FRANCIS XAVIER ENGINEERING COLLEGE
AUTONOMOUS INSTITUTION
ACCREDITED BY NBA

ISO 9001:2015 Certified | DST-FIST Supported Institution
Recognized under Section 2(f) & 12(B) of the UGC Act, 1956
Vannarpettai, Tirunelveli – 627003, Tamil Nadu

CURRICULUM & SYLLABI

Master of Computer Applications
Regulations 2019

VISION

"To provide high quality education in the field of computer applications and there by create computer professionals with proper leadership skills, commitment and moral values"

MISSION

To impart education par-excellence through innovative training, research and development focusing on the industrial requirements making it beneficial to the individuals, industry and the society.

To achieve professional excellence through high quality innovative teaching and training in computer applications for the development of students who can excel in the present future competitive profession according to the changing needs of the companies with high degree of integrity and ethical standards

Department of Computer Applications

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

PEO 1 – To prepare students to excel in the computing profession by providing solid technical Foundations in the field of computer applications.

PEO 2 – To provide students various computing skills like the analysis, design and development of innovative software products to meet the industry needs.

PEO 3 – To motivate students to pursue lifelong learning and to do research as computing Professionals and scientists.

PEO 4 – To motivate students to communicate and function effectively in teams in multidisciplinary fields within the global, societal and environmental context.

PROGRAM OUTCOMES (POs)

Graduates will be able to:

a. Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

b. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

c. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

d. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

e. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

f. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

g. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

h. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

i. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

j. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

k. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

l. Life-Long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOs)

1. **PSO_a –**Enable the students to select the suitable data model, appropriate architecture and platform to implement a system with good performance.
2. **PSO_b –**Enable the students to design innovative new technologies to provide user interactive solutions for various challenges.

MAPPING OF PROGRAMME EDUCATIONAL OBJECTIVES WITH PROGRAMME OUTCOMES

A broad relation between the programme objective and the outcomes is given in the following table

PROGRAMME EDUCATIONAL OUTCOMES(PEO)	PROGRAMME OUTCOMES (PO)											
	a	b	c	d	e	f	g	h	i	j	k	l
PEO 1	H	M	M	L	L			L	L	M	M	L
PEO 2		M	H	M	L				H		M	
PEO 3		M		H	M		L		M	M	M	H
PEO 4						H	H	M	M	H	L	

MAPPING OF PROGRAMME SPECIFIC OBJECTIVES WITH PROGRAMME OUTCOMES

A broad relation between the Program Specific Objectives and the outcomes is given in the following Table

PROGRAMME SPECIFIC OUTCOMES(PEO)	PROGRAMME OUTCOMES (PO)											
	a	b	c	d	e	f	g	h	i	j	k	l
PSO$_a$	H	M			H				M	M		
PSO$_b$				H			H	H			H	

Contribution L: Low / Reasonable M: Medium / Significant H:High / Strong

MASTER OF COMPUTER APPLICATIONS
REGULATIONS 2019
CHOICE BASED CREDIT SYSTEM
SUMMARY OF CREDIT DISTRIBUTION

S. No	CATEGORY	CREDITS PER SEMESTER						TOTAL CREDIT	CREDITS IN %	Range Of Total Credits	
		I	II	III	IV	V	VI			Min	Max
1	FC	4						4	3%	1%	5%
2	PC	16	22	22	16	13		89	75%	80%	90%
3	PE				3	6		9	8%	5%	10%
4	EEC	2			1	2	12	17	14%	10%	20%
	TOTAL	22	22	22	20	21	12	119	100%	-	-

FC	-	Foundation Course	L	-	Lecture
PC	-	Professional Core	T	-	Tutorial
PE	-	Professional Elective	P	-	Practical
EEC	-	Employability Enhancement Course	H	-	Hours

MASTER OF COMPUTER APPLICATION
REGULATIONS 2019
CHOICE BASED CREDIT SYSTEM
I – VI SEMESTERS CURRICULUM AND SYLLABI

FIRST SEMESTER

Code No.	Course	Category	L	T	P	C	H
19MA1257	Mathematical Foundations of Computer Science	FC	4	0	0	4	4
19CA1102	Computer Architecture	PC	3	0	0	3	3
19CA1103	Problem Solving using C Programming	PC	3	0	0	3	3
19CA1104	Database Management Systems	PC	3	0	0	3	3
19CA1105	Data Structures	PC	3	0	0	3	3
19CA1111	Data Structures Laboratory	PC	0	0	4	2	4
19CA1112	Database Management Systems Laboratory	PC	0	0	4	2	4
19CA1913	Communication Skills Laboratory	EEC	1	0	2	2	3
	TOTAL		17	0	10	22	27

SECOND SEMESTER

Code No.	Course	Category	L	T	P	C	H
19CA2101	Object Oriented Programming	PC	3	0	0	3	3
19CA2102	Design and Analysis of Algorithms	PC	3	0	0	3	3
19CA2103	Software Engineering	PC	3	0	0	3	3
19CA2104	Operating Systems	PC	3	0	0	3	3
19CA2105	Computer Graphics and Multimedia	PC	3	1	0	4	4
19CA2111	Object Oriented Programming Laboratory	PC	0	0	4	2	4
19CA2112	Design and Analysis of Algorithms Laboratory	PC	0	0	4	2	4
19CA2113	Operating Systems Laboratory	PC	0	0	4	2	4
		TOTAL	15	1	12	22	28

THIRD SEMESTER

Code No.	Course	Category	L	T	P	C	H
19CA3101	Microprocessor and Microcontroller	PC	3	0	0	3	3
19CA3102	Computer Networks	PC	3	0	0	3	3
19CA3103	Web Programming Essentials	PC	3	0	0	3	3
19CA3104	Programming with Java	PC	3	0	0	3	3
19CA3105	Object Oriented Analysis and Design	PC	3	1	0	4	4
19CA3111	Networking Laboratory	PC	0	0	4	2	4
19CA3112	Web Programming Laboratory	PC	0	0	4	2	4
19CA3113	Programming with Java Laboratory	PC	0	0	4	2	4
19CA3M01	Effective Communication (For Lateral entry students)	NC	-	-	-	-	-
		TOTAL	15	1	12	22	28

FOURTH SEMESTER

Code No.	Course	Category	L	T	P	C	H
19CA4401	Resource Management Techniques	PC	3	0	0	3	3
19CA4102	Mobile Communications	PC	3	0	0	3	4
19CA4103	Data Mining	PC	3	0	0	3	3
19CA4104	Web Application Development	PC	3	0	0	3	4
	Professional Elective – I	PE	3	0	0	3	3
19CA4111	Mobile Application Development Laboratory	PC	0	0	4	2	4
19CA4112	Web Application Development Laboratory	PC	0	0	4	2	4
19CA4913	Technical Seminar and Report Writing	EEC	0	0	2	1	2
		TOTAL	15	2	10	20	27

FIFTH SEMESTER

Code No.	Course	Category	L	T	P	C	H
19CA5101	Cloud Computing	PC	3	0	0	3	3
19CA5102	Big Data Analytics	PC	3	0	0	3	3
19CA5103	Machine Learning	PC	3	0	0	3	3
	Professional Elective – II	PE	3	0	0	3	3
	Professional Elective – III	PE	3	0	0	3	3
19CA5111	Cloud and Big Data Laboratory	PC	0	0	4	2	4
19CA5112	Dot Net Laboratory	PC	0	0	4	2	4
19CA5913	Mini Project	EEC	0	0	4	2	4
19CA5M01	PHP Programming	NC	-	-	-	-	-
		TOTAL	**15**	**2**	**12**	**21**	**29**

SIXTH SEMESTER

Code No.	Course	Category	L	T	P	C	H
19CA6901	Project Work	EEC	0	0	24	12	24
		TOTAL	**0**	**0**	**24**	**12**	**24**

Code No.	Course	L	T	P	C
PROFESSIONAL ELECTIVES					
PROFESSIONAL ELECTIVE I					
19CA4201	Soft Computing	3	0	0	3
19CA4202	Accounting and Financial Management	3	0	0	3
19CA4203	Software Project Management	3	0	0	3
19CA4204	Security in Computing	3	0	0	3
19CA4205	Adhoc and Sensor Network	3	0	0	3
PROFESSIONAL ELECTIVE II					
19CA5201	Professional Ethics	3	0	0	3
19CA5202	Health Care Management	3	0	0	3
19CA5203	Geological Information Systems	3	0	0	3
19CA5204	Human Resource Management	3	0	0	3
19CA5205	Internet of Things	3	0	0	3

Code No.	Course	L	T	P	C
PROFESSIONAL ELECTIVE III					
19CA5206	Software Testing and Quality Assurance	3	0	0	3
19CA5207	Web Server Programming in .NET	3	0	0	3
19CA5208	Game Programming	3	0	0	3
19CA5209	Computational Intelligence	3	0	0	3
19CA5210	Principles of Programming Languages	3	0	0	3
EMPLOYABILITY ENHANCEMENT COURSE					
19CA1913	Communication Skills Laboratory	1	0	2	2
19CA4913	Technical Seminar and Report Writing	0	0	2	1
19CA5913	Mini Project	0	0	4	2
19CA6911	Project Work	0	0	24	12
MANDATORY COURSES (NON CREDIT COURSES)					
19CA3M01	Effective Communication (For Lateral entry students)	-	-	-	-
19CA5M01	PHP Programming	-	-	-	-

SEMESTER I

19MA1257   **MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE**

	L	T	P	C
	4	0	0	4

Course Objectives

1   To provide mathematical background knowledge

2   To provide sufficient experience on various topics of discrete mathematics like matrix algebra, logic and proofs, combinatory, graphs, algebraic structures, formal languages and finite state automata.

3   To extend student's Logical and Mathematical maturity

4   To make the students ability to deal with abstraction

5   To introduce most of the basic terminologies used in computer science courses and application of ideas to solve practical problems.

Course Outcome

1   Able to get basic knowledge of matrix, set theory, functions and relations concepts needed for designing and solving problems.

2   Able to know logical operations and predicate calculus needed for computing skill

3   Able to design and solve Boolean functions for defined problems.

4   Able to apply the acquired knowledge of formal languages to the engineering areas like Compiler Design

5   Able to apply the acquired knowledge of finite automata theory and to design discrete problems to solve by computers.

PO Vs CO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	X	X		X								
2	X	X		X								
3	X	X		X								
4	X	X		X								
5	X	X		X								

UNIT I	**MATRIX ALGEBRA**	**12**

Matrices - Rank of a matrix - Solving system of equations - Eigenvalues and Eigen vectors - Cayley - Hamilton theorem - Inverse of a matrix.

UNIT II	**BASIC SET THEORY**	**12**

Basic Concepts of set theory and Cartesian products , Relations, Binary relations, Equivalence relations and Partitions, Composition of relations. Functions: Types of functions, Inverse of a function, Composition of functions, Recursive functions.

UNIT III	MATHEMATICAL LOGIC	12

Propositions and logical operators - Truth table - Propositions generated by a set - Equivalence and implication - Basic laws - Some more connectives - Functionally complete set of connectives – Normal forms - Proofs in propositional calculus - Predicate calculus.

UNIT IV	FORMAL LANGUAGES	12

Languages and grammars – Phrase structure grammar – Classification of grammar – pumping lemma for regular languages – Context free languages.

UNIT V	FINITE STATE AUTOMATA	12

Finite State Automata – Deterministic finite state Automata (DFA) – Non-deterministic finite state automata (NFA) - Equivalence of DFA and NFA - Equivalence of NFA and Regular Languages.

TOTAL   60   Hrs

References

1   David Makinson, "Sets, Logic and Maths for Computing", Springer Indian Reprint, 2011.

2   Grimaldi, R.P and Ramana, B.V. "Discrete and Combinatorial Mathematics", 5th Edition, Pearson Education, 2006.

3   HopcroftJ.E and Ullman,J.D, "Introduction to Automata Theory, Languages and Computation", Narosa Publishing House, Delhi, 2002.

4   Kenneth H. Rosen, "Discrete Mathematics and Its Applications", Tata McGraw Hill, 4th Edition, 2002.

5   Sengadir, T. "Discrete Mathematics and Combinatorics" Pearson Education, New Delhi, 2009.

6   Trembley, J.P. and Manohar, R, "Discrete Mathematical Structures with Applications to Computer Science", Tata McGraw Hill, New Delhi, 2007.

7   Venkataraman, M.K., "Engineering M a t h e m a t i c s ", 2nd Edition, Volume-I I , National Publishing Company, 1989

19CA1102	COMPUTER ARCHITECTURE			
		L	T	P	C
		3	0	0	3

Course Objectives

1   To understand the various number systems and Boolean algebra.

2   To study the different types of combinational and sequential circuits.

3   To comprehend the basis operations that happens in a CPU.

4   To learn the data path and control path implementation.

5   To become familiar with the memory hierarchy design and I/O design.

Course Outcome

1. Able to perform conversions and arithmetic operations in various number systems.
2. Able to design logical circuits such as comparators.
3. Able to program by using addressing modes.
4. Able to trace the flow of execution of a pipelined instruction in a processor.
5. Able to discuss the implementation of virtual memory.

PO Vs CO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	X	X		X								
2	X	X		X								
3	X	X		X								
4	X	X		X								
5	X	X		X								

UNIT I   DIGITAL FUNDAMENTALS AND LOGIC GATES   9

Number Systems and Conversions – Digital Systems-Binary Numbers –Number Base Conversions-Octal and Hexadecimal Numbers –Complements. Boolean Algebra and Simplifications –Theorem and properties of Boolean Algebra- Minimization of Boolean Functions – Karnaugh Map-QuineMcClusky Method-Logic Gates – NAND NOR implementation.

UNIT II   COMBINATIONAL AND SEQUENTIAL LOGIC   9

Design of Circuits –Adder /Subtracter – Encoder – Decoder – MUX /DEMUX – Comparators, Flip flops – Triggering – Master – Slave Flip Flop – State Diagram and Minimization – Counters – Registers-Shift Registers-Ripple Counters- Synchronous Counters – other counters.

UNIT III   BASIC STRUCTURE OF COMPUTER SYSTEM   9

Functional Units - Basic Operational Concepts – Bus structures – Performance and Metrics – instruction and instruction sequencing – Hardware Software Interface – Addressing modes – Instruction Sets – RISC and CISC – Arithmetic Logic Shift Design Unit(ALU Design) – Fixed point and Floating point operations

UNIT IV   PROCESSOR DESIGN   9

Processor basics –CPU Organization – Data Path Design – Control Design unit – Basic concepts – Hardwired control unit – Micro Programmed control unit – Pipelining concept (Pipe control) – Hazards-super scalar operations.

UNIT V   MEMORY MANAGEMENTAND I/O SYSTEMS   9

Memory technology – Memory Systems- Virtual Memory – Caches – Design Methods – Associative memories – Input /output system – Programmed I/O – DMA and interrupts – I/O devices and Interfaces.

TOTAL   45   Hrs

References

1   M. Morris Mano, Michael D. Ciletti," Digital Design ", Fourth Edition.

2   Carl Hamacher, ZvonkoVranesic, SafwatZaky and NaraigManjikian, "Computer Organization and Embedded Systems", Sixth Edition, Tata McGraw Hill, 2012.

3   John P. Hayes, "Computer Architecture and Organization", Third Edition, Tata McGraw Hill,1998

4   William Stallings,"Computer Organization & Architecture – Designing for Performance" 6th Edition Pearson Education, 2003

5   David A. Patterson and John L. Hennessy, "Computer Organization and Design: The Hardware/Software Interface", Second Edition, Morgan Kaufmann , 2002.Morris Mano "Digital Design", Printice Hall of India 1997

19CA1103	PROBLEM SOLVING USING C PROGRAMMING			

	L	T	P	C
	3	0	0	3

Course Objectives

1   To understand the basic concepts of problem solving approaches

2   To understand the C programming constructs and control structures

3   To apply the techniques of structured / functional decomposition to break a program into smaller pieces and describe the mechanics of parameter passing

4   To describe the mechanics of parameter passing

5   To understand file concepts

Course Outcome

1   Able to design a computational solution for a given problem

2   Able to transform a problem solution into programs involving programming constructs

3   Able to break a problem into logical modules that can be solved / programmed

4   Able to pass parameters using structures and pointers to solving complex problem

5   Able to introduce basic file concepts and preprocessing

PO Vs CO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	X	X	X	X		X						
2	X	X	X	X		X						
3	X	X	X	X		X						
4	X	X	X	X		X						
5	X	X	X	X		X						

| UNIT I | INTRODUCTION TO COMPUTER PROBLEM SOLVING | 9 |

Introduction – The Problem Solving aspect – Top down design – Implementation of algorithm – Program Verification – The efficiency of algorithms – The analysis of algorithms – Fundamental Algorithms.

| UNIT II | INTRODUCTION TO C | 9 |

Introduction to C Programming – Operators and Expressions – Data Input and Output– Program Structure – Stages of Compilation of a Program. - Control Statements – Decision making using looping and branching

| UNIT III | FUNCTIONS AND ARRAYS | 9 |

Functions – Defining a Function – Accessing a Function – Function Prototypes – Passing Arguments to a Function – Recursion – Storage classes - Arrays – Defining and Processing Arrays – Passing arrays to a Function – Multidimensional Arrays – String and array of strings - String processing – Library functions

| UNIT IV | POINTERS AND STRUCTURES | 9 |

Introduction to Pointer - Pointer Declaration – Dynamic Memory Allocation – Arrays of Pointers – Double pointers - Representing arrays using pointers – Pass by value and Pass by reference – Strings representation using pointers - Defining a Structure – Processing a Structure – Passing Structures to Functions - Structure and arrays – Unions

| UNIT V | FILE PROCESSING AND PREPROCESSORS | 9 |

Creation of Data Files – Text Files – Formatted Data Files – Unformatted Data files- Binary Files - Reading and Writing Data Files – Processing and updating Data Files – Register Variables – Bit Fields – Enumerations – Command Line Arguments -Macros – C Preprocessors

TOTAL   45   Hrs

References

1. Byron S Gottfried ,"Programming with C", Schaum's Outlines, Tata McGraw Hill, Second Edition, 2006.

2. E. Balagurusamy, "Programming in ANSI C", Tata McGraw-Hill Education, 5th edition, 2010

3. Deitel and Deitel, "C How to program", Prentice Hall, 1994.

4. B.W. Kerninghan, D.M.Ritchie," The C Programming Language", PHI, 2nd Edition, 1995.

5. Stephen G Kochan, "Programming in ANSI C", Sams Publications, 1994

6. Brian W Kernighan & Dennis Ritchie, "The C programming language", 2nd Edition, Prentice Hall ,2015

7. Cormen,Leiserson, Rivest, Stein, " Introduction to Algorithms", McGraw Hill , Publishers,2002

8. Reema. Thareja, "Programming in C", Oxford University Press, 2nd Edition,2016

| | | 19CA1104 | | DATABASE MANAGEMENT SYSTEMS | | | | | |

L	**T**	**P**	**C**
3	**0**	**0**	**3**

Course Objectives

1	To understand the fundamentals of data models and conceptualize and depict a database system using ER diagram.
2	To make a study of SQL and relational database design.
3	To acquire the knowledge of Transaction processing to monitor the performance of the DBMS.
4	To understand the knowledge about the techniques of searching using files and indexing.
5	To understand about the design and manage database connectivity

Course Outcome

1	Able to understand the basic concepts of the database and data models.
2	Able to design a database using and normalize the relations
3	Able to impart knowledge in transaction processing, concurrency control techniques and recovery procedures.
4	Able to know about Files and Indexing.
5	Able to develop advanced level database applications.

PO Vs CO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	X	X	X	X		X	X				X	X
2	X	X	X	X		X	X				X	X
3	X	X	X	X		X	X				X	X
4	X	X	X	X		X	X				X	X
5	X	X	X	X		X	X				X	X

UNIT I   INTRODUCTION   9

File systems versus Database systems – Data Models – DBMS Architecture – Data Independence – Data Modeling using Entity – Relationship Model – Enhanced E-R Modeling.

UNIT II   RELATIONAL MODEL AND QUERY EVALUATION   9

Relational Model Concepts – Relational Algebra – SQL – Basic Queries – Complex SQL Queries – Views – Constraints – Relational Calculus – Tuple Relational Calculus – Domain Relational Calculus – Functional Dependencies – Normal Forms – 1NF – 2NF-3NF-BCNF – 4NF-5NF.

UNIT III   TRANSACTION PROCESSING   9

Transaction Processing – Properties of Transactions - Serializability – Transaction support in SQL - Locking Techniques – Time Stamp ordering – Validation Techniques – Granularity of Data Items – Recovery concepts – Shadow Paging - Log Based Recovery.

UNIT IV	FILES AND INDEXING	9

File operations – Hashing Techniques – Indexing – Single level and Multi-level Indexes – B+ tree – Static Hashing - Indexes on Multiple Keys.

UNIT V	SPECIAL PURPOSE DATABASES	9

OODBMS - Object-Based Databases - OO Data Model – OO Language - Persistence – Object Relational Databases - XML – Structure of XML —— Cloud based systems – NOSQL introduction - NOSQL key features – Hbase data model – Hbase data operations - Database Tuning -Case Study for Design and Manage the Database for any Project.

TOTAL   45   Hrs

References

1   Abraham Silberschatz, Henry F.Korth and S.Sundarshan "Database System Concepts", Sixth Edition, McGraw Hill, 2010.
2   C.J. Date, "An Introduction to Database Systems", Eight Edition, Pearson Education Delhi, 2003.
3   Frank. P. Coyle, "XML, Web Services And The Data Revolution", Pearson Education,2012.
4   Lee Chao, "Database Development and Management", Auerbach Publications, 2010
5   Peter Rob, Carlos coronel , "Database System Concepts",Ceange Learning 2008
6   RamezElamassri and Shankant B-Navathe, "Fundamentals of Database Systems",Sixth Edition, Pearson Education Delhi, 2010.
7   Raghu Ramakrishnan, ―Database Management Systems, Fourth Edition, McGraw-Hill College Publications, 2015.

19CA1105	DATA STRUCTURES

L	T	P	C
3	0	0	3

Course Objectives

1   To be familiar with basic techniques of algorithm analysis.

2   To be exposed to the concept of ADTs.

3   To learn linear data structures-List, Stack and Queue**.**

4   To learn nonlinear data structures-Tree and Graphs.

5   To be exposed to sorting, searching and hashing algorithms.

Course Outcome

1   Able to analyze algorithms and determines their time complexity.

2   Able to understand the concepts of data types, data structures and linear structures.

3   Able to apply data structures to solve various problems.

4   Able to understand non-linear data structures.

5   Able to apply different Sorting, Searching and Hashing algorithms.

PO Vs CO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1		X	X	X		X					X	X
2		X	X	X		X					X	X
3		X	X	X		X					X	X
4		X	X	X		X					X	X
5		X	X	X		X					X	X

UNIT I	INTRODUCTION	9

Introduction - Abstract Data Types (ADT) – Arrays and its representation –Structures – Fundamentals of algorithmic problem solving – Important problem types – Fundamentals of the analysis of algorithm – analysis frame work – Asymptotic notations, Properties, Recurrence Relation.

UNIT II	LINEAR DATA STRUCTURES – LIST	9

List ADT - Array-based Implementation - Linked list implementation - Singly Linked Lists – Circularly linked lists – Doubly Linked Lists - Applications of linked list – Polynomial Addition.

UNIT III	LINEAR DATA STRUCTURES - STACK, QUEUE	9

Stack ADT – Operations on Stack - Applications of stack – Infix to postfix conversion – evaluation of expression – (Dynamic Stack, Linked Stack) Queue ADT – Operations on Queue - Circular Queue - Applications of Queue.

UNIT IV	BINARY TREES AND GRAPHS	9

Trees and its representation – left child right sibling data structures for general trees- Binary Tree – Binary tree traversals –- Binary Search Tree - Graphs and its representation - Graph Traversals - Depth-first traversal – breadth-first traversal-Application of graphs.

UNIT V	SORTING, SEARCHING AND HASH TECHNIQUES	9

Sorting algorithms: Insertion sort - Bubble sort - Quick sort - Merge sort - Searching: Linear search – Binary Search - Hashing: Hash Functions – Separate Chaining – Open Addressing – Rehashing.

TOTAL   45   Hrs

References

1   A.K. Sharma, "Data Structures using C", Pearson Education Asia, 2013.

2   AnanyLevitin "Introduction to the Design and Analysis of Algorithms" Pearson Education 2012.

3   E. Horowitz, Anderson-Freed and S.Sahni, "Fundamentals of Data structures in C", University Press, 2007

4   E.Balagursamy," Data Structures using C", Tata McGraw Hill 2015 Reprint.

5   M. A. Weiss, "Data Structures and Algorithm Analysis in C", Pearson Education Asia, 2013

6   ReemaThareja, "Data Structures Using C", Oxford University Press, 2011.

7   Robert.L..Kruce "Data Structures and Program Design in C", Pearson Education 2007.

8   Tanaenbaum A.S, Langram Y. Augestein M.J, " Data Structures using C", Pearson Education, 2004.

19CA1111   **DATA STRUCTURES LABORATORY**

	L	T	P	C
	0	0	4	2

Course Objectives

1 To develop skills in design and implementation of data structures and their applications.

2 To learn and implement linear, nonlinear and tree data structures.

3 To learn linear data structures-List, Stack and Queue**.**

4 To learn the various sorting techniques

5 To know about backtracking and to implement them

Course Outcome

1 Able to develop the various Graph data structure concepts.

2 Able to apply the BFS and DFS traversal.

3 Able to work with basic data structures that are suitable for the problems to be solved efficiently.

4 Able to design and implement linear, and tree and its applications.

5 Able to design sorting technique, its algorithm design and analysis.

PO Vs CO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	X	X	X			X					X	X
2	X	X	X			X					X	X
3	X	X	X			X					X	X
4	X	X	X			X					X	X
5	X	X	X			X					X	X

LIST OF EXPERIMENTS

1. Array Implementation of Stack

2. Array Implementation of Queue

3. Linked List implementation of Stack

4. Linked list implementation of Queue

5. Infix to postfix conversion

6. Graph Traversals

7. Polynomial manipulation- addition, subtraction

8. Binary Tree Traversal

9. Quick Sort

10. Divide and conquer – Merge Sort

11. Djikstra's algorithm

12. Backtracking – 8 Queens problem

TOTAL   60   Hrs

19CA1112   DATABASE MANAGEMENT SYSTEMS LABORATORY

L	T	P	C
0	0	4	2

Course Objectives

1   To design and Implement databases and views.

2   To familiarize with SQL queries.

3   To understand the concept of PL/SQL.

4   To write stored functions and procedures in DBMS.

5   To design and Implement applications that have GUI and access databases for backend connectivity.

Course Outcome

1   Able to understand the concepts of DBMS using commands.

2   Able to formulate complex queries using SQL

3   Able to create PL/SQL including stored procedures, stored functions, cursors, packages.

4   Able to understand the working process of menus.

5   Able to learn front end tools to integrate with databases and the usage of VB Reports

PO Vs CO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1		X	X	X		X					X	
2		X	X	X		X					X	
3		X	X	X		X					X	
4		X	X	X		X					X	
5		X	X	X		X					X	

LIST OF EXPERIMENTS

1. Creation of base tables and views

2. Data Manipulation INSERT, DELETE and UPDATE in Tables. SELECT, Sub Queries and

3. Data Control Commands

4. High level language extensions – PL/SQL Or Transact SQL – Packages

5. Use of Cursors, Procedures and Functions

6. Oracle or SQL Server Triggers – Block Level – Form Level Triggers

7. Working with Forms, Menus

8. Working with Database Connectivity

9. Generate a Report for an application project in any domain

	TOTAL	60	Hrs

19CA1913   **COMMUNICATION AND SOFT SKILS LABORATORY**

L	T	P	C
1	0	2	2

Course Objectives

1. To develop communicative competence.

2. To improve writing skills.

3. To enhance the scope for taking up International Examinations.

4. To equip them with employability skills to enhance their prospect of placements.

5. To make students fair well during interview process.

Course Outcome

1. Able to listen to and comprehend Technical Talks by native speakers.

2. Able to make effective presentation using graphical representations.

3. Able to take up international examination such as IELTS and TOEFL.

4. Able to participate in Group Discussions with ease.

5. Able to get them acquainted to formal and informal situations.

PO Vs CO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1				X			X		X	X	X	X
2				X			X		X	X	X	X
3				X			X		X	X	X	X
4				X			X		X	X	X	X
5				X			X		X	X	X	X

UNIT I	LISTENING AND SPEAKING SKILLS	6

Conversational skills (formal and informal) – group discussion and interview skills – making presentations ; Listening to lectures, discussions, talk shows, news programmes, dialogues from TV/radio/Ted talk/Podcast – watching videos on interesting events on You Tube.

UNIT II	READING AND WRITING SKILLS	6

Reading different genres of texts ranging from newspapers to philosophical treatises – reading strategies such as graphic organizers, summarizing and interpretation. Writing job applications – cover letter – resume – emails – letters – memos – reports – blogs – writing for publications.

UNIT III	ENGLISH FOR NATIONAL AND INTERNATIONAL EXAMINATIONS AND PLACEMENTS	6

International English Language Testing System (IELTS) – Test of English as a Foreign Language (TOEFL) – Graduate Record Examination (GRE) – Civil Service (Language related) – Verbal ability.

UNIT IV	SOFT SKILLS	6

Motivation – self-image – goal setting – managing changes – time management – stress management – leadership traits – team work – career and life planning.

UNIT V	SOFT SKILLS	6

Multiple intelligences – emotional intelligence – spiritual quotient (ethics) – intercultural communication – creative and critical thinking – learning styles and strategies.

TOTAL　　30　　Hrs

References

1. Business English Certificate Materials, Cambridge University Press.
2. International English Language Testing System Practice Tests, Cambridge University Press.
3. Interactive Multimedia Programs on Managing Time and Stress.
4. Personality Development (CD-ROM), Times Multimedia, Mumbai.
5. Robert M Sherfield and et al. "Developing Soft Skills" 4th edition, New Delhi: Pearson Education, 2009.

EVALUATION:
INTERNAL: 50 MARKS
Record maintenance -20 Marks.
Mock Interview – 10 Marks.
Role Play & Telephonic Conversation – 10 Marks.
Reading & Presenting – 10 Marks.
EXTERNAL: 50 MARKS
Online Exam – 30 Marks.
Paper Presentation – 10 Marks.
Group Discussion – 10 Marks.

SEMESTER II

19CA2101   **OBJECT ORIENTED PROGRAMMING**

	L	T	P	C
	3	0	0	3

Course Objectives

1   To learn how C++ supports Object Oriented principles.

2   To understand and apply the principles of hiding data.

3   To understand the overloading of functions and operators.

4   To use the generic programming features of C++ including the STL.

5   To implement the concept of code reuse.

Course Outcome

1   Able to understand the object-oriented programming concepts such as encapsulation.

2   Able to use proper class protection mechanism.

3   Able to demonstrate the use of virtual functions to implement polymorphism.

4   Able to understand and implement the features of C++ including templates and file handling for providing programmed solutions to complex problems.

5   Able to reuse the code with different categories of Inheritance.

PO Vs CO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	X	X	X	X		X					X	
2	X	X	X	X		X					X	
3	X	X	X	X		X					X	
4	X	X	X	X		X					X	
5	X	X	X	X		X					X	

UNIT I   FUNDAMENTALS OF OBJECT ORIENTED PROGRAMMING   9

Procedural Programming Vs. Object-Oriented Programming - Object–Oriented Programming concepts – Encapsulation – Programming Elements – Program Structure – Enumeration Types — Functions and Pointers – Function Invocation – Overloading Functions – Scope and Storage Class – Pointer Types – Arrays and Pointers – Call–by–Reference – Assertions.

UNIT II   IMPLEMENTING ADTS AND ENCAPSULATION   9

Aggregate Type struct – Structure Pointer Operators – Unions – Bit Fields – Data Handling and Member Functions – Classes – Constructors and Destructors – Static Member – this Pointer – reference semantics – implementation of simple ADTs.

UNIT III   POLYMORPHISM   9

ADT Conversions – Overloading – Overloading Operators – Unary Operator Overloading – Binary Operator Overloading – Function Selection – Pointer Operators – Visitation – Iterators – containers – Sequence Containers - List – List Iterators – Associative Containers

UNIT IV   TEMPLATES AND FILE HANDLING   9

Template Class – Function Templates – RTTI Templates - Class Templates – Parameterizing – STL– Algorithms – Function Adaptors – Streams and Formatted I/O – I/O Manipulations -File handling – Random Access.

UNIT V   INHERITANCE   9

Derived Class – Typing Conversions and Visibility – Code Reuse – Virtual Functions – Templates and Inheritance – Run–Time Type Identifications – Exceptions – Handlers – Standard Exceptions.

                                        TOTAL   45   Hrs

References

1   E Balagurusamy, "Object oriented Programming with C++", 8th Edition, 2019, Tata McGraw Hill.

2   BhushanTrivedi, "Programming with ANSI C++", Oxford Press, Second Edition, 2012

3   Ira Pohl, "Object–Oriented Programming Using C++", Pearson Education, 2 Edition, 2003

4   Kamthane," Object Oriented Programming with ANSI and Turbo C++", Pearson Education, 2003.

5   HM Deitel and PJ Deitel "C++ How to Program", Seventh Edition, 2010, Prentice Hall

19CA2102   DESIGN AND ANALYSIS OF ALGORITHMS

	L	T	P	C
	3	0	0	3

Course Objectives

1   To understand the basic concepts of algorithms and the notations.

2   To design algorithms for divide and conquer method.

3   To solve problems based on dynamic programming.

4   To understand the techniques in back tracking.

5   To understand the concepts on NP-Hard and NP-Complete problems.

Course Outcome

1   Able to understand the time and space complexities of algorithms

2   Able to develop algorithms based on divide and conquer method.

3   Able to acquire knowledge on dynamic programming

4   Able to design algorithms for back tracking

5   Able to understand the concepts on NP-Hard and NP-Complete problems.

PO Vs CO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	X	X	X			X					X	X
2	X	X	X			X					X	X
3	X	X	X			X					X	X
4	X	X	X			X					X	X
5	X	X	X			X					X	X

UNIT I   INTRODUCTION   9

Introduction - Definition of Algorithm – pseudocode conventions – recursive algorithms – time and space complexity –big-"oh" notation – practical complexities – randomized algorithms – repeated element – primality testing - Divide and Conquer: General Method - Finding maximum and minimum – merge sort.

UNIT II   DIVIDE AND CONQUER   9

Divide and conquer contd. – Quicksort, Selection, Strassen's matrix multiplication – Greedy Method: General Method –knapsack problem - Tree vertex splitting - Job sequencing with deadlines – optimal storage on tapes.

UNIT III   DYNAMIC PROGRAMMING   9

General Method - multistage graphs – all pairs shortest paths – single source shortest paths - String Editing – 0/1 knapsack. Search techniques for graphs – DFS-BFS-connected components -biconnected components.

UNIT IV   BACK TRACKING   9

General Method – 8-queens - Sum of subsets - Graph Coloring – Hamiltonian cycles. Branch and Bound: General Method - Traveling Salesperson problem.

UNIT V   LOWER BOUND THEORY   9

Comparison trees - Oracles and advisory arguments - Lower bounds through reduction - Basic Concepts of NP-Hard and NP-Complete problems.

TOTAL   45   Hrs

References

1. E. Horowitz, S. Sahni and S. Rajasekaran, 1999, Computer Algorithms, Galgotia, New Delhi.
2. G. Brassard and P. Bratley, 1997, Fundamentals of Algorithms, PHI, New Delhi.
3. A.V. Aho, J.E. Hopcroft, J.D. Ullmann, 1974, The design and analysis of Computer Algorithms,AddisonWesley,Boston.
4. S.E.Goodman and S.T.Hedetniemi, 1977, Introduction to the Design and Analysis of algorithms, Tata McGraw Hill Int. Edn, New Delhi.
5. http://www.cise.ufl.edu/~raj/BOOK.html

19CA2103   **SOFTWARE ENGINEERING**

L	**T**	**P**	**C**
3	**0**	**0**	**3**

Course Objectives

1   To provide an insight into software life cycle and various software process models

2   To know the various designing concepts and notations for modeling the software.

3   To estimate the resources for developing the application and to prepare the schedule

4   To prepare the test cases for the project, apply various testing techniques, strategies and metrics to evaluate the software.

5   To construct software with high quality and reliability.

Course Outcome

1   Able to understand the problem domain to choose process models and to develop SRS

2   Able to model software projects using appropriate design notations

3   Able to measure the product and process performance using various methods

4   Able to evaluate the system with various testing techniques and strategies

5   Able to analyze, design, verify, validate, implement, and maintain software systems.

PO Vs CO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	X	X	X	X	X				X		X	
2	X	X	X	X	X				X		X	
3	X	X	X	X	X				X		X	
4	X	X	X	X	X				X		X	
5	X	X	X	X	X				X		X	

UNIT I	**INTRODUCTION**	**9**

Software Engineering Paradigms – SDLC – Waterfall Life Cycle Model – Spiral Model – Prototype Model –Evolutionary Model -   Agile Process Model – Unified Process Model - Planning – Software Project Scheduling - Software Requirement Specification - Case Study: Project Plan and SRS. The secure software development lifecycle – Risk based security testing – Web application session attacks.

UNIT II	**SOFTWARE DESIGN**	**9**

Designing Concepts - Abstraction – Modularity – Software Architecture – Cohesion – Coupling – Dataflow Oriented Design - Jackson System Development –Real Time and Distributed System Design – Designing for Reuse — Case Study: Design for any Application Oriented Project.

UNIT III	SOFTWARE TESTING AND MAINTENANCE	9

Software Testing Fundamentals – Software Testing Strategies – Black Box Testing – White Box Testing – System Testing – Object Orientation Testing – State Based Testing - Test Case Management – Types of Maintenance – Case Study: Testing Techniques.

UNIT IV	SOFTWARE METRICS	9

Scope – Classification of metrics – Measuring Process and Product attributes – Direct and Indirect measures – Cost Estimation – COCOMO Models - Reliability – Software Quality Assurance – Standards – Case Study for COCOMO model.

UNIT V	SCM & WEB ENGINEERING	9

Need for SCM – Version Control – SCM process – Software Configuration Items – Taxonomy – Re Engineering – Reverse Engineering - Web Engineering - CASE Repository – Features.

TOTAL   45   Hrs

References

1   Roger S. Pressman, "Software Engineering: A Practitioner Approach", Seventh Edition, Tata McGraw – Hill International Edition, 2009.

2   Ali Behforroz, Frederick J. Hudson, "Software Engineering Fundamentals", Oxford Indian Reprint,2012.

3   Jibitesh Mishra, Ashok Mohanty, "Software Engineering", Pearson Education, First Edition, 2011.

4   PankajJalote, "An Integrated approach to Software Engineering", Third Edition, Narosa Publications, 2011.

5   Roger S. Pressman, David Lowe, "Web Engineering: A Practitioner's Approach",Special Indian edition, McGraw Hill, 2008.

6   Sommerville, "Software Engineering", Tenth Edition, Pearson, 2015.

19CA2104   **OPERATING SYSTEMS**

L	T	P	C
3	0	0	3

Course Objectives

1   To understand the operating system components and its services.

2   To understand the methods for handling problems that occurs in resource sharing.

3   To understand the ways of managing memory for process.

4   To understand file handling concepts in OS perspective.

5   To be aware of components of operating system with relevant case study.

Course Outcome

1. Able to be aware of the evolution and fundamental principles of operating system, processes and their communication.
2. Able to implement the deadlock avoidance, detection and recovery.
3. Able to demonstrate the mapping between the physical memory and virtual memory.
4. Able to know about file management and the distributed file system concepts in operating systems.
5. Able to understand the operating system components and services with the recent OS.

PO Vs CO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	X	X	X			X			X			
2	X	X	X			X			X			
3	X	X	X			X			X			
4	X	X	X			X			X			
5	X	X	X			X			X			

UNIT I **INTRODUCTION** **9**

Introduction -Types of operating systems-operating systems structures-Systems components- operating systems services-System calls-Systems programs-Processes- process concept- process scheduling- operation on processes-co-operating processes-Inter process communications-CPU Scheduling- Scheduling criteria-Scheduling algorithms- Multiple-processor Scheduling

UNIT II **PROCESS SYNCHRONIZATION** **9**

Process Synchronization –Critical Section problem – Semaphores-Classical problems of synchronization-critical regions-Monitors-Deadlock Characterization-Deadlock handling- Deadlock Prevention – Deadlock avoidance-Deadlock Detection-Deadlock Recovery–Threads-Multithreading Models

UNIT III **MEMORY MANAGEMENT** **9**

Memory Management-Swapping-Contiguous Memory allocation-Paging-Segmentation- Virtual Memory-Demand paging-Page Replacement-Thrashing.

UNIT IV **DISK SCHEDULING AND DISTRIBUTED SYSTEMS** **9**

Disk Structures-Disk Scheduling-File Systems Interface-File concepts-Access methods- Directory Structures-File System Implementation-File Systems structures-Directory Implementation-Allocation Methods-Free Space management-Distributed File systems- Naming and Transparency-Remote File Accesses- File replication.

UNIT V **CASE STUDIES** **9**

Linux System-design Principles- process management-File Systems-Windows 7- history- design Principles –system components –Virtual machine OS – Mobile OS – Android and IOS

TOTAL **45** **Hrs**

References

1 Abraham Silberschalz Peter B Galvin, G.Gagne, "Operating Systems Concepts", 9th Edition, John Wiley & Sons, 2016

2 Andrew S.Tanenbaum, "Modern operating Systems", Third Edition, PHI Learning Pvt.Ltd., 2008

3 D M Dhamdhere, " Operating Systems: A Concept-based Approach", Second Edition,Tata McGraw-Hill Education, 2007

4 Marko Gargenta,"Learning Android",Oreilly publications,2014

5 Matt Neuburg, "Programming IOS 4: Fundamentals of IPhone, IPad, and IPod Touch Development", Oreilly publications,2011

| 19CA2105 | **COMPUTER GRAPHICS AND MULTIMEDIA** |

L	T	P	C
3	**1**	**0**	**4**

Course Objectives

1 To provide knowledge and understanding in the fundamental principles of Computer Graphics and Mathematical concepts related to Computer graphical operations.

2 To provide in-depth knowledge of display systems, image synthesis and shape modelling of 3D applications.

3 To understand the basic concepts related to Multimedia including data standards, algorithms and software.

4 To Experience the development of Multimedia application to display their ability by using Multimedia tools.

5 To provide knowledge in various multimedia standards.

Course Outcome

1 Gain proficiency in various algorithms of 2D Computer graphics and trend their use in various real-life systems.

2 Enhance the perspective of Modern computer system with modeling, analysis and interpretation of 3D visual information.

3 Able to understand different forms of Multimedia and gain knowledge about Audio and Video.

4 Able to understand the Networks used for Multimedia and to communicate with Multimedia Applications.

5 Able to design and implement a number of Multimedia Applications and to do Research in Multimedia Industry.

PO Vs CO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	X	X	X		X						X	X
2	X	X	X		X						X	X
3	X	X	X		X						X	X
4	X	X	X		X						X	X
5	X	X	X		X						X	X

UNIT I   **BASIC CONCEPTS**   **9+3**

Basic Shapes using Graphics - Line drawing algorithms - DDA algorithm - Bresenham's line algorithm - Filled Area Primitives - Scan-line Polygon fill algorithm - Boundary fill algorithm - Flood fill algorithm

UNIT II   **2D GRAPHICS**   **9+3**

2D Transformations – Clipping – Point Clipping – Line Clipping – Polygon Clipping – Text Clipping – Exterior Clipping – Cohen Sutherland– Window to View Port Mapping – Interactive Input Methods – Picture Construction Techniques.

UNIT III   **3D GRAPHICS**   **9+3**

3D Concepts – 3D Transformations – 3D Viewing – Visible Surface Detection Methods – Back Face Detection Method – Depth Buffer Method – Scan Line Method –Virtual Reality Environment, Rendering of 3D Objects.

UNIT IV   **MULTIMEDIA BASICS**   **9+3**

Introduction to Multimedia – Applications– Hypermedia – Authoring –– File formats –Color Models – Digital Audio– Digital Music Making – MIDI – Digital Video – Video Compression Techniques – Video Performance Measurements –Multimedia Databases–Animation.

UNIT V   **MULTIMEDIA APPLICATION DEVELOPMENT**   **9+3**

Design of a Multimedia System –Content Based Information Retrieval – HDTV, ATV, EDTV, IDTV Standards –Development of User Interface Design – Multimedia Broadcasting –Social Media Sharing – Multimedia Development Issues – Sample Multimedia Project.

       TOTAL   **45**   **+**   **15 Hrs**

References

1. Donald Hearn and M. Pauline Baker, "Computer Graphics C Version", Second Edition, Pearson Education.

2. David Hillman, "Multimedia – Technology and applications",Galgotia Publications, Delhi, 2008.

3. Mohammad Dastbaz, Designing Interactive Multimedia Systems, McGraw-Hill Publishers, 2002

4. ParagHavaldar and Gerard Medioni, "Multimedia Systems-Algorithms, Standards and Industry Practices",Cengage Learning, 2009.

5   Ralf Steinmetz and Klara "Multimedia Computing, Communications and Applications", Pearson Education, 2009.

6   Tom McReynolds – David Blythe," Advanced Graphics Programming Using OpenGL", Elsevier, 2005.

7   Ze-Nian Li, Mark S Drew and Jiangchuan Liu, "Fundamentals of Multimedia", Second Edition, Springer, 2014.

19CA2111   **OBJECT ORIENTED PROGRAMMING LABORATORY**

	L	T	P	C
	0	0	4	2

Course Objectives

1   To develop skills in object oriented programming.

2   To learn generic data structures using templates.

3   To implement the concept of polymorphism.

4   To understand the importance of STL.

5   To learn file handling in C++.

Course Outcome

1   Able to develop programs in object oriented paradigm using classes and objects.

2   Able to implement class and function templates in C++.

3   Able to program function overloading and operator overloading.

4   Able to design programs using iterators and containers.

5   Able to read, write and append files.

PO Vs CO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	X	X	X	X		X					X	
2	X	X	X	X		X					X	
3	X	X	X	X		X					X	
4	X	X	X	X		X					X	
5	X	X	X	X		X					X	

LIST OF EXPERIMENTS

1. Enumeration and Function Overloading

2. Scope and Storage class

3. Stack and Queue ADTs

4. Classes and objects

5. Constructors and Destructors and Constructor Overloading

6. Static member and methods

7. Bit fields

8. Overload as binary operator, friend and member function

9. Overload unary operator in Postfix and Prefix form as member and friend function

10. Iterators and Containers

11. Function templates

12. Template class

13. Inheritance

14. Virtual functions
15. Exception Handling
16. File Handling – Read, Write, Update

TOTAL   60   Hrs

19CA2112   DESIGN AND ANALYSIS OF ALGORITHMS LABORATORY

L	T	P	C
0	0	4	2

Course Objectives

1   To develop programs for basic algorithms in searching.

2   To develop programs for implementing greedy approach, dynamic programming and backtracking techniques

3   To develop programs by modifying existing programs/algorithms based on user specification.

4   To develop programs implementing graph algorithms in application context.

5   To develop programs to analyze the efficiency of algorithms.

Course Outcome

1   Able to work with basic algorithms for searching.

2   Able to design algorithms for greedy, dynamic programming and backtracking problems.

3   Able to analyze iterative and Recursive algorithms

4   Able to implement the graph algorithms for searching.

5   Able to work with advanced algorithms and its complexity analysis

PO Vs CO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	X	X	X			X					X	X
2	X	X	X			X					X	X
3	X	X	X			X					X	X
4	X	X	X			X					X	X
5	X	X	X			X					X	X

LIST OF EXPERIMENTS

Develop C++ programs for

1. Linear Search and Binary search

2. Minimum and maximum algorithm

3. Prims Algorithm

4. Kruskals Algorithm

5. Dijkstra's algorithm

6. Bellmann Ford Algorithm

7. Knapsack implementation using Greedy Method.

8. Implement BFS and DFS in Search graph.

9. Travelling Salesman problem using Backtracking

10. Implement N Queen's problem using Back Tracking.

                                                TOTAL   **60**   **Hrs**

19CA2113   **OPERATING SYSTEMS LABORATORY**

L	T	P	C
0	0	4	2

Course Objectives

1. To learn shell programming and the use of filters in the UNIX environment.

2. To learn to use system calls through C programs.

3. To learn to use the file system related system calls.

4. To gain knowledge of process creation and communication between processes.

5. To learn how process synchronization can be done using semaphores.

Course Outcome

1. Able to apply system calls such as open, close.

2. Able to analyze and solve process synchronization problems.

3. Able to use IPC for co-ordination among processes.

4. Able to understand communication between processes.

5. Able to understand scheduling algorithms.

PO Vs CO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1		X	X	X		X				X	X	X
2		X	X	X		X				X	X	X
3		X	X	X		X				X	X	X
4		X	X	X		X				X	X	X
5		X	X	X		X				X	X	X

LIST OF EXPERIMENTS

1. Basic UNIX commands – learning and usage.

2. Shell Programming.

3. Grep, sed, awk.

4. File system related system calls. (Learn to create, open, read, write, seek into, close files; open, read, write, search, close directories).

5. Process management - Fork, Exec (Learn to create a new process and to overlay an executable binary image on an existing process).

6. Inter-process communication between related processes using pipes.

7. Process synchronization using semaphores (Solutions to synchronization problems like producer consumer problem, dining philosopher's problem etc...).

8. Inter-process communication among unrelated processes using shared memory.

9. Inter-process communication among unrelated processes using Message Queues.

10. CPU Scheduling algorithms.

11. Contiguous memory allocation strategies – best fit, first fit and worst fit strategies.

12. Page replacement algorithms.

TOTAL   60   Hrs

SEMESTER III

19CA3101   MICROPROCESSOR AND MICROCONTROLLER

L	T	P	C
3	0	0	3

Course Objectives

1   To understand the Architecture of 8086 microprocessor.

2   To learn the design aspects of I/O and Memory Interfacing circuits.

3   To interface microprocessors with supporting chips.

4   To study the Architecture of 8051 microcontroller.

5   To study high performance CISC architecture

Course Outcome

1. Able to understand and execute programs based on 8086 microprocessor.
2. Able to design Memory Interfacing circuits.
3. Able to design and interface I/O circuits.
4. Able to understand and execute programs based on 8051 microprocessor.
5. Able to understand about the high performance CISC architecture

PO Vs CO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	X	X			X	X		X	X		X	X
2	X	X	X	X	X	X		X	X		X	X
3	X	X	X	X	X	X		X	X		X	X
4	X	X			X	X		X	X		X	X
5	X	X	X	X	X	X		X	X		X	X

UNIT I   THE 8086 MICROPROCESSOR   9

Introduction to 8086 – Microprocessor architecture – Addressing modes - Instruction set and assembler directives – Assembly language programming - Linking and Relocation - Stacks - Procedures – Macros – Interrupts and interrupt service routines .

UNIT II   8086 SYSTEM BUS STRUCTURE   9

8086 signals – Basic configurations – System bus timing –System design using 8086 – I/O programming – Introduction to Multiprogramming – System Bus Structure – Multiprocessor configurations – Coprocessor, Closely coupled and loosely Coupled configurations.

UNIT III   I/O INTERFACING   9

Memory Interfacing and I/O interfacing - Parallel communication interface – Serial communication interface – D/A and A/D Interface - Timer – Keyboard /display controller – Interrupt controller – DMA controller – Programming and applications. Case studies: Traffic Light control, LCD display and Keyboard display interface.

UNIT IV   MICROCONTROLLER   9

Architecture of 8051 – Special Function Registers(SFRs) - I/O Pins Ports and Circuits - Instruction set - Addressing modes - Assembly language programming. Case studies: Stepper Motor and Sensor Interfacing.

UNIT V   HIGH PERFORMANCE CISC ARCHITECTURE – PENTIUM   9

CPU Architecture- Bus Operations – Pipelining – Brach predication – floating point unit- Operating Modes –Paging – Multitasking – Exception and Interrupts – Instruction set – addressing modes.

      TOTAL   45   Hrs

References

1   Yu-Cheng Liu, Glenn A.Gibson, ―Microcomputer Systems: The 8086 / 8088 Family - Architecture, Programming and Design‖, Second Edition, Prentice Hall of India, 2007.

2   Mohamed Ali Mazidi, Janice GillispieMazidi, RolinMcKinlay, ―The 8051 Microcontroller and Embedded Systems: Using Assembly and C‖, Second Edition, Pearson education, 2011.

3   James L. Antonakos , " The Pentium Microprocessor", Pearson Education, 1997.

4   Daniel Tabak , "Advanced Microprocessors", McGraw Hill. Inc., 1995

5   DoughlasV.Hall, ―Microprocessors and Interfacing, Programming and Hardware‖,TMH,2012

6   K.Ray,K.M.Bhurchandi, "Advanced Microprocessors and Peripherals" 3 rd edition, Tata McGrawHill, 2012

19CA3102	COMPUTER NETWORKS

L	T	P	C
3	0	0	3

Course Objectives

1   To trace the flow of information from one node to another node in the network.

2   To understand the functionalities needed for data communication into layers

3   To analyze the function of network layer.

4   To analyze the design strategy of transport layer.

5   To identify the components required to build different types of networks

Course Outcome

1   Able to understand networking concepts and basic communication model.

2   Able to understand the operations of data link layer.

3   Able to understand the circuit and packet switching concepts.

4   Able to choose the required protocol for data transfer.

5   Able to acquire basic knowledge of various application protocols.

PO Vs CO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	X	X	X	X		X					X	
2	X	X	X	X		X					X	
3	X	X	X	X		X					X	
4	X	X	X	X		X					X	
5	X	X	X	X		X					X	

UNIT I	NETWORK FUNDAMENTALS	9

Uses of Networks – Categories of Networks -Communication model –Data transmission concepts and terminology – Protocol architecture – Protocols – OSI – TCP/IP – LAN Topology - Transmission media.

UNIT II	DATA LINK LAYER	9

Data link control - Flow Control – Error Detection and Error Correction - MAC – Ethernet, Token ring, Wireless LAN MAC.

UNIT III	NETWORK LAYER	9

Network layer – Switching concepts – Circuit switching – Packet switching –IP — Datagrams —IP addresses- IPv4 &IPv6– ICMP – Routing Protocols – Distance Vector – Link State- BGP.

UNIT IV	TRANSPORT LAYER	9

Transport layer –service –Connection establishment – Flow control – Transmission control protocol – Congestion control and avoidance – User datagram protocol. -Transport for Real Time Applications (RTP).

UNIT V	APPLICATIONS	9

Telnet, Blue Tooth – Bridges, Routers, Modems-Applications - DNS- SMTP – WWW –SNMP.

                                                        TOTAL   45   Hrs

References

1   William Stallings, "Data and Computer Communications", Tenth Edition, Pearson Education, 2014

2   Forouzan, " Data Communication and Networking", Fifth Edition , TMH 2013

3   Andrew S.Tannenbaum David J. Wetherall, "Computer Networks" Fifth Edition , Pearson Education 2011

4   Larry L. Peterson & Bruce S. Davie, "Computer Networks – A systems Approach", Fifth Edition, Morgan Kaufmann, 2012

5   James F. Kurose, Keith W. Ross, "Computer Networking: A Top-down Approach, Pearson Education, Limited, sixth edition, 2012.

19CA3103	WEB PROGRAMMING ESSENTIALS				

		L	**T**	**P**	**C**
		3	**0**	**0**	**3**

Course Objectives

1   To understand the concepts and architecture of the World Wide Web.

2   To understand the markup languages.

3   To design and implement dynamic web page with validation using JavaScript objects and by applying different event handling mechanisms.

4   To understand the web development techniques on client-side using AJAX.

5   To understand the jquery techniques in dynamic Scripting.

Course Outcome

1 Able to understand the concepts and architecture of the World Wide Web.

2 Able to create a basic website using HTML and Cascading StyleSheets.

3 Able to understand the embedded dynamic scripting on client side Internet Programming

4 Able to design rich client presentation using AJAX.

5 Able to design and implement jquery in dynamic web page.

PO Vs CO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	X	X	X	X	X			X	X		X	
2	X	X	X	X	X			X	X		X	
3	X	X	X	X	X			X	X		X	
4	X	X	X	X	X			X	X		X	
5	X	X	X	X	X			X	X		X	

UNIT I   INTRODUCTION TO WWW   9

Internet Standards – Introduction to WWW – WWW Architecture – SMTP – POP3 – File Transfer Protocol - Overview of HTTP, HTTP request – response — Generation of dynamic web pages.

UNIT II   UI DESIGN   9

Markup Language (HTML5): Basics of Html -Syntax and tags of Html- Introduction to HTML5 - Semantic/Structural Elements -HTML5 style Guide and Coding Convention– Html Svg and Canvas – Html API"s - Audio & Video - Drag/Drop - Local Storage - Web socket API– Debugging and validating Html.

Cascading Style Sheet (CSS3): The need for CSS – Basic syntax and structure Inline Styles – Embedding Style Sheets - Linking External Style Sheets - Introduction to CSS3 – Backgrounds - Manipulating text - Margins and Padding - Positioning using CSS - Responsive Web Design - Introduction to LESS/SASS- Bootstrap in CSS.

UNIT III   OVERVIEW OF JAVASCRIPT   9

Introduction - Core features - Data types and Variables - Operators, Expressions, and Statements Functions - Objects - Array, Date and Math Related Objects - Document Object Model - Event Handling - Controlling Windows & Frames and Documents - Form validations.

UNIT IV   ADVANCED FEATURES OF JAVASCRIPT   9

Browser Management and Media Management – Classes – Constructors – Object-Oriented Techniques in JavaScript – Object constructor and Prototyping - Sub classes and Super classes – Introduction to JSON – JSON Structure –Introduction to jQuery –Introduction to AJAX-Bootstrap - Bootstrap components.

UNIT V	JQUERY BASIC	9

Basics –String, Numbers, Boolean, Objects, Arrays, Functions, Arguments, Scope, Built-in Functions, jQuery – Selectors - jQuery – CSS Element Selector and ID Selector - CSS Element Class Selector and Universal Selector – CSS Multiple Elements E, F, G Selector - Callback Functions.

		TOTAL	45	Hrs

References

1   Harvey & Paul Deitel& Associates, Harvey Deitel and Abbey Deitel, "Internet andWorld Wide Web - How To Program", Fifth Edition, Pearson Education, 2011

2   Thomas A. Powell, "HTML & CSS: The Complete Reference", Fifth Edition, 2010

3   David Flanagan, "JavaScript: The Definitive Guide, Sixth Edition", O'Reilly Media, 2011

4   Thomas A Powell, Fritz Schneider, "JavaScript: The Complete Reference", Third Edition, Tata McGraw Hill, 2013

5   Thomas A Powell, "Ajax: The Complete Reference", McGraw Hill, 2008

6   Jonathan Chaffer, Learning jQuery, Fourth Edition, Kindle Edition

19CA3104	PROGRAMMING WITH JAVA

	L	T	P	C
	3	0	0	3

Course Objectives

1   To understand the OOPS concept & how to apply in programming.

2   To provide the advance features and collections packages.

3   To understand and apply the fundamentals core java, packages, database connectivity for computing

4   To enhance the knowledge to web application.

5   To provide an overview of working principles of internet, web related functionalities

Course Outcome

1   Able to write Java programs.

2   Able to understand different packages in Java

3   Able to make use of Java class hierarchy to provide a solution to a given set of requirements found in the Java API

4   Able to use the frameworks JSP, Hibernate, Spring.

5   Able to design and implement server-side programs using Servlets and JSP.

PO Vs CO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	X	X	X	X	X				X		X	X
2	X	X	X	X	X				X		X	X
3	X	X	X	X	X				X		X	X
4	X	X	X	X	X				X		X	X
5	X	X	X	X	X				X		X	X

UNIT I	JAVA FUNDAMENTALS	9

Java features – Java Platform – Java Fundamentals – Expressions, Operators, and Control Structures – Classes, Methods – Inheritance - Packages and Interfaces – Boxing, Unboxing, Exception Handling – Thread.

UNIT II	COLLECTIONS AND ADVANCE FEATURES	9

Utility Packages- Introduction to collection –Hierarchy of Collection framework – Generics, Array list, LL, HashSet, TreeSet, HashMap – Comparators – Java annotations.

UNIT III	ADVANCED JAVAPROGRAMMING	9

Input Output Packages – Inner Classes – Java Database Connectivity - Introduction JDBC Drivers - JDBC connectivity with MySQL/Oracle -Prepared Statement & Result Set – JDBC Stored procedures invocation - Servlets - RMI.

UNIT IV	OVERVIEW OF DATA RETRIEVAL & ENTERPRISE APPLICATION	9
	DEVELOPMENT	

Tiered Application development - Java Servers, containers –Web Container – Servlets - Creating Web Application using JSP/Servlets – Web Frameworks / Play Framework – Introduction to Hibernate.

UNIT V	JAVA INTERNALS AND NETWORKING	9

Java jar Files-Introspection – Garbage collection – Architecture and design – GC Cleanup process, Invoking GC, Generation in GC - Networking Basics Java and the Net – InetAddress – TCP/IP Client Sockets – URL –URL Connection – TCP/IP Server Sockets – A Caching Proxy HTTP Server – Datagrams.

TOTAL   45   Hrs

References

1 Amritendu De, "Spring 4 and Hibernate 4: Agile Java Design and Development", McGraw-Hill Education, 2015

2 Herbert Schildt, The Complete Reference – Java 2, Ninth Edition, Tata McGraw Hill, 2014

3 Joyce Farrell, "Java Programming", Cengage Learning, Seventh Edition, 2014.

4 John Dean, Raymond Dean, "Introduction to Programming with JAVA – A Problem Solving Approach", Tata McGraw Hill, 2014.

5 Mahesh P. Matha, "Core Java A Comprehensive Study", Prentice Hall of India, 2011.

19CA3105	OBJECT ORIENTED ANALYSIS AND DESIGN				
		L	T	P	C
		3	1	0	4

Course Objectives

1 To provide a brief, hands-on overview of object-oriented concepts and its life cycle for software development

2 To learn modeling of software and to design them using UML diagrams

3 To understand the problem domain and to identify the objects from the problem specification.

4   To understand, how to apply design axioms and corollaries for the classes and object relational systems.

5   To gain knowledge about open source tools for Computer Aided Software Engineering

Course Outcome

1   Able to understand the object oriented concepts and to apply object oriented life cycle model for a project.

2   Able to design static and dynamic models using UML diagrams.

3   Able to perform object oriented analysis to identify the objects from the problem specification.

4   Able to identify and refine the attributes and methods for designing the object oriented system.

5   Able learn the open source CASE tools and to apply them in various domains.

PO Vs CO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1		X	X	X	X				X		X	
2		X	X	X	X				X		X	
3		X	X	X	X				X		X	
4		X	X	X	X				X		X	
5		X	X	X	X				X		X	

UNIT I   **INTRODUCTION**   **9+3**

An overview – Object basics – Object state and properties – Behaviour – Methods – Messages – Information hiding – Class hierarchy – Relationships – Associations – Aggregations- Identity – Dynamic binding – Persistence – Meta classes – Object oriented system development life cycle.

UNIT II   **METHODOLOGY AND UML**   **9+3**

Introduction – Survey – Rumbaugh, Booch, Jacobson methods – Unified modeling language – Static and Dynamic models – Rational Rose Suite - UML diagrams – Static diagram : Class diagram – Use case diagrams – Behaviour Diagram : Interaction diagram – State chart diagram – Activity diagram - Implementation diagram: Component diagram – Deployment diagram – example - Design of online railway reservation system using UML diagrams - Dynamic modelling – Model organization – Extensibility.

UNIT III   **OBJECT ORIENTED ANALYSIS**   **9+3**

Identifying Use case – Business object analysis – Use case driven object oriented analysis – Use case model – Documentation – Classification – Identifying object, relationships, attributes, methods – Super sub class – A part of relationships Identifying attributes and methods – Object responsibility – construction of class diagram for generalization, aggregation – example – vehicle class

UNIT IV	OBJECT ORIENTED DESIGN AND PATTERNS	9+3

Design process and benchmarking – Axioms – Corollaries – Designing classes – Class visibility – Refining attributes – Methods and protocols – Object storage and object interoperability – Databases – Object relational systems – Designing interface objects – Macro and Micro level processes – The purpose of a view layer interface-OOUI - MVC Architectural Pattern and Design – Designing the system – Creative Patterns and Frameworks

UNIT V	CASE TOOLS	9+3

Railway domain: Platform assignment system for the trains in a railway station- Academic domain : Student Marks Analyzing System - ATM system - Stock maintenance - Quiz System- E-mail Client system - Cryptanalysis – Health Care Systems. Use Open source CASE Tools: StarUML/ UML Graph for the above case studies.

TOTAL   45   +   15 Hrs

References

1   Ali Bahrami, "Object Oriented System Development", McGraw Hill International Edition, 2008

2   Bernd Bruegge, Allen H. Dutoit, Object Oriented Software Engineering using UML, Patterns and Java, Pearson 2004

3   Craig Larman, Applying UML and Patterns – An Introduction to Object-Oriented Analysis and Design and Iterative Development" , 3rd Edition, Pearson Education, 2005

4   Grady Booch, James Rumbaugh, Ivar Jacobson, "The Unified Modeling Language User Guide", Addison Wesley Long man, 1999

5   Martin Fowler, "UML Distilled A Brief Guide to Standard Object Modeling Language", 3rd Edition, Addison Wesley, 2003

19CA3111   **NETWORKING LABORATORY**

L	T	P	C
0	0	4	2

Course Objectives

1   To learn socket programming.

2   To be familiar with routing commands.

3   To have hands on experience on various networking protocols.

4   To implement subnetting.

5   To understand the simulation tools.

Course Outcome

1   Able to implement the various protocols.

2   Able to analyze the Remote Procedure calls.

3   Able to analyze various routing algorithms using simulation tools.

4   Able to implement subnetting.

5   Able to communicate with client and server using echo.

PO Vs CO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1		X	X	X	X		X			X	X	
2		X	X	X	X		X			X	X	
3		X	X	X	X		X			X	X	
4		X	X	X	X		X			X	X	
5		X	X	X	X		X			X	X	

LIST OF EXPERIMENTS

1. Implementation of Stop and Wait Protocol and Sliding Window Protocol.

2. Study of Socket Programming and Client – Server model

3. Write a code simulating ARP /RARP protocols.

4. Write a code simulating PING and TRACEROUTE commands

5. Create a socket for HTTP for web page upload and download.

6. Write a program to implement RPC (Remote Procedure Call)

7. Implementation of Subnetting .

8. Applications using TCP Sockets like

   a. Echo client and echo server b. Chat c. File Transfer

9. Applications using TCP and UDP Sockets like d. DNS e. SNMP f. File Transfer

10. Study of Network simulator (NS).and Simulation of Congestion Control Algorithms using NS

11. Perform a case study about the different routing algorithms to select the network path with its optimum and economical during data transfer. i. Link State routing ii. Flooding iii. Distance vector Routing.

LIST OF EQUIPMENTS FOR A BATCH OF 30 STUDENTS SOFTWARE

- C / C++ / Java / Equivalent Compiler 30
- Network simulator like NS2/Glomosim/OPNET/ Equivalent

TOTAL   60   Hrs

| | 19CA3112 | WEB PROGRAMMING LABORATORY | | | |

	L	T	P	C
	0	**0**	**4**	**2**

Course Objectives

1. To develop the most important technologies that is being used today by web developers to build a wide variety of web applications.
2. To build web applications using proven developer tools and message formats.
3. To understand and practice web development techniques on client-side
4. To implement server side programming for data access.
5. To design a Web application using various technologies.

Course Outcome

1. Able to develop simple web applications using scripting languages.
2. Able to implement web application and validate it using Java script.
3. Able to develop client web applications with various web technology tools
4. Able to design a Web application using JSON technologies.
5. Able to develop an application for social media using HTML5, CSS3, JQuery, AJAX

PO Vs CO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1		X	X	X	X				X		X	
2		X	X	X	X				X		X	
3		X	X	X	X				X		X	
4		X	X	X	X				X		X	
5		X	X	X	X				X		X	

LIST OF EXPERIMENTS

1. Create your own Resume using HTML 5 Tags
2. Debug and validate your HTML document (Resume) using W3C validator and fix the issues (https://validator.w3.org/#validate_by_upload).
3. Add Styles to your Resume using CSS 3 Properties.
   i. Add External, Internal and Inline CSS styles to know the priority.
   ii. Add CSS3 Animation to your profile
4. a) Add functionalities that use any 2 of HTML 5 API"s.
   b) Create a student Registration form for Job Application and validate the form fields using JavaScript.
5. Create a CGPA Calculator in Web Brower using HTML, CSS and JavaScript. Use functions in JavaScript.

6. Create a Quiz Program with adaptive questions using JavaScript.

7. Create a Pan Card Validation form using Object Oriented JavaScript, consider the 10th character to be an alphabet.

     i. Get the user"s First Name, Last Name and other required fields as input

     ii. Assume the last digit of the Pan Number to be an alphabet

     iii. Validate the PAN Number.

8. a)Create an online Event Registration form and validate using JQuery

   b) Create an online video Player which will allow you to play videos from the system and also create custom playlist using JQuery.

9. Construct a JSON Structure for a bookstore and validate it using JSON Validator such as http://jsonlint.com/ and parse the Json file to list the books under the category "Fiction".UseJavascript or JQuery for parsing.

10. Create a Single Page application allowing to search for a movie and displaying the trailer, poster for various movies.

     a. Create an admin login to upload the trailer, poster, keyword and details of the movie.

     b. Use Bootstrap and JQuery for designing the User Interface.

     c. Form Submission should be handled through Ajax.

11. Develop a Social Media Web Application using HTML5, CSS3, JQuery, AJAX.

                     TOTAL   **60**   **Hrs**

19CA3113   PROGRAMMING WITH JAVA LABORATORY

L	T	P	C
0	0	4	2

Course Objectives

1   To develop Java based web programming.

2   To develop the technologies that is being used by the web developers to build a wide variety of web applications.

3   To understand and apply the fundamentals core java, packages, database connectivity for computing

4   To enhance the knowledge to server-side programming

5   To provide knowledge on advanced features like Swing, JavaBeans, Sockets.

Course Outcome

1   Able to apply the Object-Oriented features of Java for programming on the web.

2   Able to make use of hierarchy of Java classes to provide a solution to a given set of requirements found in the Java API

3   Able to understand the components and patterns that constitute a suitable architecture for a web application using java servlets

4   Able to get knowledge of backend and front end by developing an appropriate application.

5   Able to implement socket programming and Client-side scripting in Java

PO Vs CO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1		X	X	X	X				X		X	
2		X	X	X	X				X		X	
3		X	X	X	X				X		X	
4		X	X	X	X				X		X	
5		X	X	X	X				X		X	

LIST OF EXPERIMENTS

1.   Writing Java programs by making use of class, interface, package, etc for the following

   a.   Different types of inheritance study

   b.   Uses of "this" keyword

   c.   Polymorphism

   d.   Creation of user specific packages

   e.   Creation of jar files and using them

   f.   User specific exception handling

2.   Writing window-based GUI applications using frames and applets such as Calculator application, Fahrenheit to Centigrade conversion etc.

3.   Application of threads examples.

4.   Create a Personal Information System using Swing

5.   Reading and writing text files.

6.   Writing an RMI application to access a remote method.

7.   Writing a Servlet program with database connectivity for a web-based application such as students result status checking.

8.   Creation and usage of Java bean.

9.   Create an Application to search Phone Number using contact Name Using Hash Map.

10.   Create an Application which displays in E-mail contacts using Set Interface.

11.   FTP Using Sockets.

                                                    TOTAL   60   Hrs

19CA3M01	EFFECTIVE COMMUNICATION (For Lateral Entry Students)

	L	T	P	C
	-	-	-	-

Course Objectives

1 To develop all forms of communication skills of the students to enable them to conduct well in any business process without any communication barrier.

2 To train students to enhance their skills in written as well as oral Communication.

3 To help students in understanding the principles & techniques of effective communication.

4 To assist students enhance required soft skills.

5 To promote writing skills especially in writing compliance statements.

Course Outcome

1 Able to understand the scope of communication and use it in different Business situations.

2 Able to identify the appropriate usage of informative business messages and write an informative business message.

3 Able to understand the differences in communication methods and the suitability according to business scenarios.

4 Able to discuss appropriate ways to communicate to an audience in and outside the company.

5 Able to identify key principles of effective negotiating skills.

PO Vs CO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1				X			X		X	X	X	X
2				X			X		X	X	X	X
3				X			X		X	X	X	X
4				X			X		X	X	X	X
5				X			X		X	X	X	X

UNIT I	SHARING INFORMATION	6

Reading - Short Comprehension Passages – Day-to-day conversation ; Writing- Reframing sentences from the jumbled words – Creating Coherence ; Listening- Listening to TED talks, texts - short formal business conversations ;   Speaking- introducing oneself to the audience giving importance to characteristics ; Telephonic conversation ; Language development - Framing Yes/No questions, Use of Question tag.

UNIT II	WRITTEN CORRESPONDENCE I	6

Listening - Listening to Reports - Advertisements ; Reading – reading and understanding articles ; Writing– Writing Feasibility Reports ; Writing about a product; Vocabulary Development - Verbal Analogies ; Language Development - advanced use of Articles, Prepositional phrases.

UNIT III	WRITTEN CORRESPONDENCE II	6

Reading- Comprehending Articles from magazines, understanding the writing style - longer texts both general and technical, practice in speed reading ; Listening - Listening to business talks ; Speaking – answering Interview questions; Writing - Job Application with Resume – Interpretation of Charts - Minutes of the Meeting – Writing opinion paragraph - Writing paragraphs with reasons ; Language development – Tenses - simple present - simple past- present continuous and past continuous Language Development - If – Conditionals.

UNIT IV   SOFT SKILLS   6

Introduction - Objectives and Expectations - Classifying Decisions - valuating Alternatives - Plus-Minus-Implication **–** Project Direction – Writing down decision statements - Understanding Culture - Evaluating Alternatives: Paired Comparison **-** Supportive Listening Skills Demonstration **-** Team Decision Making - Communicating Verbally **-** Conflict Analysis - Visual idea Presentation.

UNIT V   NEGOTIATION SKILLS   6

Understanding the hidden complexities and dynamics of negotiation - Internalizing the roles played by relationships, trust and rapport - Strategically preparing for any negotiation scenario – writing implementation and compliance statements.

TOTAL   30   Hrs

TEXT BOOKS

1. Pease, Allan and Barbara Pease. The Definitive Book of Body Language. New Delhi: Manjul Publishing House, 2005.

2. Robbins P.Stephen, Hunsakerl.Philip.Training in Interpersonal Skill. 6th Edition. NewDelhi: Pearson, 2015.

REFERENCE BOOKS

1. Business communication, principles and methods and Techniques – Nirmalsingh,

2. Deep and Deep publications Pvt Ltd., - www.ddpbooks.com

3. Business communication – Sathyaswaroop, DebaishBhagabandas – PHI learning private ltd.,

4. Business communication – Meenakshi Raman, Prakashsingh, Oxford university press

SEMESTER IV

19CA4401   RESOURCE MANAGEMENT TECHNIQUES

L	T	P	C
3	0	0	3

Course Objectives

1   To provide the concept and an understanding of basic concepts in Operations Research

2   To understand, develop and solve mathematical model of linear programming problems

3   To understand, develop and solve mathematical model of Transport and assignment problems

4   To understand network modeling for planning and scheduling the project activities

5   To learn the techniques for Analysis and Modeling in Computer Applications.

Course Outcome

1 Able to understand and apply linear, integer programming to solve operational problem with constraints

2 Able to apply transportation and assignment models to find optimal solution in warehousing and Travelling,

3 Able to prepare project scheduling using PERT and CPM.

4 Able to identify and analyze appropriate queuing model to reduce the waiting time in queue.

5 Able to use optimization concepts in real world problems.

PO Vs CO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1			X					X				X
2	X								X		X	
3			X			X						X
4		X			X		X					
5	X			X						X		

UNIT I   LINEAR PROGRAMMING MODELS   9

Roles of operation Research in Engineering- Mathematical Formulation of LPP- Graphical Solution of linear programming models -Simplex method -Artificial variable Techniques. Variants of simplex method.

UNIT II   TRANSPORTATION AND ASSIGNMENT MODELS   9

Mathematical formulation of transportation problem- Methods for finding initial basic feasible solution – optimum solution – degeneracy-non-degeneracy –Mathematical formulation of assignment models – Hungarian Algorithm

UNIT III   INTEGER PROGRAMMING MODELS   9

Formulation of IPP – Applications of Integer Programming- Gomory"s IPP method – Gomory"s mixed integer method – Branch and Bound technique.

UNIT IV   SCHEDULING BY PERT AND CPM   9

Network Construction– Critical Path Method– Project Evaluation and Review Technique – Resource Analysis in Network Scheduling.

UNIT V   QUEUEING MODELS   9

Characteristics of Queuing Models– Poisson Queues - (M / M / 1): (FIFO / ∞ /∞), (M / M /1): (FIFO / N / ∞), (M / M / C): (FIFO / ∞ / ∞), (M / M / C): (FIFO / N / ∞) models.

TOTAL   45   Hrs

References

1   Taha H.A., "Operations Research: An Introduction " 8th Edition, Pearson Education, 2008.

2   Prem Kumar Gupta, D.S. Hira, "Operations Research", S.Chand& Company Ltd, New Delhi, 3rd Edition , 2008.

3   A.M.Natarajan, P.Balasubramani, A.Tamilarasi, "Operations Research", Pearson Education, Asia, 2005.

4   Gross, D. and Harris, C.M., "Fundamentals of Queueing Theory", Wiley Student, 3rd Edition, New Jersy, 2004.

5   N. D Vohra, Quantitative Techniques in Management,TataMcgraw Hill, 2010

6   Ravindran, Phillips, Solberg,"Operations Research: Principles And Practice", 2ND ED, John Wiley & Sons, 2007.

| 19CA4102 | MOBILE COMMUNICATIONS | | | |

	L	T	P	C
	3	0	0	3

Course Objectives

1   To learn the basic concepts, aware of the GSM, SMS, GPRS Architecture.

2   To have an exposure about wireless protocols -WLN, Bluetooth, WAP, ZigBee issues.

3   To know the Network, Transport Functionalities of Mobile communication.

4   To impart knowledge about Mobile Application Development Platform

5   To impart the knowledge about basic components needed for Mobile App development

Course Outcome

1   Able to gain the knowledge about various types of Wireless Data Networks and Voice Networks.

2   Able to understand the wireless protocols.

3   Able to understand the architectures, the challenges and the Solutions of Wireless Communication.

4   Able to realize the role of Android Application in shaping the future Internet.

5   Able to develop simple Mobile Application Using Android.

PO Vs CO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1		X	X		X	X			X	X	X	X
2		X	X		X	X			X	X	X	X
3		X	X		X	X			X	X	X	X
4		X	X		X	X			X	X	X	X
5		X	X		X	X			X	X	X	X

| UNIT I | WIRELESS COMMUNICATION FUNDAMENTALS | 9 |

Frequency Spectrum- Multiplexing- Spread spectrum-GSM vs CDMA - -Comparison of 2G , 3 G, 4G - GSM Architecture-Entities-Call Routing- Address and identifiers- GSM Protocol architecture-Mobility Management-Frequency Allocation- Security –GPRS Architecture .

| UNIT II | MOBILE WIRELESS SHORT RANGE NETWORKS | 9 |

Introduction-WLAN Equipment-WLAN Topologies-WLAN Technologies-IEEE 802.11 Architecture-WLAN MAC-Security of WLAN, - Standards- WAP Architecture- Bluetooth enabled Devices Network-Layers in Bluetooth Protocol-Security in Bluetooth- IrDA- ZigBee.

| UNIT III | MOBILE IP NETWORK LAYER, TRANSPORT LAYER | 9 |

IP and Mobile IP Network Layer- Packet delivery and Handover Management-Location Management-Registration- Tunneling and Encapsulation-Route Optimization- Mobile Transport Layer-Conventional TCP/IP Transport Layer Protocol-Indirect, Snooping, Mobile TCP.

| UNIT IV | MOBILE APPLICATION DEVELOPMENT USING ANDROID | 9 |

Mobile Applications Development - Understanding the Android Software Stack – Android Application Architecture –The Android Application Life Cycle – The Activity Life Cycle-Creating Android Activity -Views- Layout -Creating User Interfaces with basic views

| UNIT V | IMPLEMENTATION OF MOBILE APPLICATION DEVELOPMENT | 9 |

Linking activities with Intents- Services-Broadcast Receivers – Adapters – Data Storage, Retrieval and Sharing.-Location based services- Development of simple mobile applications.

| | TOTAL | 45 | Hrs |

References

1. JochenSchillar "Mobile Communications" Pearson Education second Edition.
2. Barry A. Burd ,"Android Application Development For Dummies All in One", Wiley,2015.
3. Ed Burnette,"Hello, Android: Introducing Google"s Mobile Development Platform" third edition" Pragmatic Programmers,2012.
4. Asoke K Talukder, HasanAhmed,RoopaRYavagal"Mobile Computing", Tata McGraw Hill Pub ,2nd Edition Aug – 2010.
5. Jerome(J.F) DiMarzio "Android A programmer"s Guide" Tata McGraw-Hill 2010 Edition.
6. MaritnSauter, ―From GSM to LTE: An Introduction to Mobile Networks and Mobile Broadband, John Wiley and Sons, 2011.
7. RetoMeier,Professional Android 2 Application Development, Wrox"s Programmer to Programmer

19CA4103	DATA MINING

	L	T	P	C
	3	0	0	3

Course Objectives

1. To apply data mining techniques for managing data.
2. To learn to use association rule mining for handling large data.
3. To understand the concept of classification for the retrieval purposes.
4. To know the clustering techniques in details for better organization and retrieval of data.
5. To identify Business applications and Trends of Web mining.

Course Outcome

1. Able to understand Data mining principles and techniques and Introduce DM as cutting edge business intelligence.
2. Able to apply the association rules for mining the data.
3. Able to Design and deploy appropriate classification techniques.
4. Able to cluster the high dimensional data for better organization of the data.
5. Able to implement algorithms for mining the web.

PO Vs CO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1		X	X	X	X	X			X		X	X
2		X	X	X	X	X			X		X	X
3		X	X	X	X	X			X		X	X
4		X	X	X	X	X			X		X	X
5		X	X	X	X	X			X		X	X

UNIT I	DATA MINING & DATA PREPROCESSING	9

Introduction to KDD process – Knowledge Discovery from Databases - Need for Data Preprocessing – Data Cleaning – Data Integration and Transformation – Data Reduction – Data Discretization and Concept Hierarchy Generation.

UNIT II	ASSOCIATION RULE MINING	9

Introduction - Data Mining Functionalities - Association Rule Mining - Mining Frequent Itemsets with and without Candidate Generation - Mining Various Kinds of Association Rules - Constraint-Based Association Mining.

UNIT III	CLASSIFICATION & PREDICTION	9

Classification vs. Prediction – Data preparation for 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.

UNIT IV	CLUSTERING	9

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

UNIT V	WEB MINING	9

Basic concepts of Information Retrieval - Information Retrieval Models – Text and web page pre-processing – web search – web spamming – web crawling – A Basic Crawler Algorithm – The problem of opinion mining – Aspect-based opinion mining – Data modeling for web usage mining.

TOTAL   45   Hrs

References

1   Jiawei Han and MichelineKamber, "Data Mining Concepts and Techniques" Second Edition, Elsevier, Reprinted 2008

2   Pang-Ning Tan, Michael Steinbach and Vipin Kumar, "Introduction to Data Mining", PearsonEducation, 2007

3   G. K. Gupta, "Introduction to Data Mining with Case Studies", Easter Economy Edition, PrenticeHall of India, 2006

4   Marakas, George M, Modern Data Warehousing, Mining, and Visualization, Pearson Education, 2011

5   Bing Liu," Web Data Mining: Exploring Hyperlinks, Contents, and Usage Data", Second Edition, Springer, 2011.

19CA4104	WEB APPLICATION DEVELOPMENT

L	T	P	C
3	0	0	3

Course Objectives

1   To understand architecture of J2EE and design applications using J2EE

2   To acquire knowledge on the usage of recent platforms in developing Web services

3   To design and develop interactive web application

4   To gain knowledge in any IDE

5   To build better Web apps more quickly and with less code

Course Outcome

1   Able to design and implement web applications using J2EE

2   Able to design a system according to customer needs using Spring Web Services

3   Able to design Angular component based web applications.

4   Able to deploy a Python web application.

5   Able to gain knowledge in the architecture of DJANGO

PO Vs CO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	X	X	X	X	X				X		X	X
2	X	X	X	X	X				X		X	X
3	X	X	X	X	X				X		X	X
4	X	X	X	X	X				X		X	X
5	X	X	X	X	X				X		X	X

UNIT I   **J2EE PLATFORM**   **9**

Introduction -Enterprise Architecture Styles -J2EE Architecture - Containers - J2EE Technologies - Developing J2EE Applications - Naming and directory services - Using JNDI - JNDI Service providers - Java and LDAP - LDAP operations - Searching an LDAP server - Storing and retrieving java objects in LDAP - Application Servers - Implementing the J2EE Specifications - J2EE packaging and Deployment - J2EE packaging overview - Configuring J2EE packages

UNIT II   **SPRING WEB SERVICES**   **9**

Web Services - Consuming a RESTFulWeb Service Java desktop application /JSP. Building REST Service with spring -Spring Security Architecture – Accessing relational data using JDBC with spring-Uploading Files using spring application- Validating form input - Handling form submission -Creation of Batch Service -Securing web application -Integrating Data - Accessing data with MongoDB-Creating asynchronous method – Using web socket build an interactive web application

UNIT III   **ANGULAR**   **9**

Creating and preparing Angular project – adding bootstrap CSS Package – Development tools – Html Page – Adding Angular features – Creation of data model – Template – Component – Two way binding – Adding to do items

UNIT IV   **PYTHON**   **9**

Introduction to python – Why to use python – History of python – Python IDE - Pyscripter IDE – Hello world program in python – Number & Math function – Variables & Names – String basics – String features – Conditional Statements – Functions – For & While loop – List,Tuple& Dictionaries – File handling – Debugging elements breakpoints watch and stepin – debugging step in & step out – Debugging watch variables – class & objects – Packages & Modules – Python Pip – Python MySql – Read Excel data in python.

UNIT V   **DJANGO**   **9**

Introduction to Django-Django model layer – View layer – Template Layer – Forms – Automated admin interface – Django Security – Internationalization and localization – Django Web application tools – Core functionalities – Geographic Framework.

                                              TOTAL   **45**   **Hrs**

References

1 SubrahmanyamAllamaraju and Cedric Buest , "Professional Java Server Programming (J2EE 1.3 Edition), ", Shroff Publishers & Distributors Pvt Ltd

2 Craig Walls, "Spring in Action, 4th Edition Kindle Edition, Manning Publication, 2015.

3 JobineshPurushothaman, "RESTful Java Web Services" Second Edition, Packt Publishing, 2015

4 Adam Freeman,"Pro Angular 6", ISBN-13 (pbk): 978-1-4842-3648-2

5 Jeff Forcier, Paul Bissex, Wesley J Chun, "Python Web Development with DjangoDeveloper's Library", Pearson Education, 2009

6 Mark Summerfield, "Programming in Python 3: A Complete Introduction to the Python Language", second edition, Pearson Education, 2010.

19CA4111   MOBILE APPLICATION DEVELOPMENT LABORATORY

L	T	P	C
0	0	4	2

Course Objectives

1 To know the components and structure of mobile application development frameworks like Android /windows /ios.

2 To understand how to work with various mobile application development frameworks.

3 To learn the basic and important design concepts and issues of development of mobile applications.

4 To understand the capabilities and limitations of mobile devices.

5 To write applications for the platforms used, simulate them, and test them on the mobile hardware where possible.

Course Outcome

1 Able to install and configure Android application development tools.

2 Able to design and develop user Interfaces for the Android platform.

3 Able to apply Java programming concepts to Android application development.

4 Able to be familiar with technology and business trends impacting mobile applications.

5 Able to be competent with the characterization and architecture of mobile applications.

PO Vs CO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1		X	X	X	X	X			X	X	X	X
2		X	X	X	X	X			X	X	X	X
3		X	X	X	X	X			X	X	X	X
4		X	X	X	X	X			X	X	X	X
5		X	X	X	X	X			X	X	X	X

LIST OF EXPERIMENTS

1. Develop an application that uses Layout Managers.

2. Develop an application that uses event listeners.

3. Develop an application that uses Adapters, Toast.

4. Develop an application that uses Toast.

5. Develop an application that makes use of database.

6. Develop an application that makes use of RSS Feed.

7. Implement an application that implements Multithreading.

8. Develop a native application that uses GPS location information.

9. Implement an application that writes data to the SD card.

10. Implement an application that creates an alert upon receiving a message.

                                                          TOTAL   60   Hrs

19CA4112   **WEB APPLICATION DEVELOPMENT LABORATORY**

	L	T	P	C
	0	0	4	2

Course Objectives

1   To understand architecture of J2EE and design applications using J2EE

2   To acquire knowledge on the usage of recent platforms in developing Web services

3   To design and develop interactive web application

4   To gain knowledge in any IDE

5   To build better Web apps more quickly and with less code

Course Outcome

1   Able to design and implement web applications using J2EE

2   Able to design a system according to customer needs using Spring Web Services

3   Able to design Angular component based web applications.

4   Able to deploy a Python web application.

5   Able to gain knowledge in the architecture of DJANGO

PO Vs CO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	X	X	X	X	X				X		X	X
2	X	X	X	X	X				X		X	X
3	X	X	X	X	X				X		X	X
4	X	X	X	X	X				X		X	X
5	X	X	X	X	X				X		X	X

LIST OF EXPERIMENTS

1. A car showroom inventory web application with 2-tier architecture. Use JSP and JDBC.
2. A real estate web application with n-tier architecture. Use JSP, Servlets and JDBC. The application should be able to add and search all properties such as rental/own, individual/apartment and duplex/semi-duplex.
3. Simple Spring MVC application to user input and checks the input using standard validation annotations.
4. Database application using Spring JDBC with CURD functionality.
5. Online bookstore using Spring MVC
6. Customer HTML UI – Directives and Interpolation in Angular
7. Install packages requests, flask and explore them. using (pip)
8. Import requests and fetch content from the page. Eg. (Wiki)
9. Simple Angular Component based project
10. DIY: Hello World project

| | **TOTAL** | **60** | **Hrs** |

19CA4913   TECHNICAL SEMINAR AND REPORT WRITING

L	T	P	C
0	0	2	1

Course Objectives

1 To train the students to critically evaluate a well-defined set of research subjects.

2 To summarize the findings concisely in a paper of scientific quality.

3 To identify the current issues in the domain.

4 To prepare a comparative study with file reference papers

5 To present a paper in the conference.

Course Outcome

1 Able to understand the current research trends.

2 Able to survey the issues in the domain selected.

3 Able to summarize the findings with scientific quality.

4 Able to review a case study.

5 Able to analyze the current ideas.

PO Vs CO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1		X					X	X	X	X	X	X
2		X					X	X	X	X	X	X
3		X					X	X	X	X	X	X
4		X					X	X	X	X	X	X
5		X					X	X	X	X	X	X

Procedures:

1. Every student selects a topic related to current trends and the same should be approved by the respective committee. This selection should have at least 5 distinct primary sources.

2. Every student must write a short review of the topic and present it to fellow students and faculty (discuss the topic – expose the flaws – analyze the issues) every week.

3. The paper will be evaluated based on the ability to understand a topic, communicate it and identify the issues.

4. Results from this term paper will be presented to fellow students and a committee of faculty members.

5. The faculty should evaluate the short review and award marks with respect to the following.
   a. Has the student analyzed – not merely quoted – the most significant portions of the primary sources employed?
   b. Has the student offered original and convincing insights?
   c. Plagiarism to be checked.

6. Every student should re-submit and present the review article including issues/ comments/ Conclusions which had arisen during the previous discussion.

7. Every student should submit a final paper as per project specifications along with all short Review reports (at least 4 internal reviews) and corresponding evaluation comments.

8. Every student should appear for a final external review exam to defend themselves.

TOTAL   60   Hrs

SEMESTER V

19CA5101   **CLOUD COMPUTING**

L	T	P	C
3	0	0	3

Course Objectives

1   To introduce the broad perceptive of cloud architecture and model

2   To understand the concept of Virtualization and design of cloud Services

3   To be familiar with the lead players in cloud.

4   To understand the features of cloud simulator.

5   To apply different cloud programming models &to design the trusted cloud Computing system.

Course Outcome

1   Able to understand the strengths and limitations of cloud computing.

2   Able to identify the suitable virtualization model and choose the appropriate cloud player.

3   Able to implement Cloud Services and Set a private cloud.

4   Able to know the architecture, infrastructure and delivery models of cloud computing.

5   Able to understand the core issues of cloud computing such as security and interoperability.

PO Vs CO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1		X	X		X		X		X		X	X
2		X	X		X		X		X		X	X
3		X	X		X		X		X		X	X
4		X	X		X		X		X		X	X
5		X	X		X		X		X		X	X

UNIT I   **CLOUD ARCHITECTURE AND MODEL**   **9**

Technologies for Network-Based System – System Models for Distributed and Cloud Computing – NIST Cloud Computing Reference Architecture. Cloud Models: - Characteristics – Cloud Services – Cloud models (IaaS, PaaS, SaaS) – Public vs Private Cloud –Cloud Solutions - Cloud ecosystem – Service management – Computing on demand.

UNIT II   **VIRTUALIZATION**   **9**

Basics of Virtualization - Types of Virtualization - Implementation Levels of Virtualization - Virtualization Structures - Tools and Mechanisms - Virtualization of CPU, Memory, I/O Devices - Virtual Clusters and Resource management – Virtualization for Data-center Automation.

UNIT III   **CLOUD INFRASTRUCTURE AND IoT**   **9**

Architectural Design of Compute and Storage Clouds – Layered Cloud Architecture Development – Design Challenges - Inter Cloud Resource Management – Resource Provisioning and Platform Deployment – Global Exchange of Cloud Resources-Enabling Technologies for the Internet of Things – Innovative Applications of the Internet of Things.

UNIT IV   **PROGRAMMING MODEL**   **9**

Parallel and Distributed Programming Paradigms – MapReduce, Twister and Iterative MapReduce – Hadoop Library from Apache – Mapping Applications - Programming Support - Google App Engine, Amazon AWS - Cloud Software Environments -Eucalyptus, Open Nebula, OpenStack, Aneka, CloudSim.

UNIT V   **SECURITY IN THE CLOUD**   **9**

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

TOTAL   45   Hrs

References

1   George Reese, "Cloud Application Architectures: Building Applications and Infrastructure in theCloud" O'Reilly.

2   GautamShroff, "Enterprise Cloud Computing",Cambridge University Press,2011.

3   John W.Rittinghouse and James F.Ransome, "Cloud Computing: Implementation, Management, and Security", CRC Press, 2010.

4   Kai Hwang, Geoffrey C Fox, Jack G Dongarra, "Distributed and Cloud Computing, From ParallelProcessing to the Internet of Things", Morgan Kaufmann Publishers,2012.

5   Katarina Stanoevska-Slabeva, Thomas Wozniak, SantiRistol, "Grid and Cloud Computing – ABusiness Perspective on Technology and Applications", Springer.

6   Michael Miller, Cloud Computing,Que Publishing,2008.

7   Toby Velte, Anthony Velte, Robert Elsenpeter, "Cloud Computing, A Practical Approach", TMH, 2009.

8   RajkumarBuyya, Christian Vecchiola, S.ThamaraiSelvi, „Mastering Cloud Computing", TMGH,2013.

9   Ronald L. Krutz, Russell Dean Vines, "Cloud Security – A comprehensive Guide to Secure Cloud Computing", Wiley – India, 2010.

19CA5102   **BIG DATA ANALYTICS**

L	T	P	C
3	0	0	3

Course Objectives

1   To learn to analyze the big data using intelligent techniques.

2   To learn to use various techniques for mining data stream.

3   To understand the applications using Map Reduce Concepts

4   To understand the basic visualization concepts of data.

5   To learn the basic frameworks for analysing data.

Course Outcome

1   Able to work with big data platform and understand the fundamentals of various big data analysis techniques

2   Able to design efficient algorithms for mining the data from large volumes

3   Able to analyse the HADOOP and Map Reduce technologies associated with big data analytics

4   Able to calculate page ranks for web pages.

5   Able to design analysis algorithms using the frameworks.

PO Vs CO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1		X	X	X	X	X			X		X	X
2		X	X	X	X	X			X		X	X
3		X	X	X	X	X			X		X	X
4		X	X	X	X	X			X		X	X
5		X	X	X	X	X			X		X	X

| UNIT I | INTRODUCTION TO BIG DATA | 9 |

Introduction to BigData Platform – Challenges of Conventional Systems - Intelligent data analysis – Nature of Data - Analytic Processes and Tools - Analysis vs Reporting - Modern Data Analytic Tools - Statistical Concepts: Sampling Distributions - Re-Sampling - Statistical Inference - Prediction Error.

| UNIT II | MINING DATA STREAMS | 9 |

Introduction To Streams Concepts – Stream Data Model and Architecture - Stream Computing - Sampling Data in a Stream – Filtering Streams – Counting Distinct Elements in a Stream – Estimating Moments – Counting Oneness in a Window – Decaying Window - Real time Analytics Platform(RTAP)Applications –- Case Studies - Real Time Sentiment Analysis, Stock Market Predictions.

| UNIT III | HADOOP ENVIRONMENT | 9 |

History of Hadoop- The Hadoop Distributed File System – Components of Hadoop-Analysing the Data with Hadoop- Scaling Out- Hadoop Streaming- Design of HDFS-Hadoopfile systems-Java interfaces to HDFS- Basics-Developing a Map Reduce Application-How Map Reduce Works-Anatomy of a Map Reduce Job run-Failures-Job Scheduling-Shuffle and Sort – Task execution - Map Reduce Types and Formats- Map Reduce Features - Setting up a Hadoop Cluster - Cluster specification - Cluster Setup and Installation – Hadoop Configuration-Security in Hadoop

| UNIT IV | DATA ANALYSIS SYTEMS AND VISUALIZATION | 9 |

Link Analysis – PageRank - Efficient Computation of PageRank- Topic-Sensitive PageRank – Link Spam- Recommendation Systems- A Model for Recommendation Systems- Content-Based Recommendations - Collaborative Filtering- Dimensionality Reduction- Visualizations - Visual data analysis techniques-interaction techniques

| UNIT V | FRAMEWORKS AND APPLICATIONS | 9 |

IBM for Big Data –Framework - Hive – Sharding – NoSQL Databases –Mango DB-Casandra-Hbase – Impala – Analyzing big data with twitter – Big data for Ecommerce – Big data for blogs

                                        TOTAL   45   Hrs

References

1   AnandRajaraman and Jeffrey David Ullman, "Mining of Massive Datasets", CambridgeUniversity Press, 2014

2   Michael Berthold, David J. Hand, "Intelligent Data Analysis", Springer, 2007

3   Glenn J. Myatt, "Making Sense of Data", John Wiley & Sons, 2007

4   Pete Warden, "Big Data Glossary", O"Reilly, 2011

5   Tom White " Hadoop: The Definitive Guide" Fourth Edition, O"reilly Media, 2015

	19CA5103				MACHINE LEARNING						

			L	T	P	C
			3	0	0	3

Course Objectives

1	To understand basic concepts and techniques of Machine Learning.
2	To become familiar with learning methodologies.
3	To understand various domains
4	To become familiar with Dimensionality reduction Techniques
5	To acquire knowledge in clustering techniques

Course Outcome

1	Able to gain knowledge about basic concepts of Machine Learning
2	Able to identify machine learning techniques suitable for a given problem
3	Able to solve the classifier issue
4	Able to apply dimensionality reduction techniques.
5	Able to design application using clustering techniques

PO Vs CO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	X	X	X	X		X	X			X	X	
2	X	X	X	X		X	X			X	X	
3	X	X	X	X		X	X			X	X	
4	X	X	X	X		X	X			X	X	
5	X	X	X	X		X	X			X	X	

UNIT I	**INTRODUCTION**	**9**

A Simple Machine-Learning Task – Challenges in machine Learning - Training sets and classifiers – Minor Digression – Hill Climbing – Bayesian Classifiers – The Single-Attribute case – Vectors of discrete attributes – Probabilities of Rare Events – Gaussian "Bell" function

UNIT II	**LEARNING PRINCIPLES**	**9**

Environmental constraints – Statistical Learning – Bayesian Inference – Bayesian Learning - Information Based Learning – Learning under the Parsimony Principle.

UNIT III	**INTER-CLASS BOUNDARIES**	**9**

The Additive Rule – The Multiplicative Rule – Domains with more than one classes - Polynomial Classifiers – Special aspects of Polynomial Classifiers - Numerical Domains and Support Vector Machines.

UNIT IV	PARAMETRIC METHODS	9

Maximum Likelihood Estimation – Evaluating an Estimator: Bias and Variance – The Bayes' Estimator – Parametric Classification – Regression – Tuning Model Complexity – Model Selection Procedures.

UNIT V	CLUSTERING	9

Mixture Densities – k-means clustering – Expectation Maximization Algorithm – Mixtures of Latent Variable Models – Supervised Learning after Clustering – Spectral Clustering – Hierarchical Clustering – Choosing the Number of clusters.

TOTAL   45   Hrs

References

1   Yves Kodartoff, RyszardMichalski, "Machine Learning, An Artificial Intelligence Approach", Volume III, Morgan Kaufmann Publishers.

2   MiroslavKubat, "An Introduction to Machine Learning", Second Edition, Springer, 2017.

3   EthemAlpaytin, "Introduction to Machine Learning", Third Edition, The MIT press.

4   Marco Gori, "Machine Learning – A Constraint-Based Approach", Morgan Kaufmann Publishers, 2018.

5   Pat Langley and Stanford University, "Elements of Machine Learning", Morgan Kaufmann Publishers.

19CA5111	CLOUD AND BIG DATA LABORATORY			
		L	**T**	**P**	**C**
		0	**0**	**4**	**2**

Course Objectives

1   To understand the different tool kits for cloud environment.

2   To run virtual machines of different configuration.

3   To work with Virtual Machines from one node to another.

4   To understand the usage of Hadoop Distributed File System (HDFS) to set up single and multi-node clusters.

5   To know the new cloud setup.

Course Outcome

1   Able to use the cloud and big data tool kits.

2   Able to design and Implement applications on the Cloud environment.

3   Able to implement Hadoop clusters

4   Able to use the map reduce tasks for various applications

5   Able to explore the applications in Hadoop.

PO Vs CO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1		X	X	X	X	X			X		X	X
2		X	X	X	X	X			X		X	X
3		X	X	X	X	X			X		X	X
4		X	X	X	X	X			X		X	X
5		X	X	X	X	X			X		X	X

LIST OF EXPERIMENTS

1. Use Eucalyptus or Open Nebula or Open Stack or equivalent to set up the cloud and demonstrate

2. Find procedure to run the virtual machine of different configuration. Check how many virtual machines can be utilized at particular time

3. Find procedure to attach virtual block to the virtual machine and check whether it holds the data even after the release of the virtual machine

4. Install a C compiler in the virtual machine and execute a sample program.

5. Show the virtual machine migration based on the certain condition from one node to the other (Find procedure to install storage controller and interact with it)

6. Find procedure to set up the one node Hadoop cluster.

7. Mount the one node Hadoop cluster using FUSE.

8. Write a word count program to demonstrate the use of Map - Reduce tasks.

9. Unstructured data into NoSQL data and do all operations such as NoSQL query with API.

10. K-means clustering using map reduce.

                                   TOTAL   **60**   **Hrs**

    19CA5112   **DOT NET LABORATORY**

L	T	P	C
0	0	4	2

Course Objectives

1. To learn about MS.NET framework developed by Microsoft.

2. To understand XML in C#.NET specifically ADO.NET and SQL server.

3. To be able to understand use of C# basics, Objects and Types, Inheritance.

4. To develop, implement and creating Applications with C#.

5. To develop, implement, and demonstrate Component Services, Threading, Remoting, Windows services, web.

Course Outcome

1   Able to use the tools in Dot net

2   Able to understand the Wizards in the Dot net framework

3   Able to understand the functionalities of Dot net framework.

4   Able to demonstrate the various components in the framework.

5   Able to develop and deploy an application of their own.

PO Vs CO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	X	X	X	X	X				X	X	X	
2	X	X	X	X	X				X	X	X	
3	X	X	X	X	X				X	X	X	
4	X	X	X	X	X				X	X	X	
5	X	X	X	X	X				X	X	X	

LIST OF EXPERIMENTS

1. Online shopping
   a) HTML Controls
   b) Web Controls
   c) ADO.NET
   d) AJAX
   e) Master Pages
2. Job portal Website (Eg. Naukri.com)
   a) CSS3
   b) SQL Queries
   c) Data List Controls
   d) SQL Data Adapter
   e) Data Set
3. Online video player using html5 and bootstrap (Ex: Youtube)
   a) HTML5
   b) UI Design
   c) Player Controls
   d) Player Integration
   e) Embedding Video
4. Creation of a weather control web service
   a) IIS
   b) Creating Website
   c) Enabling web service
   d) Dynamic Data
   e) Prediction

5. Mobile based food ordering system using bootstrap

    a) Bootstrap
    b) Navigation bar
    c) Grid Controls
    d) Dynamic Location
    e) Data Process

Requirements:

1. Web controls

2. Master pages

3. Stylesheets

4. ADO.NET

TOTAL   60   Hrs

19CA5913   **MINI PROJECT SOCIALLY RELEVANT**

		L	**T**	**P**	**C**
		0	**0**	**4**	**2**

Course Objectives

1   To analyze research knowledge in various domains

2   To finalize the domain and area of interest

3   To design the project using any software

4   To analyze / Compare the results

5   To demonstrate the application which is socially relevant

Course Outcome

1   Able to analyze the research areas

2   Able to gather the requirements of a domain

3   Able to develop the project

4   Able to compare the data

5   Able to cultivate the presentation skills

PO Vs CO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	X	X	X	X	X		X		X		X	X
2	X	X	X	X	X		X		X		X	X
3	X	X	X	X	X		X		X		X	X
4	X	X	X	X	X		X		X		X	X
5	X	X	X	X	X		X		X		X	X

List to do:

- Team Project with a maximum of four in a team

- Students shall select a domain and develop an application with social relevance

- Documentation is to be based on the standards

- Evaluation pattern is like Lab examination

- Need to submit a report, presentation with demo.

- User Based Testing and feedback from the benefited society required

TOTAL	**60**	**Hrs**

19CA5M01   **PHP PROGRAMMING**

L	T	P	C
-	-	-	-

Course Objectives

1   To understand how server-side programming works on the web.

2   To understand PHP Basic syntax for variable types and calculations and creating conditional structures.

3   To store data in arrays.

4   To use PHP built-in functions and creating custom functions.

5   To understand POST and GET in form submission.

Course Outcome

1   Able to execute server side programming in details.

2   Able to understand how to connect and execute with the database.

3   Able to handle dynamic website creation.

4   Able to understand the built-in functionalities.

5   Able to create an application of their own

PO Vs CO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	X	X	X		X						X	X
2	X	X	X		X						X	X
3	X	X	X		X						X	X
4	X	X	X		X						X	X
5	X	X	X		X						X	X

UNIT I	FUNDAMENTALS OF PHP PROGRAMMING	9

Introduction to WAMP server - Static & Dynamic Programming - Introduction to Website Development - Client & Server Side Scripting - Introduction to PHP &its essentials - Installation, Syntax & Variables - Data Types, Strings, Constants &Operators.

UNIT II	CONTROL STRUCTURES, LOOPS AND FORMS	9

PHP Looping - If...Else….Else if - While - Do While - For - Arrays - Functions -Sorting Arrays – Super Globals. Working with forms - Building a Form - Processing a Form's Data - Differences between POST and GET - Form Validation, Required.

UNIT III	PHP WITH DATABASE CONNECTIVITY	9

Arrays - Indexed, Associative, & Multidimensional Arrays in PHP, PHP Date & Time- File Handling - Include, Require - Cookies & Sessions - MySQL Database Connectivity - CRUD operations in Databases - Limiting and Optimizing Data in MySQL.

UNIT IV	OBJECT ORIENTATION IN PHP	9

Object Oriented PHP - Understanding Objects & Classes in PHP -Inheritance - Interface - Abstraction - Magic Methods - Introduction to PHP Frameworks - Case Study :Codeigniter

UNIT V	ADVANCED PHP	9

Design Patterns - Mail Function - Retrieving and Sending an E-mail using a PHP Function – Demo - Send E-mail using Simple Mail Transfer Protocol – Demo - PHP Extension and Application Repository

	TOTAL	45	Hrs

References

1. Bruce Berke, "Learn PHP: The Complete Beginner's Guide To Learn PHP Programming (PHP Guide)" Copyright 2017."

2. Lynn Beighley and Michael Morrison, "Head First PHP & MySQL: A Brain-Friendly Guide" O Reilly First Edition, 2018.

3. https://www.w3schools.com/php/default.asp

4. https://www.tutorialspoint.com/php/

PROFESSIONAL ELECTIVE I

19CA4201   **SOFT COMPUTING**

L	T	P	C
3	0	0	3

Course Objectives

1. To learn the key aspects of Soft computing
2. To know about the components and building block hypothesis of Genetic algorithm.
3. To understand the features of neural network and its applications
4. To study the fuzzy logic components
5. To gain insight onto Neuro Fuzzy modeling and control.

Course Outcome

1   Able to implement machine learning through Soft computing

2   Able to gain Knowledge to develop Genetic Algorithm and Support vector machine based machine learning system.

3   Able to understand supervised and unsupervised learning neural networks

4   Able to understand fuzzy concepts and develop a Fuzzy expert system to derive decisions.

5   Able to Model Neuro Fuzzy system for data clustering and classification.

PO Vs CO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	X	X		X		X						X
2	X	X		X		X						X
3	X	X		X		X						X
4	X	X		X		X						X
5	X	X		X		X						X

UNIT I	**INTRODUCTION TO SOFT COMPUTING**	**9**

Evolution of Computing – Introduction to Artificial Intelligence – Example problems – tic – tac-toe – question answering – Turing test - Prepositional and Predicate Calculus Rule Based knowledge Representation - Knowledge acquisition – Expert system – Introduction – Example – MYCIN - Soft Computing Constituents – From Conventional AI to Computational Intelligence - Machine Learning Basics – Case study : Simple artificial intelligence programs in PROLOG for diagnosis of a disease

UNIT II	**GENETIC ALGORITHMS**	**9**

Introduction, Building block hypothesis, working principle, Basic operators and terminologies such as individual, gene, encoding, fitness function and reproduction, Genetic modelling: Significance of Genetic operators, Inheritance operator, cross over, inversion & deletion, mutation operator, bitwise operator, GA optimization problems, JSPP (Job Shop Scheduling Problem), TSP (Travelling Salesman Problem), Differences & similarities between GA & other traditional methods, (Applications of GA)

UNIT III	**NEURAL NETWORKS**	**9**

Machine learning using Neural Network, Adaptive Networks – Feed Forward Networks Defuzzification – Supervised Learning Neural Networks – Radial Basis Function Networks - Reinforcement Learning – Unsupervised Learning Neural Networks – Adaptive Resonance Architectures – Advances in Neural Networks – Case study : Identification and control of linear and nonlinear dynamic systems using MATLAB.

| UNIT IV | DATA CLUSTERING METHODS AND ALGORITHMS | 9 |

Fuzzy Sets – Operations on Fuzzy Sets – Fuzzy Relations – Membership Functions-Fuzzy Rules and Fuzzy Reasoning – Defuzzification - Fuzzy Inference Systems – Mamdani Fuzzy Model – Takagi – Sugeno- Kang Fuzzy Model - Fuzzy Expert Systems – Fuzzy Decision Making - Case Study : implementation of fuzzy logic controller using MATLAB fuzzy logic toolbox.

| UNIT V | NEURO-FUZZY MODELING | 9 |

Adaptive Neuro-Fuzzy Inference Systems – Coactive Neuro-Fuzzy Modeling – Classification and Regression Trees – Data Clustering Algorithms – Rule base Structure Identification – Neuro-Fuzzy Control – Case Studies.

TOTAL   45   Hrs

References

1   Amos Gilat, " MATLAB : "An introduction with applications", John Wiley & Sons Inc,2011

2   A.E. Eiben and J.E. Smith "Introduction to Evolutionary Computing" Springer, 2003

3   David E. Goldberg, "Genetic Algorithms in Search, Optimization and Machine Learning",

4   Addison Wesley, 2007

5   E. Sanchez, T. Shibata, and L. A. Zadeh, Eds., "Genetic Algorithms and Fuzzy Logic Systems: Soft Computing Perspectives, Advances in Fuzzy Systems - Applications and Theory", Vol. 7, River Edge, World Scientific, 1997

6   Elaine Rich, Kevin Knight, Shiva Shankar B. Nair, "Artificial Intelligence", Tata McGraw hill Ltd, 2008

7   George J. Klir and Bo Yuan, "Fuzzy Sets and Fuzzy Logic-Theory and Applications", Prentice Hall, 1995

8   Jyh-Shing Roger Jang, Chuen-Tsai Sun, EijiMizutani, "Neuro-Fuzzy and Soft Computing", Prentice-Hall of India, 2003.

9   James A. Freeman and David M. Skapura, "Neural Networks Algorithms, Applications, and Programming Techniques", Pearson Edn., 2003

10   KwangH.Lee, "First course on Fuzzy Theory and Applications", Springer–Verlag Berlin Heidelberg, 2005

11   Mitsuo Gen and RunweiCheng,"Genetic Algorithms and Engineering Optimization", Wiley Publishers 2000

12   Melanie, "An Introduction to Genetic Algorithm", Prentice Hall, 1998

13   Ross Timothy J, Fuzzy Logic with Engineering Applications, Wiley India Pvt Ltd, New Delhi, 2010

14   S.N.Sivanandam, S.N.Deepa, "Introduction to Genetic Algorithms", Springer, 2007

19CA4202	ACCOUNTING AND FINANCIAL MANAGEMENT

	L	T	P	C
	3	0	0	3

Course Objectives

1   To understand the basic principles of Double entry system and preparation of balance sheet.

2   To understand the process of estimating the cost of a particular product.

3   To prepare the estimate for various business activities such as purchase, sale, production and cash budgets

4   To ensure decision making process of an organization.

5   To understand the capital policies

Course Outcome

1   Able to understand the balance sheet preparation and do analysis

2   Able to understand the budget preparation and control of a company

3   Able to decide about the state of affairs of a particular firm / company.

4   Able to ensure the preparation of fiscal policies of the organization.

5   Able to ensure the factors to be considered in investment policies.

PO Vs CO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	X	X						X			X	
2	X	X						X			X	
3	X	X						X			X	
4	X	X						X			X	
5	X	X						X			X	

UNIT I	FINANCIAL ACCOUNTING	9

Meaning and Scope of Accounting-Principles-Concepts-Conventions-Accounting Standards-Final Accounts-Trail Balance-Trading Account-Profit and Loss Account-Balance Sheet

UNIT II	COST ACCOUNTING	9

Meaning-Objectives-Elements of Cost-Cost Sheet-Marginal Costing and Cost Volume Profit Analysis-Break Even Analysis-Applications-Limitations-Standard Costing

UNIT III	BUDGETS AND BUDGETING CONTROL	9

Budgets and Budgetary Control-Meaning-Types-Sales Budget-Production Budget-Cost of Production Budget-Flexible Budgeting-Cash Budget-Master Budget-Zero Base Budgeting

UNIT IV	INVESTMENT DECISION AND COST OF CAPITAL	9

Objectives and Functions of Financial Management-Risk-Return Relationship- Capital Budgeting-Methods of Appraisal-Cost of Capital Factors Affecting Cost of Capital- Computation of specific cost and Weighted Average Cost of Capital.

UNIT V   FINANCING DECISION AND WORKING CAPITAL MANAGEMENT   9

Capital Structure-Factors Affecting Capital Structure - Concepts of Working Capital-Working Capital Policies-Factors affecting Working Capital-Estimation of Working Capital Requirements

TOTAL   45   Hrs

References

1   AswatDamodaran, "Corporate Finance Thoery and Practice", JohnWiley& Sons,2008

2   Brigham, Ehrhardt, "Financial Management Theory and Practice" 11th Edition, Cengage Learning, 2008

3   I.M.Pandey, "Management Accounting", Vikas Publishing House Pvt. Ltd., 3rd Edition, 2009

4   I.M.Pandey, "Financial Management", Vikas Publishing House Pvt. Ltd., 9th Edition, 2009

5   M.Y.Khan and P.K.Jain, "Financial Management, Text, Problems and Cases", Tata McGraw Hill, 5th Edition, 2008

6   S.N.Maheswari, "Financial and Management Accounting", Sultan Chand & Sons, 5 edition,2010

7   Srivatsava, Mishra, "Financial Management", Oxford University

19CA4203   **SOFTWARE PROJECT MANAGEMENT**

L	T	P	C
3	0	0	3

Course Objectives

1   To know of how to do project planning for the software process.

2   To learn the cost estimation during the analysis of the project.

3   To understand the estimation techniques available in the IT industry

4   To understand the risks available in the Software Management.

5   To know the Global standards and social impacts on globalization.

Course Outcome

1   Able to understand the activities during the project scheduling of any software application.

2   Able to learn the risk management activities and the resource allocation for the projects.

3   Able to apply the software estimation and recent quality standards for evaluation of the software Projects

4   Able to acquire knowledge and skills needed for the construction of highly reliable software project

5   Able to create reliable, replicable estimation that links to the requirements of project planning and managing.

PO Vs CO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	X	X	X	X	X				X	X	X	
2	X	X	X	X	X				X	X	X	
3	X	X	X	X	X				X	X	X	
4	X	X	X	X	X				X	X	X	
5	X	X	X	X	X				X	X	X	

UNIT I   **INTRODUCTION TO IoT**   **9**

Introduction to Software Project Management: An Overview of Project Planning: Select Project, Identifying Project scope and objectives, infrastructure, project products and Characteristics. Estimate efforts, Identify activity risks, and allocate resources- TQM, Six Sigma, Software Quality: defining software quality, ISO9126, External Standards.

UNIT II   **SOFTWARE EVALUATION AND COSTING**   **9**

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

UNIT III   **SOFTWARE ESTIMATION TECHNIQUES**   **9**

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

UNIT IV   **RISK MANAGEMENT**   **9**

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

UNIT V   **GLOBALIZATION ISSUES IN PROJECT MANAGEMENT**   **9**

Globalization issues in project management: Evolution of globalization- challenges in building global teams-models for the execution of some effective management techniques for managing global teams. Impact of the internet on project management– managing projects for the internet – effect on project management activities. Comparison of project management software's: dot Project, Launch pad, openProj. Case study: PRINCE2.

                                            TOTAL   **45**   **Hrs**

References

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

2   Futrell , "Quality Software Project Management", Pearson Education India, 2008

3   Gobalswamy Ramesh, "Managing Global Software Projects", Tata McGraw Hill Publishing Company, 2003

4   Richard H.Thayer "Software Engineering Project Management", IEEE Computer Society

5   S. A. Kelkar," Software Project Management" PHI, New Delhi, Third Edition ,2013

6   http://en.wikipedia.org/wiki/Comparison_of_project_management_software

7   http://www.ogc.gov.uk/methods_prince_2.asp

19CA4204	**SECURITY IN COMPUTING**		

	L	**T**	**P**	**C**
	3	**0**	**0**	**3**

Course Objectives

1   To understand the basics of cryptography.

2   To find the vulnerabilities in programs and to overcome them.

3   To know the different kinds of security threats in networks and its solution.

4   To know the different kinds of security threats in databases and solutions available.

5   To learn about the models and standards for security.

Course Outcome

1   Able to apply cryptographic algorithms for encrypting and decryption for secure data transmission.

2   Able to understand the importance of Digital signature for secure e-documents exchange.

3   Able to get the knowledge about the security services available for internet and web applications.

4   Able to understand data vulnerability and sql injection.

5   Able to gain the knowledge of security models and published standards.

PO Vs CO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1		X	X	X		X						X
2		X	X	X		X						X
3		X	X	X		X						X
4		X	X	X		X						X
5		X	X	X		X						X

| UNIT I | ELEMENTARY CRYPTOGRAPHY | 9 |

Terminology and Background – Substitution Ciphers – Transpositions – Making Good Encryption Algorithms- Data Encryption Standard- AES Encryption Algorithm – Public Key Encryption – Cryptographic Hash Functions – Key Exchange – Digital Signatures.

| UNIT II | PROGRAM SECURITY | 9 |

Secure programs – Non-malicious Program Errors – Viruses – Targeted Malicious code – Controls Against Program Threat – Control of Access to General Objects – User Authentication – Good Coding Practices – Open Web Application Security Project Flaws.

| UNIT III | SECURITY IN NETWORKS | 9 |

Threats in networks – Virtual Private Networks – PKI – SSL – IPSec – Content Integrity – Access Controls – Honeypots – Traffic Flow Security – Firewalls – Intrusion Detection Systems – Secure e-mail.

| UNIT IV | SECURITY IN DATABASES | 9 |

Security requirements of database systems – Reliability and Integrity in databases – Redundancy – Recovery – Concurrency/ Consistency – Monitors – Sensitive Data – Types of disclosures –Inference-finding and confirming sql injection- Information Security Project Ideas.

| UNIT V | SECURITY MODELS AND STANDARDS | 9 |

Secure SDLC – Security architecture models – Bell-La Padula Confidentiality Model – Biba Integrity Model – Graham-Denning Access Control Model – Harrison-Ruzzo-Ulman Model – Secure Frameworks – COSO – CobiT – Security Standards - ISO 27000 family of standards – NIST.

TOTAL   45   Hrs

References

1 Education Charles P. Pfleeger, Shari Lawrence Pfleeger, "Security in Computing", Fourth Edition, Pearson, 2007.

2 Michael Whitman, Herbert J. Mattord, "Management of Information Security",Third Edition, Course Technology, 2010.

3 Michael Howard, David LeBlanc, John Viega, "24 Deadly Sins of Software Security: Programming Flaws and How to Fix Them", First Edition, McGrawHill Osborne Media, 2009.

4 Matt Bishop, "Computer Security: Art and Science", First Edition, Addison- Wesley, 2002.

5 N. Bala Sundara Ganaathy, "Security in Computing".

19CA4205   ADHOC AND SENSOR NETWORK

L	T	P	C
3	0	0	3

Course Objectives

1 To create a Sensor network environment for different type of applications

2 To design ad-hoc and sensor network architectures using QoS and Congestion control mechanisms

3 To interpret the various control fields of the protocol in each layer

4 To select appropriate routing algorithms for different network environments

5 To deploy security mechanisms in the wireless ad-hoc and sensor networks

Course Outcome

1   Able to understand the basics of Ad-hoc & Sensor Networks

2   Able to learn various fundamental and emerging protocols of all layers in ad-hoc network

3   Able to study about the issues pertaining to major obstacles in establishment and efficient management of ad-hoc and sensor networks

4   Able to understand the nature and applications of ad-hoc and sensor networks

5   Able to understand various security practices and protocols of Ad-hoc and Sensor Networks

PO Vs CO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1		X			X	X				X		
2		X			X	X				X		
3		X			X	X				X		
4		X			X	X				X		
5		X			X	X				X		

| UNIT I | ADHOC NETWORKS FUNDAMENTALS & | 9 |
| | COMMUNICATIONPROTOCOLS | |

Fundamentals Of WLANs – IEEE 802.11 Architecture - Self Configuration and Auto Configuration-issues in Ad-Hoc Wireless Networks – MAC Protocols for Ad-Hoc Wireless Networks – Contention Based Protocols - TCP Over Ad-Hoc Networks-TCP Protocol Overview - TCP and MANETs – Solutions for TCP Over Ad-Hoc Networks

| UNIT II | ADHOC NETWORK ROUTING AND MANAGEMENT | 9 |

Routing in Ad-Hoc Networks- Introduction -Topology based versus Position based Approaches – Proactive Routing - DSDV, WRP, TBRPF Reactive Routing – DSR,AODV, Hybrid Routing Approach ZRP, CBRP- Location services - DREAM – Quorums based Location Service – Forwarding Strategies – Greedy Packet Forwarding, LAR.

| UNIT III | SENSOR NETWORK COMMUNICATION PROTOCOLS | 9 |

Introduction – Architecture - Single Node Architecture – Sensor Network Design Considerations – Energy Efficient Design Principles for WSN"s – Protocols for WSN – Physical Layer - Transceiver Design Considerations – MAC Protocols for wireless sensor network – IEEE 802.15.4 Zigbee – Link Layer and Error Control Issues - Routing Protocols – Gossiping and agent based unicast forwarding, Energy efficient unicast –Transport Protocols &QoS – Congestion Control Issues – Application specific Support

| UNIT IV | SENSOR NETWORK MANAGEMENT AND PROGRAMMING | 9 |

Sensor Management - Topology Control Protocols and Sensing Mode Selection Protocols - Time Synchronization - Localization and Positioning – Operating Systems and Sensor Network Programming – Sensor Network Simulators- Case study: Industrial automation and tsunami early warning system with wireless sensor networks

UNIT V	ADHOC AND SENSOR NETWORK SECURITY	9

Security in Ad-Hoc and Sensor Networks – Key Distribution and Management – Software based Anti-tamper Techniques – Water Marking techniques – Defense against Routing Attacks - Secure Adhoc Routing Protocols – Broadcast Authentication WSN Protocols – TESLA – Biba – Sensor Network Security Protocols – SPINS

                                                          TOTAL   45   Hrs

References

1   Adrian Perrig, J. D. Tygar, "Secure Broadcast Communication: In Wired and Wireless Networks", Springer, 2006

2   AmiyaNayak, Ivan Stojmenovic, : Wireless Sensor and Actuator Networks : Algorithm and Protocols for Scalable Coordination and Data communication John Wiley & Sons 2010

3   Carlos De MoraisCordeiro, Dharma PrakashAgrawal, "Ad Hoc and Sensor Networks: Theory and Applications", Second Edition, World Scientific Publishing, 2011

4   C.Siva Ram Murthy and B.S.Manoj, "Ad Hoc Wireless Networks – Architectures and Protocols", Pearson Education, 2011

5   C.K.Toh, "Ad Hoc Mobile Wireless Networks", Pearson Education, 2007

PROFESSIONAL ELECTIVE II

19CA5201   **PROFESSIONAL ETHICS**

L	T	P	C
3	0	0	3

Course Objectives

1   To understand the concepts of computer ethics in work environment.

2   To understand the threats in computing environment

3   To analyse the risk and safety in internet.

4   To understand the intricacies of accessibility issues

5   To ensure safe exits when designing the software projects

Course Outcome

1   Able to examine situations and to internalize the need for applying ethical principles, values to tackle with various situations.

2   Able to develop a responsible attitude towards the use of computer as well as the technology.

3   Able to analyze the professional responsibility and empowering access to information in the workplace.

4   Able to understand the code of ethics and standards of computer professionals.

5   Able to envision the societal impact on the products/ projects they develop in their career

PO Vs CO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1		X	X		X			X	X			
2		X	X		X			X	X			
3		X	X		X			X	X			
4		X	X		X			X	X			
5		X	X		X			X	X			

UNIT I   COMPUTER ETHICS INTRODUCTION AND COMPUTER HACKING   9

A general Introduction – Computer ethics: an overview – Identifying an ethical issue – Ethics and law – Ethical theories - Professional Code of conduct – An ethical dilemma – A framework for ethical decision making - Computer hacking – Introduction – definition of hacking – Destructive programs – hacker ethics - Professional constraints – BCS code of conduct

UNIT II   ASPECTS OF COMPUTER CRIME AND INTELLECTUAL PROPERTY   9
RIGHTS

Aspects of computer crime - Introduction - What is computer crime – computer security measures – Professional duties and obligations - Intellectual Property Rights – The nature of Intellectual property – Intellectual Property – Patents, Trademarks, Trade Secrets, Software Issues, Copyright - The extent and nature of software piracy – free software and open source code.

UNIT III   REGULATING INTERNET CONTENT, TECHNOLOGY AND SAFETY   9

Introduction – In defence of freedom expression – censorship – laws upholding free speech – Free speech and the Internet - Internet technologies and privacy – Safety and risk – assessment of safety and risk – risk benefit analysis – reducing risk.

UNIT IV   COMPUTER TECHNOLOGIES ACCESSIBILITY ISSUES   9

Introduction – Principle of equal access – Obstacles to access for individuals – professional responsibility - Empowering computers in the workplace – Introduction – computers and employment – computers and the quality of work – computerized monitoring in the work place – telecommuting – social, legal and professional issues - Use of Software, Computers and Internet-based Tools - Liability for Software errors - Documentation Authentication and Control – Software engineering code of ethics and practices – IEEE-CS – ACM Joint task force.

UNIT V   SOFTWARE DEVELOPMENT AND SOCIAL NETWORKING   9

Software Development – strategies for engineering quality standards – Quality management standards – Social Networking – Company owned social network web site – the use of social networks in the hiring process – Social Networking ethical issues – Cyber bullying – cyber stalking – Online virtual world – Crime in virtual world - digital rights management - Online defamation – Piracy – Fraud.

TOTAL   45   Hrs

References

1   Penny Duquenoy, Simon Jones and Barry G Blundell, "Ethical, legal and professional issues in computing", Middlesex University Press, 2008.

2   Caroline Whitback," Ethics in Engineering Practice and Research ", Cambridge University Press, 2011.

3   George Reynolds, "Ethics in Information Technology",Cengage Learning, 2011.

4   John Weckert and Douglas Adeney, Computer and Information Ethics, Greenwood Press, 1997.

5   Richard Spinello, "Case Studies in Information and Computer Ethics", Prentice Hall, 1997.

		L	T	P	C
19CA5202	HEALTH CARE MANAGEMENT	3	0	0	3

Course Objectives

1   To understand the basic concepts of health care system.

2   To know about creating and maintaining health care information systems

3   To ensure access of clinical information system on the fly

4   To know social media analytics for health care data.

5   To learn temporal data mining and visual data analytics for health care.

Course Outcome

1   Able to develop an understanding of basic research skills applicable to the design

2   Able to evaluate and implementation of appropriate Healthcare Information Systems (HIS)

3   Able to define and analyse the impact, strengths and weaknesses of various HIS in any healthcare settings

4   Able to extract health care data in temporal data mining.

5   Able to perform sensor data and visual data analytics.

PO Vs CO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	X					X	X		X			
2	X					X	X		X			
3	X					X	X		X			
4	X					X	X		X			
5	X					X	X		X			

UNIT I	INTRODUCTION	9

Introduction to health care information – Health care data quality – Health care information regulations, laws and standards.

UNIT II	HEALTH CARE INFORMATION SYSTEMS	9

History and evolution of health care information systems – Current and emerging use of clinical information systems – system acquisition – System implementation and support.

UNIT III	NEURAL NETWORKS	9

Information architecture and technologies that support health care information systems – Health care information system standards – Security of health care information systems.

UNIT IV	MINING AND SOCIAL MEDIA ANALYTICS FOR HEALTH CARE DATA	9

Resources – Terminology Acquisition and Management – Information Extraction – Text Mining Environments – Applications – Social Media Analysis for Public Health Research – Analysis of Social Media use in Healthcare

UNIT V	TEMPORAL DATA MINING AND VISUAL ANALYTICS FOR HEALTH CARE	9

Association Analysis – Temporal Pattern Mining – Sensor Data Analysis – Introduction to Visual Analysis and Medical Data Visualization – Visual Analytics in Health care – Visual Analytics for Clinicians.

TOTAL   45   Hrs

References

1 Chandan K. Reddy, Charu C. Aggarwal, "Healthcare Data Analytics", CRC Press,

2 Taylor & Francis Group, 2015.

3 Kevin Beaver, Healthcare Information Systems, Second edition Best Practices, CRC Press, 2002

4 Karen A Wager, Frances Wickham Lee, John P Glaser, "Managing Health Care Information Systems: A Practical Approach for Health Care Executives", John Wiley, 2 nd edition 2009.

5 Marion J. BallHealthcare Information Management Systems: A Practical Guide Springer-Verlag GmbH, 1995

6 Marion J. Ball, Charlotte Weaver, Joan Kiel ,"Healthcare Information Management Systems: Cases, Strategies, and Solutions", Springer, 2010, 3rd edition

7 Rudi Van De Velde and Patrice Degoulet, "Clinical Information Systems: A Component based approach", Springer 2005

19CA5203	GEOLOGICAL INFORMATION SYSTEMS

L	T	P	C
3	0	0	3

Course Objectives

1 To understand the basic concepts of Geological information systems

2 To understand the preparation and digitization of data

3 To understand raster data geo processing

4 To trace the vector data processing.

5 To learn the models and applications of GIS.

Course Outcome

1. Able to understand GIS concepts and spatial data representation
2. Able to design spatial data input in raster form as well as vector form.
3. Able to understand Raster data analysis and output functions
4. Able to understand vector data analysis and output functions
5. Able to design a GIS model for real world problem

PO Vs CO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1		X			X	X	X			X		X
2		X			X	X	X			X		X
3		X			X	X	X			X		X
4		X			X	X	X			X		X
5		X			X	X	X			X		X

UNIT I   **SPATIAL DATA REPRESENTATION**   **9**

GIS – Definition and related terminology- Digital representation of geospatial data – raster – vector – object oriented – geo database model-analysis

UNIT II   **DATA - DIGITIZATION AND PREPARATION**   **9**

Data – Sources and types. Maps and scales – advantages and limitations. Coordinates, Datum and projection system. Raster data. Characteristics and file formats. Vector data characteristics. Scanner: Principles, On Screen Digitization-post scanning-importing- data editing **.**Linking digital databases: ODBC – GPS data integration

UNIT III   **RASTER DATA ANALYSIS**   **9**

Raster Geospatial Data Analysis-Local operations: Reclassification, Logical and Arithmetic overlay operations – Neighbourhood operations: Aggregation, Filtering, Slope and Aspect map – Extended neighbourhood operations: - Statistical Analysis, Proximity, Connectivity operations, Buffering, Viewshed analysis – Regional operations: Area, Perimeter, Shape, Identification of region and Classification-output functions of Raster geoprocessing

UNIT IV   **VECTOR DATA PROCESSING**   **9**

Non-topological analysis: Attribute database query, SQL, Summary statistics-statistical computation-calculation-quantification- Address geocoding, -Topological analysis Feature based topological functions-overlay-buffering- Layer based topological function-Reclassification, Aggregation, Overlay analysis- Point-in-polygon, Line-in-polygon, Polygon-on-polygon: Clip, Erase, Identity, Union, Intersection – Network based Geoprocessing – Output functions

UNIT V	GIS MODELLING AND APPLICATIONS	9

Spatial indexing. Spatial modelling – External, Conceptual, Logical, Internal –GIS Modeling with case study- spatial data mining-DEM- introduction and applications

TOTAL   45   Hrs

References

1   Lo, C.P. and Yeung, Albert K.W., Concepts and Techniques of Geographic Information Systems, Prentice Hall, 2/E,2009

2   Kang-Tsung Chang ,Introduction to Geographic Information Systems, 6th Edition, McGraw-Hill Higher Education, 2011

3   Peter A. Burrough, Rachael A. McDonnell, Principles of GIS, 3rd Edition, Oxford University Press, 2015

4   Paul A. Longley, Mike Goodchild, David J. Maguire, Geographic Information Systems and Science, 4th Edition, John Wiley & Sons Inc ,2015

5   Robert Laurini and Derek Thompson, Fundamentals of Spatial Information Systems, Academic Press, 1992

19CA5204	HUMAN RESOURCE MANAGEMENT			
		L	**T**	**P**	**C**
		3	**0**	**0**	**3**

Course Objectives

1   To understand the importance of human resources.

2   To describe the steps involved in the human resource planning process

3   To understand the stages of employee socialization and training needs.

4   To know about the purposes of performance management systems and appraisal.

5   To know the list of occupational safety and health administration enforcement priorities

Course Outcome

1   Able to identify the primary external influences affecting HRM.

2   Able to outline the components and the goals of staffing, training and development.

3   Able to understand the selection procedure in various organizations.

4   Able to understand the practices used to retain the employees and able to evaluate their performance.

5   Able to identify the stress and the cause of burn out

PO Vs CO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	X	X				X		X	X			
2	X	X				X		X	X			
3	X	X				X		X	X			
4	X	X				X		X	X			
5	X	X				X		X	X			

UNIT I   UNDERSTANDING HRM WITH LEGAL & ETHICAL CONTEXT   9

Introduction- Importance of HRM – functions – Structure of HRM Department-Trends and opportunities – External Influences Affect HRM- HRM in global environment – HR & Corporate Ethics - Laws Affecting discriminatory practices – Enforcing Equal Opportunity Employment- Discipline & Employee Rights.

UNIT II   STAFFING, RECRUITING AND FOUNDATIONS OF SELECTION   9

Introduction – An Organizational Framework- Job analysis -Methods -Purpose– Recruiting Goals – Recruiting Sources – Recruitment Process- Selection Process – Selection from Global Perspective- job offers – Avoiding hiring mistakes - key element for successful predictors.

UNIT III   TRAINING AND DEVELOPMENT   9

Introduction – Socialization of New employee orientation, Employee process - purpose training-Employee Development– Evaluating training and Development Effectiveness-international training and development issues – Career Development -Value for organization and individual – mentoring and coaching – traditional career stages.

UNIT IV   PERFORMANCE EVALUATION, REWARDS AND BENEFITS   9

Appraisal process – methods – factors distort appraisal – team appraisal – Theories of motivation - compensation administration – job evaluation and pay structure – special cases of compensation – executive compensation programs – employee benefits Voluntary Benefits

UNIT V   SAFE AND HEALTHY WORK ENVIRONMENT   9

Occupational safety and health act -Contemporary Health and Safety Issues – Health and safety Provisions- employee unions – labor legislation- Unionizing Employees- Collective Bargaining. Maternity Benefit- contract labour act, ESI, PF

TOTAL   45   Hrs

References

1   BiswajeetPattanayak, Human Resource Management, Prentice Hall of India, 2001

2   Decenzo and Robbins, Human Resource Management, Wilsey, 10th edition, 2010

3   Dessler Human Resource Management, Pearson Education Limited, 2002

4   Resource Management, EugenceMckenna and Nic Beach, Pearson Education Limited, 2002

5   Ivancevich, Human Resource Management, McGraw Hill 2002.

6   Mamoria C.B. and MamoriaS.Personnel Management, Himalaya Publishing Company, 1997.

7   Wayne Cascio, Managing Human Resource, McGraw Hill, 1998

19CA5205   **INTERNET OF THINGS**

L	T	P	C
3	0	0	3

Course Objectives

1   To understand the fundamentals of Internet of Things

2   To learn about the basics of IOT protocols

3   To build a small low-cost embedded system using Raspberry Pi.

4   To apply the concept of Internet of Things to Cloud

5   To renovate the existing real-world device.

Course Outcome

1   Able to understand various protocols for IoT

2   Able to develop web services to access/control IoT devices.

3   Able to design a portable IoT using Rasperry Pi

4   Able to deploy an IoT application and connect to the cloud.

5   Able to analyze applications of IoT in real time scenario.

PO Vs CO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	X	X	X	X	X				X	X	X	
2	X	X	X	X	X				X	X	X	
3	X	X	X	X	X				X	X	X	
4	X	X	X	X	X				X	X	X	
5	X	X	X	X	X				X	X	X	

UNIT I   **INTRODUCTION TO IoT**   **9**

Internet of Things - Physical Design- Logical Design- IoT Enabling Technologies - IoT Levels & Deployment Templates - Domain Specific IoTs- IoT and M2M - IoT System Management with NETCONF-YANG- IoT Platforms Design Methodology.

UNIT II   **IoT ARCHITECTURE**   **9**

M2M high-level ETSI architecture - IETF architecture for IoT - OGC architecture - IoT reference model - Domain model - information model - functional model - communication model - IoT reference architecture.

| UNIT III | IoT PROTOCOLS | 9 |

Protocol Standardization for IoT – Efforts – M2M and WSN Protocols – SCADA and RFID Protocols – Unified Data Standards – Protocols – IEEE 802.15.4 – BACNet Protocol – Modbus– Zigbee Architecture – Network layer – 6LowPAN - CoAP – Security.

| UNIT IV | BUILDING IoT WITH RASPBERRY PI & ARDUINO | 9 |

Building IOT with RASPERRY PI- IoT Systems - Logical Design using Python – IoT Physical Devices & Endpoints - IoT Device -Building blocks -Raspberry Pi -Board - Linux on Raspberry Pi - Raspberry Pi Interfaces -Programming Raspberry Pi with Python - Other IoT Platforms - Arduino.

| UNIT V | CASE STUDIES AND REAL-WORLD APPLICATIONS | 9 |

Real world design constraints - Applications - Asset management, Industrial automation, smart grid, Commercial building automation, Smart cities - participatory sensing - Data Analytics for IoT – Software & Management Tools for IoT Cloud Storage Models & Communication APIs - Cloud for IoT - Amazon Web Services for IoT.

TOTAL   45   Hrs

References

1 ArshdeepBahga, Vijay Madisetti, "Internet of Things – A hands-on approach", Universities Press, 2015.

2 Dieter Uckelmann, Mark Harrison, Michahelles, Florian (Eds), "Architecting the Internet of Things", Springer, 2011.

3 Jan Ho¨ ller, VlasiosTsiatsis , Catherine Mulligan, Stamatis , Karnouskos, Stefan Avesand. David Boyle, "From Machine-to-Machine to the Internet of Things - Introduction to a New Age of Intelligence", Elsevier, 2014.

4 Honbo Zhou, "The Internet of Things in the Cloud: A Middleware Perspective", CRC Press, 2012.

5 Olivier Hersent, David Boswarthick, Omar Elloumi , "The Internet of Things – Key applications and Protocols", Wiley, 2012

PROFESSIONAL ELECTIVE III

19CA5206   **SOFTWARE TESTING AND QUALITY ASSURANCE**

L	T	P	C
3	0	0	3

Course Objectives

1 To know the behaviour of the testing techniques and to design test cases

2 To get insight into the levels of testing in the user environment

3 To understand standard principles to check the occurrence of defects and its removal

4 To learn the functionality of automated testing tools to apply in the specialized environment

5 To understand the models and metrics of software quality and reliability

Course Outcome

1   Able to test the software by applying various testing techniques

2   Able to debug the project and to test the entire computer based systems at all levels

3   Able to test the applications in the specialized environment using various automation tools

4   Able to evaluate the web applications using bug tracking tools

5   Able to apply quality and reliability metrics to ensure the performance of the software

PO Vs CO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1		X			X	X				X		
2		X			X	X				X		
3		X			X	X				X		
4		X			X	X				X		
5		X			X	X				X		

UNIT I   TESTING TECHNIQUES & TEST CASE DESIGN   9

Using White Box Approach to Test design - Test Adequacy Criteria – Static Testing Vs. Structural Testing – Code Functional Testing – Coverage and Control Flow Graphs – Covering Code Logic – Paths – Their Role in White box Based Test Design – Code Complexity Testing –. Test Case Design Strategies – Using Black Box Approach to Test Case Design – Random Testing– Boundary Value Analysis –Decision tables – Equivalence Class Partitioning – State-based testing – Cause-effect graphing – Error guessing – Compatibility testing – User documentation testing – Domain testing – Case study for Control Flow Graph and State-based Testing

UNIT II   LEVELS OF TESTING   9

The Need for Levels of Testing- Unit Test Planning –Designing the Unit Tests – The Test Harness – Running the Unit tests and Recording Results – Integration Tests – Designing Integration Tests – Integration Test Planning – Scenario Testing – Defect Bash Elimination. System Testing – Acceptance testing – Performance testing – Regression Testing- Ad-hoc testing – Alpha, Beta Tests- Testing OO systems – Usability and Accessibility Testing – Configuration Testing - Compatibility Testing – Testing the documentation – Website Testing - Case Study for Unit and Integration Testing.

UNIT III   TESTING FOR SPECIALIZED ENVIRONMENT   9

Testing Client / Server Systems – Testing in a Multiplatform Environment - Testing Object-Oriented Software – Object Oriented Testing – Testing Web based systems – Web based system – Web Technology Evolution – Traditional Software and Web based Software – Quality Aspects – Web Engineering – Testing of Web based Systems. Case Study for Web Application Testing.

UNIT IV	TEST AUTOMATION	9

Selecting and Installing Software Testing Tools - Software Test Automation – Skills needed for Automation – Scope of Automation – Design and Architecture for Automation – Requirements for a Test Tool – Challenges in Automation – Tracking the Bug – Debugging – Case study using Bug Tracking Tool.

UNIT V	SOFTWARE TESTING AND QUALITY METRICS	9

Six-Sigma – TQM - Complexity Metrics and Models – Quality Management Metrics - Availability Metrics - Defect Removal Effectiveness - FMEA - Quality Function Deployment – Taguchi Quality Loss Function – Cost of Quality. Case Study for Complexity and Object Oriented Metrics.

TOTAL   45   Hrs

References

1. Adithya P. Mathur, " Foundations of Software Testing – Fundamentals algorithms and techniques", Dorling Kindersley (India) Pvt. Ltd., Pearson Education, 2008

2. Boris Beizer, " Software Testing Techniques" , Dream Tech Press, 2009

3. Dale H. Besterfiled , "Total Quality Management", Pearson Education Asia, ThirdEdition, Indian Reprint (2011)

4. Edward Kit, " Software Testing in the Real World – Improving the Process", Pearson Education, 1995

5. Glenford J. Myers, Tom Badgett, Corey Sandler, "The Art of Software Testing", 3rd   Edition, John Wiley & Sons Publication, 2012

19CA5207	WEB SERVER PROGRAMMING IN .NET				
		L	T	P	C
		3	0	0	3

Course Objectives

1. To understand the basics of .NET framework.
2. To learn the communication in web servers.
3. To understand the basics of FTP.
4. To learn the various encryption algorithms.
5. To gain exposure in case studies.

Course Outcome

1. Able to analyze the framework of .NET.
2. Able to understand the communication of web servers.
3. Able to understand FTP and firewalls.
4. Able to analyze the algorithms for encryption.
5. Able to design web servers for specific application.

PO Vs CO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1		X	X	X	X	X					X	X
2		X	X	X	X	X					X	X
3		X	X	X	X	X					X	X
4		X	X	X	X	X					X	X
5		X	X	X	X	X					X	X

UNIT I   I/O IN THE .NET FRAMEWORK   9

Introduction – Streams – Files – Encoding data – Binary and text streams – Serialization – Writing a database to a stream – Sockets – UDP Client – UDP Server – Using TCP/IP to transfer files – TCP/IP Client –Server – Debugging network code – Socket-level networking in. Net.

UNIT II   COMMUNICATING WITH WEB SERVERS   9

HTTP-Request – Response - MIME types – system web – posting data – Cockies – Web Servers – implementing a web server – Mobile Web Browsers – Mobile web SDK. E-mail Servers – Sending an email – SMTP – Implementation – Post Office Protocol 3 – system. Webmail – Mail Application Programming Interface.

UNIT III   COMMUNICATING WITH FILE SERVERS (FTP)   9

Background – Microsoft file sharing – Netware file sharing – FTP uses ports, ftp handshake – Navigating folders – Implementing FTP – Securing a Network; firewalls - proxy servers -- and Routers.

UNIT IV   PROTECTING DATA : ENCRYPTION   9

Cryptanalysis – Terminology Asymmetric encryption – using RSA As asymmetric encryption – Symmetric encryption – Controlling User Access: Authentication and Authorization – Authentication Techniques – IIS authentication – Hashing information – SSL – Certificates – server and client Certificates.

UNIT V   PROGRAMMING FOR SCALABILITY   9

Case Study: The Google search engine – Replication and redundancy – Scalable network applications – future proofing – thread pooling – Avoiding deadlocks – Load balancing – Tricks and tips to increase performance – Multicast UDP – Data Compression – Lossless compression – Lossy Compression.

TOTAL   45   Hrs

References

1   "Professional ASP.NET MVC 5 (WROX)" by Jon Galloway and Brad Wilson.

2   "ASP.NET: The Complete Reference" by Matthew Macdonald.

3   "ASP.NET 4.5 in Simple Steps" by Kogent Learning Solutions Inc.

4   "ASP.NET 4.5, Covers C# and VB Codes, Black Book" by Kogent Learning Solutions Inc.

5   "Professional ASP.NET 4.5 in C# and VB (WROX)" by Jason N Gaylord and Christian Wenz.

19CA5208   **GAME PROGRAMMING**

L	**T**	**P**	**C**
3	**0**	**0**	**3**

Course Objectives

1 To get subsequent understanding of game design and development, which includes the processes, mechanics, issues in game design, game engine development, modeling, techniques, handling situations, and logic.

2 To create interactive games.

3 To gain knowledge in rendering concepts

4 To know about various gaming platforms and frameworks.

5 To develop 2D &3D interactive games.

Course Outcome

1 Able to illustrate an understanding of the concepts behind game programming techniques.

2 Able to implement game programming techniques

3 Able to solve game development tasks.

4 Able to construct a basic game engine using open-source programming libraries.

5 Able to develop interactive games using 2D and 3D.

PO Vs CO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1		X	X	X		X						X
2		X	X	X		X						X
3		X	X	X		X						X
4		X	X	X		X						X
5		X	X	X		X						X

UNIT I   **GRAPHICS FOR GAME PROGRAMMING**   **9**

Coordinate Systems, Ray Tracing, Modeling in Game Production, Vertex Processing, Rasterization, Fragment Processing and Output Merging, Illumination and Shaders, Parametric Curves and Surfaces, Shader Models, Image Texturing, Bump Mapping, Advanced Texturing, Character Animation, Physics-based Simulation.

UNIT II   **GAME DESIGN PRINCIPLES**   **9**

Game Logic, Game AI, Path Finding, Game Theory, Character development, Story Telling, Narration, Game Balancing, Core mechanics, Principles of level design, Genres of Games, Collision Detection.

UNIT III   **GAMING ENGINE DESIGN**   **9**

Renderers, Software Rendering, Hardware Rendering, and Controller based animation, Spatial Sorting, Level of detail, collision detection, standard objects, and physics.

UNIT IV   **GAMING PLATFORMS AND FRAMEWORKS**   **9**

Flash, DirectX, OpenGL, Java, Python, XNA with Visual Studio, Mobile Gaming for the Android, iOS, Game engines - Adventure Game Studio, DX Studio, Unity.

UNIT V	GAME DEVELOPMENT	9

Developing 2D and 3D interactive games using OpenGL, DirectX – Isometric and Tile Based Games, Puzzle games, Single Player games, Multi-Player games.

TOTAL   45   Hrs

References

1   Andy Harris, "Beginning Flash Game Programming For Dummies", For Dummies; Updated Edition, 2005.
2   David H. Eberly, "3D Game Engine Design, Second Edition: A Practical Approach to Real-Time Computer Graphics" Morgan Kaufmann, 2nd Edition, 2006
3   Dino Dini, "Essential 3D Game Programming", Morgan Kaufmann, 1st Edition, 2012
4   Ernest Adams and Andrew Rollings, "Fundamentals of Game Design", Prentice Hall 1st Edition,2006
5   Eric Lengyel, "Mathematics for 3D Game Programming and Computer Graphics", 3rd Edition, Course Technology PTR, 2011.

19CA5209   **COMPUTATIONAL INTELLIGENCE**

L	T	P	C
3	0	0	3

Course Objectives

1   To understand the fundamentals of computational intelligence
2   To know about the various knowledge representation methods
3   To understand the features of neural network and its implementation
4   To study about various data clustering methods
5   To gain knowledge in evolutionary computation and neuro – fuzzy systems

Course Outcome

1   Able to implement computational intelligence through applications
2   Able to understand knowledge representation methods and apply approximate reasoning
3   Able to apply evolutionary algorithm to solve the optimization problem
4   Able to gain research Knowledge to develop applications using hybrid systems
5   Able to Model Flexible Fuzzy Inference systems for dynamic nonlinear data sets

PO Vs CO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	X	X		X		X						X
2	X	X		X		X						X
3	X	X		X		X						X
4	X	X		X		X						X
5	X	X		X		X						X

UNIT I   INTRODUCTION TO COMPUTATIONAL INTELLIGENCE   9

Evolution of Computing – Introduction to Artificial Intelligence –– Turing test - Prepositional and Predicate Calculus - Expert system – Introduction – MYCIN – PROSPECTOR – Robotics – From Conventional AI to Computational Intelligence – Issues in Artificial Intelligence - Machine Learning Basics – Intelligence of ants - Artificial Life – BOTS – Comparison of various expert systems.

UNIT II   KNOWLEDGE REPRESENTATION METHODS   9

Introduction – rough sets – set approximation – analysis of decision tables – Application of LERS software – Type – 1 fuzzy sets – definition – basic operations on fuzzy sets – The extension principle – Triangular norms and negations – Fuzzy Relations – Approximate reasoning – fuzzy Inference systems – Application of fuzzy sets – Type – 2 fuzzy sets – Footprint of uncertainty – basic operations on fuzzy sets – Type – 2 fuzzy relations – Type reduction – type 2 fuzzy Inference systems – Comparison of Fuzzy Inference systems.

UNIT III   NEURAL NETWORKS AND LEARNING ALGORITHMS   9

Machine learning using Neural Network, Adaptive Networks – Feed Forward Networks Defuzzification – Supervised Learning Neural Networks – backpropagation Algorithm – Levenberg-Marquardt algorithm – Recurrent neural networks – BAM networks - Radial Basis Function Networks - Reinforcement Learning – Unsupervised Learning Neural Networks – Adaptive Resonance Architectures – Case Study : Neural Network explanation facility.

UNIT IV   DATA CLUSTERING METHODS AND ALGORITHMS   9

Introduction – Hard and fuzzy partitions – Distance Measures – Hard C- Means algorithm – Fuzzy C-Means algorithm – Possibilistic C- Means algorithm - Fuzzy Maximum Likelihood Estimates (FMLE) algorithm – Neuro Fuzzy systems - Mamdani Fuzzy Model – modelling problems - - Logical type - Takagi – Sugeno- Kang Fuzzy Model – comparison of neuro – fuzzy systems – Model evaluation criteria, complexity. Fuzzy Expert Systems – Fuzzy Decision Making – Case study: EEG spike detection.

UNIT V   EVOLUTIONARY COMPUTATION AND NEURO-FUZZY SYSTEMS   9

Evolutionary computation – GA – Particle Swarm Optimization – Ant colony Optimization – Artificial Immune Systems – Honey- Bee Optimization – Memetic Algorithms - Optimization problems – TSP, JSSP - evolutionary algorithms – Flexible neuro – fuzzy systems – Introduction – soft triangular norms – Parameterized triangular norms – Adjustable triangular norms – Flexible systems – Learning algorithms – Simulation examples –Hybrid Techniques - Neuro-Fuzzy Control – Case study : Evolutionary medical diagnosis A simple project using any one of the above domains with tools like MATLAB, Python 2 and Weka tool 3.7 .

                                        TOTAL   45   Hrs

References

1   A.E. Eiben and J.E. Smith "Introduction to Evolutionary Computing" Springer, 2003

2   AndriesEngelbrecht, Computational Intelligence: An Introduction, 2007

3   Amos Gilat, "MATLAB: "An introduction with applications", John Wiley & Sons Inc, 2011.

4   David E. Goldberg, "Genetic Algorithms in Search, Optimization and Machine Learning", Addison Wesley, 2007

5   Elaine Rich, Kevin Knight, Shiva Shankar B. Nair, "Artificial Intelligence", Tata McGraw hill Ltd, 2008.

6   E. Sanchez, T. Shibata, and L. A. Zadeh, Eds., "Genetic Algorithms and Fuzzy Logic Systems: Soft Computing Perspectives, Advances in Fuzzy Systems - Applications and Theory", Vol. 7, River Edge, World Scientific, 1997.

7   George J. Klir and Bo Yuan, "Fuzzy Sets and Fuzzy Logic-Theory and Applications", Prentice Hall, 1995

8   Jyh-Shing Roger Jang, Chuen-Tsai Sun, EijiMizutani, "Neuro-Fuzzy and Soft Computing", Prentice-Hall of India, 2003

9   KwangH.Lee, "First course on Fuzzy Theory and Applications", Springer–Verlag Berlin Heidelberg, 2005

10   Kaluza, B. INSTANT Weka How-to, Packt Publishing, 2013.

11   LeszekRutkowski, " Computational Intelligence – Methods and Techniques", Springer, 2008.

12   Mitsuo Gen and RunweiCheng,"Genetic Algorithms and Engineering Optimization", Wiley, Publishers 2000.

13   Mitchell Melanie, "An Introduction to Genetic Algorithm", Prentice Hall, 1998

14   Ross Timothy J, Fuzzy Logic with Engineering Applications, Wiley India Pvt Ltd, New Delhi, 2010.

15   S.N.Sivanandam, S.N.Deepa, "Introduction to Genetic Algorithms", Springer, 2007.

19CA5210	**PRINCIPLES OF PROGRAMMING LANGUAGES**			

	L	T	P	C
	3	0	0	3

Course Objectives

1   To understand and describe syntax and semantics of programming languages.

2   To understand Data, Data types, and Bindings.

3   To learn the concepts of functional and logical programming.

4   To understand the logic programming concepts.

5   To design and implement subprogram constructs, Apply object - oriented, concurrency, pro and event handling programming constructs

Course Outcome

1   Able to describe syntax and semantics of programming languages

2   Able to explain data, data types, and basic statements of programming languages

3   Able to develop programs in LISP, ML.

4   Able to develop programs in logic programming using prolog.

5   Able to explore the knowledge about concurrent Programming paradigms.

PO Vs CO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1		X	X	X	X			X				
2		X	X	X	X			X				
3		X	X	X	X			X				
4		X	X	X	X			X				
5		X	X	X	X			X				

UNIT I   ELEMENTS OF PROGRAMMING LANGUAGES   9

Reasons for studying, concepts of programming languages, Language Evaluation Criteria, influences on Language design, Language categories. Programming Language Implementation – Compilation, Hybrid Implementation, Pure Interpretation and Virtual Machines. Describing Syntax and Semantics - Introduction - The General Problem of Describing Syntax-Formal Methods of Describing Syntax - Attribute Grammars - Describing the Meanings of Programs: Dynamic Semantics.

UNIT II   DATA TYPES-ABSTRACTION   9

Introduction - Primitive Data Types- Character String Types- User-Defined Ordinal Types- Array types- Associative Arrays-Record Types- Tuple Types-List Types -Union Types - Pointer and Reference Types -Type Checking- Strong Typing -Type Equivalence - Theory and Data Types-Variables-The Concept of Binding -Scope - Scope and Lifetime - Referencing Environments - Named Constants- The Concept of Abstraction- Parameterized Abstract Data Types- Encapsulation Constructs-Naming Encapsulations.

UNIT III   FUNCTIONAL PROGRAMMING   9

Introduction- Mathematical Functions- Fundamentals of Functional Programming Languages- The First Functional Programming Language: LISP- An Introduction to Scheme- Common LISP- Haskell-F# - ML : Implicit Types- Data Types- Exception Handling in ML. Functional Programming with Lists- Scheme, a Dialect of Lisp- The Structure of Lists- List Manipulation- A Motivating Example: Differentiation- Simplification of Expressions- Storage Allocation for Lists.

UNIT IV   LOGIC PROGRAMMING   9

Relational Logic Programming- Syntax- Basics- Facts- Rules- Syntax- Operational Semantics-Relational logic programs and SQL operations- Logic Programming- Syntax- Operational semantics-

Data Structures-Meta-tools: Backtracking optimization (cuts); Unify; Meta-circular interpreters- The Origins of Prolog- Elements- of Prolog-Deficiencies of Prolog- Applications of Logic Programming.

UNIT V **CONCURRENT PROGRAMMING** **9**

Parallelism in Hardware- Streams: Implicit Synchronization-Concurrency as Interleaving- Liveness Properties- Safe Access to Shared Data- Concurrency in Ada- Synchronized Access to Shared Variables- Synthesized Attributes- Attribute Grammars- Natural Semantics- Denotational Semantics -A Calculator in Scheme-Lexically Scoped Lambda Expressions- An Interpreter-Recursive Functions.

TOTAL **45** **Hrs**

References

1 Ghezzi, "Programming Languages", 3rd Edition, John Wiley, 2008

2 John C. Mitchell, "Concepts in Programming Languages", Cambridge University Press, 2004.

3 Louden, "Programming Languages", 3rd Edition, 2012.

4 Ravi Sethi, "Programming Languages: Concepts and Constructs", 2nd Edition, Addison Wesley, 1996.

5 Robert .W. Sebesta, "Concepts of Programming Languages", 10th Edition, Pearson Education, 2002.