M	S	S	S	M	S	L	M	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	**Data Analytics**		
Elective - IV	II Year - III Semester		Credit: 3

Objectives:

- To gives an overview of Big Data, i.e. storage, retrieval and processing of big data.
- To focus on the "technologies", i.e., the tools/algorithms that are available for storage, processing of Big Data.
- To help a student to perform a variety of "analytics" on different data sets and to arrive at positive conclusions.
- To introduce the tools required to manage and analyze big data like Hadoop,NoSql MapReduce.
- To teach the fundamental techniques and principles in achieving big data analytics with scalability and streaming capability

Outcomes:

- Understand Big Data and its analytics in the real world
- Analyze the Big Data framework like Hadoop and NOSQL to efficiently store and process Big Data to generate analytics
- Design of Algorithms to solve Data Intensive Problems using Map Reduce Paradigm
- Design and Implementation of Big Data Analytics using pig and spark to solve data intensive problems and to generate analytics
- To have skills that will help them to solve complex real-world problems in for decision support.

UNIT – I: ESSENTIALS OF BIG DATA AND ANALYTICS: 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; 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: HADOOP: 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: MAPREDUCE PROGRAMMING: 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: HIVE: Introduction to Hive, Hive architecture, Hive data types, Hive file format, Hive Query Language (HQL), User-Defined Function (UDF) in Hive;

UNIT – V: 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.

Recommended Texts:

1. Seema Acharya, Subhashini Chellappan, "Big Data Analytics", 1st Edition, Wiley, 2015.

Reference Books:

1. Boris lublinsky, Kevin t. Smith, Alexey Yakubovich, "Professional Hadoop Solutions",1st Edition, Wrox, 2013.
2. Chris Eaton, Dirk Deroos et. al., "Understanding Big data", Indian Edition, McGraw Hill, 2015.
3. Tom White, "HADOOP: The definitive Guide", 3rd Edition, O Reilly, 2012.
4. Vignesh Prajapati, "Big Data Analytics with R and Hadoop", 1st Edition, Packet Publishing Limited, 2013.

Web References:

1. https://www.youtube.com/watch?v=xvEKQefqQ7A

Mapping with Programme Outcomes:

Mapping with Programmers outcomes*										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	S	S	M	M	L	S	L	L
CO2	S	M	S	M	S	S	M	L	M	L
CO3	M	S	S	S	M	S	L	M	L	M
CO4	S	L	M	M	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	**Artificial Intelligence**		
Elective - IV	II Year - III Semester		Credit: 3

Objectives:

- To impart knowledge about Artificial Intelligence.
- To give understanding of the main abstractions and reasoning for intelligent systems.

- To enable the students to understand the basic principles of Artificial Intelligence in various applications.
- To identify the scope of Artificial Intelligence in real life applications
- To enable decoding of human thinking process and find the ways of making the machine decide intelligently in lieu of number crunching

Outcomes:

- Solve basic AI based problems.
- Define the concept of Artificial Intelligence.
- Apply AI techniques to real-world problems to develop intelligent systems.
- Select appropriately from a range of techniques when implementing intelligent systems.
- Possess the basic knowledge of different machine learning techniques.

Unit -I: AI problems, foundation of AI and history of AI intelligent agents: Agents and Environments, the concept of rationality, the nature of environments, structure of agents, problem solving agents, problem formulation.

Unit –II: Searching- Searching for solutions, uniformed search strategies – Breadth first search, depth first Search. Search with partial information (Heuristic search) Hill climbing, A*, AO* Algorithms, Problem reduction, Game Playing-Adversial search, Games, mini-max algorithm, optimal decisions in multiplayer games, Problem in Game playing, Alpha-Beta pruning, Evaluation functions.

Unit –III: Knowledge representation issues, predicate logic- logic programming, semantic nets- frames and inheritance, constraint propagation, representing knowledge using rules, rules-based deduction systems. Reasoning under uncertainty, review of probability, Baye's probabilistic interferences and dempster Shafer theory.

Unit – IV: First order logic. Inference in first order logic, propositional vs. first order inference, unification & lifts forward chaining, Backward chaining, Resolution, learning from observation Inductive learning, Decision trees, Explanation based learning, Statistical Learning methods, Reinforcement Learning.

Unit – V: Expert systems:- Introduction, basic concepts, structure of expert systems, the human element in expert systems how expert systems works, problem areas addressed by expert systems, expert systems success factors, types of expert systems, expert systems and the internet interacts web, knowledge engineering, scope of knowledge, difficulties, in knowledge acquisition methods of knowledge acquisition, machine learning, intelligent agents, selecting an appropriate knowledge acquisition method, societal impacts reasoning in artificial intelligence, inference with rules, with frames: model based reasoning, case based reasoning, explanation & meta knowledge inference with uncertainty representing uncertainty.

Recommended Texts:

1. S. Russel and P. Norvig, 2003, "Artificial Intelligence – A Modern Approach", Second Edition, Pearson Education.

Reference Books:

1. David Poole, Alan Mackworth, Randy Goebel, 1998, ”Computational Intelligence : a logical approach”, Oxford University Press.
2. G. Luger, 2001, “Artificial Intelligence: Structures and Strategies for complex problem solving”, Fourth Edition, Pearson Education.
3. J. Nilsson, 1998,“Artificial Intelligence: A new Synthesis”, Elsevier Publishers.
4. Elaine Rich, Kevin Knight and Shivashankar B Nair, 2010, Artificial Intelligence, 3rd ed., Tata McGraw Hill.
5. Dan W. Patterson, 1995, Introduction to Artificial Intelligence and Expert Systems, Pearson Education.

Web References:

1. https://artint.info/index.html

Mapping with Programme Outcomes:

Mapping with Programmers outcomes*										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	S	S	M	M	L	S	L	L
CO2	S	M	S	M	S	S	M	L	M	L
CO3	M	S	S	S	M	S	L	M	L	M
CO4	S	L	M	M	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	**Deep Learning and Neural Networks**		
Elective - IV	II Year - III Semester		Credit: 3

Objectives:

- To understand the theoretical foundations, algorithms and methodologies of Neural Network
- To design and develop an application using specific deep learning models
- To provide the practical knowledge in handling and analysing real world applications.
- To recognize the characteristics of deep learning models that are useful to solve real-world problems.
- To introduce Various paradigms of earning problems, Perspectives and Issues in deep learning framework, review of fundamental learning techniques.

Outcomes:

- Understand different methodologies to create application using deep nets.
- Identify and apply appropriate deep learning algorithms for analyzing the data for variety of problems.
- Implement different deep learning algorithms
- Design the test procedures to assess the efficacy of the developed model.
- Combine several models in to gain better results

Unit I: Basics of artificial neural networks (ANN): Artificial neurons, Computational models of neurons, Structure of neural networks, Functional units of ANN for pattern recognition tasks. Feedforward neural networks: Pattern classification using perceptron, Multilayer feedforward neural networks (MLFFNNs), Backpropagation learning, Empirical risk minimization, Regularization, Autoencoders

Unit II: Deep neural networks (DNNs): Difficulty of training DNNs, Greedy layer wise training, Optimization for training DNNs, Newer optimization methods for neural networks (AdaGrad, RMSProp, Adam), Second order methods for training, Regularization methods (dropout, drop connect, batch normalization)

Unit III: Convolution neural networks (CNNs): Introduction to CNNs – convolution, pooling, Deep CNNs, Different deep CNN architectures – LeNet, AlexNet, VGG, PlacesNet, training a CNNs: weights initialization, batch normalization, hyperparameter optimization, Understanding and visualizing CNNs.

Unit IV: Recurrent neural networks (RNNs): Sequence modeling using RNNs, Back propagation through time, Long Short Term Memory (LSTM), Bidirectional LSTMs, Bidirectional RNNs, Gated RNN Architecture - Generative models: Restrictive Boltzmann Machines (RBMs), Stacking RBMs, Belief nets.

Unit V: Learning sigmoid belief nets, Deep belief nets Under complete - Auto encoder, Regularized Auto encoder, stochastic Encoders and Decoders, Contractive Encoders. Applications: Applications in vision, speech and natural language processing

Recommended Texts:

- S. Haykin, Neural Networks and Learning Machines , Prentice Hall of India, 2010
- IIan Goodfellow, YoshuaBengio and Aaron Courville, “ Deep Learning”, MIT Press, 2017

Reference Books:

- Satish Kumar, Neural Networks - A Class Room Approach, Second Edition, Tata McGraw-Hill, 2013
- B. Yegnanarayana, Artificial Neural Networks, Prentice- Hall of India, 1999
- Giancarlo Zaccone, Md. RezaulKarim, Ahmed Menshawy "Deep Learning with TensorFlow: Explore neural networks with Python", Packt Publisher, 2017.
- Antonio Gulli, Sujit Pal "Deep Learning with Keras", Packt Publishers, 2017.
- Francois Chollet "Deep Learning with Python", Manning Publications, 2017.

Web References: https://www.youtube.com/watch?v=aPfkYu_qiF4&list=PLEAYkSg4uSQ1r-2XrJ_GBzzS6I-f8yfRU

Mapping with Programme Outcomes:

Mapping with Programmers outcomes*										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	S	S	M	M	L	S	L	L
CO2	S	M	S	M	S	S	M	L	M	L
CO3	M	S	S	S	M	S	L	M	L	M
CO4	S	L	M	M	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	Internet of Things		
Elective – 5	II Year & III Semester	Credit: 3	

Objectives:

- To understand the concepts of Internet of Things and the application of IoT.
- To Determine the Market Perspective of IoT.
- To Understand the vision of IoT from a global context
- To learn how to integrate IoT with the environment; communicate from and to machines and some aspects of security of IoT.

Outcomes:

- Students would have become familiar with IoT and its flavors; realised the IoT ecosystem and topologies; learnt how to integrate IoT with the environment; communicate from and to machines and some aspects of security of IoT.
- Implement basic IoT applications on embedded platforms**.**
- Design IoT applications in different domain and be able to analyze their performance.

Unit 1: Introduction: Defining Internet of Things (IoT) – IoT: AWeb 3.0 View – Ubiquitous IoT Applications – Important vertical IoT applications - Four Pillars of IoT: M2M, RFID, WSN and SCADA – DNA of IoT: Device, Connect and Manage.

Unit 2: Middleware for IoT: An Overview of middleware – Communication middleware for IoT – LBS and Surveillance middleware. Protocol Standardization for IoT - IoT Protocol Standardization Efforts: M2M and WSN Protocols – SCADA and RFID Protocols – Issues with IoT Standardization – Unified Data Standards.

Unit 3: Architecture Standardization for Web of Things (WoT): Web of Things versus Internet of Things — Platform Middleware for WoT – Unified Multitier WoT Architecture – WoT Portals and Business Intelligence

Unit 4: Cloud of Things: Cloud Computing - Grid/SOA and Cloud Computing - Cloud Middleware - NIST's SPI Architecture and Cloud Standards - Cloud Providers and Systems. IoT and Cloud Computing - Mobile Cloud Computing – The Cloud of Things Architecture - Four Deployment Models - Vertical Applications - Fifteen Essential Features - Four Technological Pillars - Three Layers of IoT Systems - Foundational Technological Enablers

Unit 5: Applications: Case Studies illustrating IoT design – Smart lighting and intrusion detection in Home – Smart parking in cities – Weather Monitoring System and Forest Fire detection – Smart irrigation – IoT printer.

Text Books:

1. Honbo Zhou, "The Internet of Things in the Cloud: A Middleware Perspective", CRC Press, Taylor and Francis Group, 2012
2. Arshdeep Bahga , Vijay Madisetti , "Internet of Things: A Hands-on-Approach", 2014. (Chapter 9)

References

1. Jean-Philippe Vasseur, Adam Dunkels,,"Interconnecting Smart Objects with IP: The Next Internet", Morgan Kuffmann, 2010.
2. Dieter Uckelmann; Mark Harrison; Florian Michahelles-(Editors), Architecting the Internet of Things, First Edition, Springer – 2011
3. Adrian McEwen, Hakim Cassimally, Designing the Internet of Things, First Edition, Wiley, 2014.
4. Olivier Hersent, David Boswarthick, Omar Elloumi , "The Internet of Things – Key applications and Protocols", Wiley, 2012

Mapping with Programme Outcomes:

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

S-Strong M-Medium L-Low

Title of the Course / Paper	SOFTWARE TESTING		
Elective-5	II Year & III Semester	Credit: 3	

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 methods 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 – The art of Debugging.

Recommended Texts:

1) Boris Beizer, Software testing techniques, DreamTech Press, Second Edition – 2003.
2) Myers and Glenford.J., The Art of Software Testing, John-Wiley & Sons,1979.

Reference Books:

1) Roger.S.Pressman, Software Engineering – A Practitioner's Approach,McGraw Hill, 5th edition, 2001. 2 Marnie.L. Hutcheson, Software Testing Fundamentals, Wiley-India,2007.
2) Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

E-learning resources:

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

Mapping with Programme Outcomes:

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

S-Strong M-Medium L-Low

Title of the Course/ Paper	Information Security		
Elective – 5	II Year & III Semester	Credit: 3	

Objectives:

- To acquire knowledge of cryptography and network security
- To acquire knowledge of security management and incident response
- To acquire knowledge of security in software and operating systems
- To acquire knowledge of data security and secure system development
- To acquire knowledge of privacy and data protection
- To provide the ability to examine and analyze real-life security cases.

Outcomes:

- Test and evaluate security in systems and networks
- Use methods for planning and designing secure systems
- Apply techniques and tools for secure system deployment and operation
- Perform continuous testing, assessment and updating of system security
- Evaluate vulnerability of an information system and establish a plan for risk management.
- Demonstrate how to secure a network. Evaluate a company's security policies and procedures.

Unit 1: Introduction: Security- Attacks- Computer criminals- Method of defense Program Security: Secure programs- Non-malicious program errors- Viruses and other malicious code- Targeted malicious code- Controls against program threats

Unit 2: Operating System Security: Protected objects and methods of protection- Memory address protection- Control of access to general objects- File protection mechanism- Authentication: Authentication basics- Password- Challenge-response- Biometrics.

Unit 3: Database Security: Security requirements- Reliability and integrity- Sensitive data- Interface- Multilevel database- Proposals for multilevel security

Unit 4: Security in Networks: Threats in networks- Network security control- Firewalls- Intrusion detection systems- Secure e-mail- Networks and cryptography- Example protocols: PEM- SSL- Ipsec.

Unit 5: Administrating Security: Security planning- Risk analysis- Organizational security policies- Physical security - Legal- Privacy- and Ethical Issues in Computer Security - **P**rotecting programs and data- Information and law- Rights of employees and employers- Software failures- Computer crime- Privacy- Ethical issues in computer society- Case studies of ethics.

Recommended Text

1) C. P. Pfleeger, and S. L. Pfleeger, Security in Computing, Pearson Education, 4th Edition, 2003
2) Matt Bishop, Computer Security: Art and Science, Pearson Education, 2003.

Reference Books

1) Stallings**,** Cryptography & N/w Security: Principles and practice, 4th Edition, 2006
2) Kaufman, Perlman, Speciner, Network Security, Prentice Hall, 2nd Edition, 2003
3) Eric Maiwald, Network Security : A Beginner's Guide, TMH, 1999
4) Macro Pistoia, Java Network Security, Pearson Education, 2nd Edition, 1999
5) Whitman, Mattord, Principles of Information Security, Thomson, 2nd Edition, 2005

Website and e-Learning Source

1) http://www.cs.gsu.edu/~cscyqz/courses/ai/aiLectures.html
2) http://www.eecs.qmul.ac.uk/~mmh/AINotes/
3) https://nptel.ac.in/courses/106106129
4) https://nptel.ac.in/courses/106106199

Mapping with Programme Outcomes:

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

S-Strong M-Medium L-Low

Syllabus of Soft Skill Courses

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

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.

Outcomes:

- Enumerate varied soft skills needed for employment
- Identify the lack in oneself 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

1.1 Definition and process of communication
1.2 Types of communication - formal and informal, oral and written, verbal and non-verbal
1.3 Communications barriers and how to overcome them
1.4 Barriers to Communication, Tools of Communication

2 Application of Grammar

2.1 Parts of Speech (Noun, verb, adjective, adverb) and modals
2.2 Sentences and its types
2.3 Tenses
2.4 Active and Passive Voice
2.5 Punctuation
2.6 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

4.1 Picture composition
4.2 Writing paragraph

4.3 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 centred 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 RevathiSrinivas; Abhishek Publications, Chandigarh.
2. Communication Techniques and Skills by R. K. Chadha; DhanpatRai 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.Varshnay, R.K. Bansal, Mittal Book Depot, Malhotra
3. The Functional aspects of Communication Skills – Dr. P. Prsad, 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.

Web References:

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 Programme Outcomes:

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

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

Objectives:

●Knowledge of English Language plays an important role in career development.

●This subject aims at introducing basic concepts of communication besides laying emphasis on developing listening, speaking, reading and writing skills as parts of Communication Skill.

Outcomes:

●Frame correct sentences with illustrations

●Comprehend the language correctly and Interpret the language correctly

●Use given material in new situations.

●Correspond effectively using various types of writings like letters, memos etc.

●Communicate effectively in English with appropriate body language making use of correct and appropriate vocabulary and grammar in an organised set up and social context.

1. Functional Grammar

1.1 Prepositions

1.2 Framing Questions

1.3 Conjunctions

1.4 Tenses

2 Reading

2.1 Unseen Passage for Comprehension (Vocabulary enhancement - Prefixes, Suffixes, one word substitution, Synonym and Antonym) based upon the passage should be covered under this topic.

3 Writing Skill

3.1. Correspondence a) Business Letters- Floating Quotations, Placing Orders, Complaint Letters. b) Official Letters- Letters to Government and other Offices

3.2. Memos, Circular, Office Orders

3.3. Agenda & Minutes of Meeting

3.4. Report Writing

LIST OF PRACTICALS

Note: Teaching Learning Process should be focused on the use of the language in writing reports and making presentations. Topics such as Effective listening, effective note taking, group discussions and regular presentations by the students need to be taught in a project oriented manner where the learning happens as a byproduct.

4 Speaking and Listening Skills

1. Debate
2. Telephonic Conversation: general etiquette for making and receiving calls
3. Offering- Responding to offers.
4. Requesting – Responding to requests
5. Congratulating
6. Exploring sympathy and condolences
7. Asking Questions- Polite Responses
8. Apologizing, forgiving
9. Complaining
10. Warning
11. Asking and giving information
12. Getting and giving permission
13. Asking for and giving opinions

●Students should be encouraged to participate in role play and other student-centered activities in class rooms 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 RevathiSrinivas; 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. e-books/e-tools/relevant software to be used as recommended by AICTE/NITTTR, Chandigarh.

Web References:

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 Programme Outcomes:

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

Title of the Course/Paper	Java Programming	
Soft Skill		Credit:2

OBJECTIVES :

- Gain knowledge about basic Java language syntax and semantics
- Understand the concepts of Object Oriented Programming.
- Learn about the control structures, class with attributes and methods used in Java

OUTCOMES:

- Knowledge of the structure and model of the Java programming language.
- Understand the basic principles of creating Java applications with GUI.

Unit I: Introduction to OOPS: Paradigms of Programming Languages –Basic concepts of Object Oriented Programming – Differences between Procedure Oriented Programming and Object Oriented programming - Benefits of OOPs – Application of OOPs.

Unit II: Java: History – Java features – Java Environment – JDK – API. Introduction to Java: Types of java program – Creating and Executing a Java program – Java Tokens- Java Virtual Machine (JVM) – Command Line Arguments –Comments in Java program.

Unit III: Constants – Variables – Data types - Scope of variables – Type casting – Operators: Special operators –Expressions – Evaluation of Expressions.

Unit IV : Decision making and branching statements- Decision making and Looping– break – continue statement-Arrays: One Dimensional Array – Multidimensional Array

Unit V: Class and objects: Defining a class – Methods – Creating objects– Accessing class members – Constructors – Method overloading – Static members – this keyword – Inheritance: Defining inheritance –types of inheritance

List of Practicals:

1. Write a Java program to find area and perimeter of circle.
2. Write a java Program to find factorial of a given number.
3. Write a java program to find simple and compound Interest
4. Write a Java program to find sum of n numbers using array
5. Write a simple Java program using class & objects.

Text Books

1. E. Balagurusamy, ―Programming with Java‖, TataMc-Graw Hill, 5th Edition.
2. Sagayaraj, Denis, Karthick and Gajalakshmi, ―Java Programming for Core and advanced learners‖, Universities Press (INDIA) Private Limited 2018.

Reference Books

1.Herbert Schildt, ―The complete reference Java‖, TataMc-Graw Hill, 7th Edition.

Web References

1. https://www.geeksforgeeks.org/
2. https://www.tutorialspoint.com/java

Mapping with Programme Outcomes:

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

Title of the Course/Paper	Python Programming	
Soft skill		Credit:2

OBJECTIVES

- To understand the basic concepts of computer programming using the Python language.
- To demonstrate significant experience with the Python program development environment
- Acquire programming skills in core Python.

OUTCOMES:

- Learn computational thinking skills
- Develop creative and problem solving skills and acquire a strong grasp of how to apply code to real life.

Unit I: Python – origins – features – variable and assignment – Python basics – statement and syntax – Identifiers – Basic style guidelines – Python objects – Standard types and other built-in types – Internal types – Standard type operators – Standard type -built-in functions.

Unit II:Numbers – Introduction to Numbers – Integers – Double precision floating point numbers – Complex numbers –Operators –Variables – Expression.

Unit III: Input/Output statements- Conditionals and loops – if statement – else Statement – elif statement – while statement – for statement – break statement – continue statement.

Unit IV: Numeric type functions – strings and strings operators – String built-in methods – Lists -Tuples.

Unit V : File handling – Read file- write file – delete file – Command Line argument

List of Practicals:

1. Write a python program to find area of triangle
2. Write a program to find maximum of two numbers using python
3. Write a python Program to find sum of n numbers using array
4. Write a python program to find ASCII value of a character.
5. Write a python program to check whether the given string is palindrome or not.

Text Book
Wesley J. Chun Core Python Programming Pearson Education Publication 2012

Reference Books
1.Wesley J. Chun Core Python Application Programming Pearson Education Publication 2015
2.Eric Matthes Python crash course William pollock 2016
3.Zed Shaw Learn Python the hard way Addition Wesley 2017

Web References
1.https://www.tutorialspoint.com/python/
2.www.spoken-tutorial.org

Mapping with Programme Outcomes:

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

Title of the Course/Paper	Personality Development and other Soft Skills for Software Engineers	
Soft skill		Credit:2

Objectives:
●The course intends to develop talent, facilitate employability enabling the incumbent to excel and sustain in a highly competitive world of business.
●The programme aims to bring about personality development with regard to the different behavioural dimensions that have far reaching significance in the direction of organisational effectiveness.
●To make students know about self-awareness, life skills, soft skills, need for personal development etc**.**

Outcomes:
●The student will be able to understand, analyse develop and exhibit accurate sense of self.
●Think critically.

●Demonstrate knowledge of personal beliefs and values and a commitment to continuing personal reflection and reassessment.
●Learn to balance confidence with humility and overcome problems associated with personality

Unit 1: Personality Development : A Must for Leadership and Career Growth
Case 1: One's Personality Sends Out a Signal that Others Read
Case 2: Same Person: Consciously Different Personalities can be Powerful
Case 3: There isn't One Right Personality
Learnings About Personality Development from the Three Cases
Personality Analysis - Freudian Analysis of Personality Development - Swami Vivekananda's Concept of Personality Development - Physical Self- Energy Self - Intellectual Self - Mental Self - Blissful Self - Personality Begets Leadership Qualities - Interpersonal Skills - Resolving Conflict - A Smiling Face - Appreciative Attitude - Assertive Nature - Communication - Skills-Listening Skills -Developing Empathy - The Personality Attribute of Taking Bold Decisions - Personality Types and Leadership Qualities - Mapping the Different Personality Types - Perfectionists-Helpers-Achievers-Romantics-Observers - Questioners - Enthusiasts or Adventurers-Bosses or-Asserters-Mediators or Peacemakers - Personality Tests - Example of a Personality Test: Jung Typology Test - Personality Assessment
Unit 2: Soft Skills: Demanded by Every Employer
Case I: Dr Devi Shetty
Case II: Abraham Lincoln
Case III: Jeff Immelt
Lessons from the Three Case Studies - Change in Today's Workplace: Soft Skills as a Competitive Weapon - Antiquity of Soft Skills - Classification of Soft Skills - Time Management -Attitude -Responsibility - Ethics, Integrity, Values, and Trust -Self-confidence and Courage - Consistency and Predictability - Teamwork and Interpersonal Skills - Communication and Networking - Empathy and Listening Skills - Problem Solving, Troubleshooting and Speed-reading - Leadership
Unit 3:Your Resume or Curriculum Vitae: The First Step Forward
The Strategy of Resume Writing—From an Employer's Perspective
Strategy I: The Resume Should Reveal ose Personality Traits that Align with the Organization's Values
Strategy II: The Resume Should Convince the Potential Employer of Right Fitment to the Opening
Strategy III: The Resume Should Show to the Employer the Bene ts that the Candidate Will Bring in
A Favourable First Impression—The 'Career Objective' in the Resume - The Main Body of the Resume - Clarity and Crispness of the Resume - Format and Content of the Resume - A Fresher's Resume - Examples - Example of a Well-written Resumeby an Experienced

Professional -Example of a Well-written Resumeof a Fresh Graduate - Example of a Poorly Written Resume - Writing a Modern Resume - How is the Modern CV Different from the Traditional One? - Various Modern ResumeFormats -

Unit 4: Group Discussion: A Test of Your Soft Skills

Case Studies - Learnings from the Three Case Studies - Ability to Work as a Team - Communication Skills, Including Active Listening - Non-verbal Communicatio - Leadership and Assertiveness - Reasoning - Ability to Influence - Innovation, Creativity and Lateral Thinking - Flexibility - Group Discussion Types - The Responsibility of the First Speaker - Concluding the Discussion — The Technique of Summing Up

Recommended Texts:

1. Personality Development and SOFT SKILLS, BARUN K. MITRA, Oxford University Press

Reference Books:

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.

Web References:

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 Programme Outcomes:

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
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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

Title of the Course/Paper	Documentation and Interview skills for Software Engineers		
Soft Skill -	Year - Semester		Credit: 2

Objectives:

- Ensure that you understand what the job involves, and that you have the necessary skills
- Make sure you do want to work for the company
- Check that the philosophy/values of the company match your personal requirements
- Find out more about the job, training, career structure etc.

Outcomes:

- Understand the purpose of interviews
- Be aware of the processes involved in different types of interviews
- Know how to prepare for interview
- Be clear about the importance of self presentation

Unit 1: Job Interviews: The Gateway to the Job Market

Types of Interviews - Groundwork Before the Interview - Abide by the Dress Code - Importance of Body Language in Interviews - Need for Proper Articulation - **Probable Interview Questions**: Tell Us about Yourself - Would You Call Yourself a Team Player? - **Few Tricky Questions and Possible Answers:**Why Should We Employ You? - Do You Have Off ers from Other Companies? - What Salary are You Expecting? - How Much do You ink You are Worth? - What Kind of a Culture are You Comfortable with? - What is More Important to You—Salary or Growth Opportunities? - What do You Know about Our Company? - Tell Us about Your Strengths and Weaknesses - Where do You See Yourself in 5 or 10 Years? - What are Your Plans for Higher Studies? - When Leading a Team, How Will You Motivate Your Team Members and Resolve Any Differences between them? - What Has Been the Biggest Challenge You Have Faced, and How Did You Handle It? - What Do You ink are the Essential Qualities of a Good Employee? - You Claim to be Computer-savvy. Can You Mention Any Innovative Way to Enhance the Sales of the Company Using Your Computer Knowledge and Skills? — Concluding an Interview - Telephonic or Video Interview—A Growing Trend - Disadvantages of Telephonic or Video Interview - **A Mock Interview:**Why did the Interview Team Select Vikram? - Why did the Interview Team not Select Chandra and Amit?

Unit 2:Body Language: Reveals Your Inner Self and Personality

Emotions Displayed by Body Language:Aggressive - Submissive - Attentive - Nervous - Upset - Bored - Relaxed - Power - Defensive—Handshake—The Most Common Body Language— Eyes— A Powerful Reflection of One's Inner Self —Entry to My Space—Personal Zones May Vary: Intimate Zone - Personal Zone - Social Zone - Public Zone -

Typical Body Language when Zones are Intruded — Body Language Exhibited During Different Professional Interactions -Interview - Manager's Discussions with a Subordinate Employee - Discussions with Supervisor - Presentation to a Large Audience - Group Discussions - Video-conference

Unit 3: Enhance Your Writing Skill to Create an Impression

Fifteen Principles to Increase Clarity of Communication - Use Short, Simple and Clear Words - Use Short Sentences - Do not Cram Di erent Points into One Sentence - Using Compact Substitutes for Wordy Phrases - Remove Redundant Words and Expressions - Avoid Use of Mixed Metaphors - Avoid Hackneyed and Stilted Phrases - Avoid Verbosity in the Use of Common Prepositions - Do not Twist the Word Order - Present Similar Ideas in a Sentence with Same Structural and Grammatical Form - Make Positive Statements Without Being Hesitant or Non-committal - e Statements Without Being Hesitant or Non-committal - Avoid Pompous Words and Phrases - Use Active Instead of Passive Voice - Ensure Correct Spelling and Grammar in the Text - Substitute Easily-understood Words for Words Imported from Other Fields - Edit-Edit-Edit - The Reader's Perspective - Clarity of Thought - Clarity of Text - Example of Poorly and Well-written Texts

Unit 4: Fog Index: Provides Guidance for Proper Writing

Fog Index or Clarity Index -Examples of Passages with High and LowFog Index - Infogineering Clarity Rating - Flesch Kincaid Reading Ease Index - Other Readability Indices - Checking Grammar, Spelling and Voice - Clarity of Verbal Communication - Case 1 - Case 2

Recommended Texts:

1. Personality Development and SOFT SKILLS, BARUN K. MITRA, Oxford University Press

Reference Books:

1. **C**ommunicating 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.

Web References:

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

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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

Title of the Course/Paper	**Team Project**		
Soft Skill -	Year - 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 design or 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 development cycle with emphasis on different processes - requirements, design, and implementation phases.

Outcomes:

●Demonstrate the ability to locate and use technical information from multiple 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 in terms 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 record of all 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.

Mapping with Programme Outcomes:

Mapping with Programmers outcomes*										
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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

S-Strong M-Medium L-Low

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S.A.C. SEPT'2022