ANNA UNIVERSITY
AFFILIATED INSTITUTIONS
REGULATIONS – 2017
CURRICULUM AND SYLLABUS I TO VI SEMESTERS (FULL TIME)
MASTER OF COMPUTER APPLICATIONS
CHOICE BASED CREDIT SYSTEM

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs) :

I. To prepare students to excel in the computing profession by providing solid technical foundations in the field of computer applications.
II. To provide students various computing skills like the analysis, design and development of innovative software products to meet the industry needs.
III. To motivate students to pursue lifelong learning and to do research as computing professionals and scientists.
IV. To motivate students to communicate and function effectively in teams in multidisciplinary fields within the global, societal and environmental context.

PROGRAM OUTCOMES (POS):

On successful completion of the program:

1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work**: Function effectively as an individual, and as a member or leader in

diverse teams, and in multidisciplinary settings.

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

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

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

PROGRAM SPECIFIC OBJECTIVES (PSOs):

1. Enable the students to select the suitable data model, appropriate architecture and platform to implement a system with good performance.
2. Enable the students to design and integrate various system based components to provide user interactive solutions for various challenges.

MAPPING OF PROGRAMME EDUCATIONAL OBJECTIVES WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OBJECTIVES:

Programme Educational Objectives	**Programme Outcomes**												**PSO**	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**
1	3	2	2	1	1								3	3
2		2	3	2	1						2		3	2
3		2		3	2	1			2	2	2	3	1	1
4						3	3	2	2	3	1		2	2

			PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
YEAR 1	SEM 1	Mathematical Foundations of Computer Science	3	2									1	
		Computer Organization`	3	2		1								
		Problem Solving and Programming	3	3	2	2				1				
		Database Management Systems	3	2	2	2		1	1				1	
		Data Structures	3	2										
		Data Structures Laboratory		3	2	1								
		Database Management Systems Laboratory		3	2	1		1					1	
		Communication Skills Laboratory						2	2	1	2	3		2
	SEM 2	Object Oriented Programming	3	3	2	1								
		Embedded Systems		2	2	1	2	1			1		1	1
		Software Engineering	3	3	2	2	2	1	1	1	2	2	2	
		Operating Systems	3	2	2			1						
		Computer Graphics and Multimedia	3	2	1		2						1	2
		Object Oriented Programming Laboratory		3	2	2	2				1		2	
		Graphics and Multimedia Laboratory	3	2	2		2						1	1
		Operating Systems and Embedded Systems Laboratory		3	2	1	2	2			2		2	1

YEAR 2	**SEM 3**	Advanced Data Structures and Algorithms	3	2	2	1							2	
		Computer Networks	3	2	2	2		1					2	
		Web Programming Essentials	3	2	2	2	2			1	2		2	
		Programming with Java	3	2	2	2	2				2		2	1
		Object Oriented Analysis and Design		3	2	2	3						2	
		Data Structures and Algorithms Laboratory		3	2	2	2						2	
		Web Programming Laboratory		3	2	2	2			1	2		2	
		Programming with Java Laboratory		3	2	2	2				2		2	
	SEM 4	Resource Management Techniques	3	2	2		2							
		Mobile Computing		3	2		3	1		1	1		2	2
		Advanced Databases and Data mining Techniques		3	2	2	3	1			2		2	1
		Web Application Development	3	3	2	2	2				2		2	2
		Professional Elective - I												
		Mobile Application Development Laboratory		3	2	2	2	2		1	2		2	2
		Web Application Development Laboratory		3	2	2	2				2		2	2
		Technical Seminar and Report Writing							2	1	2	2	3	2

YEAR 3	**SEM V**	Cloud Computing		3	2		2				2		2	1
		Big Data Analytics		3	2	2	2	1			2		2	1
		Software Testing and Quality Assurance	3	2	2	2	2			1	2			
		Professional Elective II												
		Professional Elective III												
		Cloud and Big Data laboratory		3	2	2	2	1			2		2	1
		Software Testing Laboratory		3	2	2	2	1		1	2			
		Mini Project					3		2	1	2	2	2	2
	SEM VI	Project Work	3	3	2	2	3	2	1	1	2	2	2	2

ANNA UNIVERSITY, CHENNAI
AFFILIATED INSTITUTIONS
MASTER OF COMPUTER APPLICATIONS
REGULATIONS – 2017
CHOICE BASED CREDIT SYSTEM
CURRICULA AND SYLLABI

SEMESTER I

SL. NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	MA5161	Mathematical Foundations for Computer Applications	FC	4	4	0	0	4
2.	MC5101	Computer Organization	PC	3	3	0	0	3
3.	MC5102	Problem Solving and Programming	PC	3	3	0	0	3
4.	MC5103	Database Management Systems	PC	3	3	0	0	3
5.	MC5104	Data Structures	PC	3	3	0	0	3
PRACTICALS								
6.	MC5111	Data Structures Laboratory	PC	4	0	0	4	2
7.	MC5112	Database Management Systems Laboratory	PC	4	0	0	4	2
8.	MC5113	Communication Skills Laboratory	EEC	3	1	0	2	2
			TOTAL	**27**	**17**	**0**	**10**	**22**

SEMESTER II

SL. NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	MC5201	Object Oriented Programming	PC	3	3	0	0	3
2.	MC5202	Embedded Systems	PC	3	3	0	0	3
3.	MC5203	Software Engineering	PC	3	3	0	0	3
4.	MC5204	Operating Systems	PC	3	3	0	0	3
5.	MC5205	Computer Graphics and Multimedia	PC	3	3	0	0	3
PRACTICALS								
6.	MC5211	Object Oriented Programming Laboratory	PC	4	0	0	4	2
7.	MC5212	Graphics and Multimedia Laboratory	PC	4	0	0	4	2
8.	MC5213	Operating Systems and Embedded Systems Laboratory	PC	4	0	0	4	2
			TOTAL	**27**	**15**	**0**	**12**	**21**

SEMESTER III

SL. NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	MC5301	Advanced Data Structures and Algorithms	PC	3	3	0	0	3
2.	MC5302	Computer Networks	PC	3	3	0	0	3
3.	MC5303	Web Programming Essentials	PC	3	3	0	0	3
4.	MC5304	Programming with Java	PC	3	3	0	0	3
5.	MC5305	Object Oriented Analysis and Design	PC	5	3	2	0	4
PRACTICALS								
6.	MC5311	Data Structures and Algorithms Laboratory	PC	4	0	0	4	2
7.	MC5312	Web Programming Laboratory	PC	4	0	0	4	2
8.	MC5313	Programming with Java Laboratory	PC	4	0	0	4	2
			TOTAL	**29**	**15**	**2**	**12**	**22**

SEMESTER IV

SL. NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	MC5401	Resource Management Techniques	PC	3	3	0	0	3
2.	MC5402	Mobile Computing	PC	3	3	0	0	3
3.	MC5403	Advanced Databases and Datamining	PC	3	3	0	0	3
4.	MC5404	Web Application Development	PC	5	3	2	0	4
5.		Professional Elective - I	PE	3	3	0	0	3
PRACTICALS								
6.	MC5411	Mobile Application Development Laboratory	PC	4	0	0	4	2
7.	MC5412	Web Application Development Laboratory	PC	4	0	0	4	2
8.	MC5413	Technical Seminar and Report Writing	PC	2	0	0	2	1
			TOTAL	**27**	**15**	**2**	**10**	**21**

SEMESTER V

SL. NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	MC5501	Cloud Computing	PC	3	3	0	0	3
2.	MC5502	Big Data Analytics	PC	3	3	0	0	3
3.	MC5503	Software Testing and Quality Assurance	PC	3	3	0	0	3
4.		Professional Elective II	PE	3	3	0	0	3
5.		Professional Elective III	PE	3	3	0	0	3
PRACTICALS								
6.	MC5511	Cloud and Big Data Laboratory	PC	4	0	0	4	2
7.	MC5512	Software Testing Laboratory	PC	4	0	0	4	2
8.	MC5513	Mini Project	EEC	4	0	0	4	2
			TOTAL	**27**	**15**	**0**	**12**	**21**

SEMESTER VI

SL. NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
PRACTICALS								
1.	MC5611	Project Work	EEC	24	0	0	24	12
			TOTAL	**24**	**0**	**0**	**24**	**12**

TOTAL NO. OF CREDITS:119

FOUNDATION COURSES (FC)

SL. NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	MA5161	Mathematical Foundations for Computer Applications	FC	4	4	0	0	4

PROFESSIONAL CORE (PC)

SL. NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	MC5101	Computer Organization	PC	3	3	0	0	3
2.	MC5102	Problem Solving and Programming	PC	3	3	0	0	3
3.	MC5103	Database Management Systems	PC	3	3	0	0	3
4.	MC5104	Data Structures	PC	3	3	0	0	3
5.	MC5111	Data Structures Laboratory	PC	4	0	0	4	2
6.	MC5112	Database Management Systems Laboratory	PC	4	0	0	4	2
7.	MC5201	Object Oriented Programming	PC	3	3	0	0	3
8.	MC5202	Embedded Systems	PC	3	3	0	0	3
9.	MC5203	Software Engineering	PC	3	3	0	0	3
10.	MC5204	Operating Systems	PC	3	3	0	0	3
11.	MC5205	Computer Graphics and Multimedia	PC	3	3	0	0	3
12.	MC5211	Object Oriented Programming Laboratory	PC	4	0	0	4	2
13.	MC5212	Graphics and Multimedia Laboratory	PC	4	0	0	4	2
14.	MC5213	Operating Systems and Embedded Systems Laboratory	PC	4	0	0	4	2
15.	MC5301	Advanced Data Structures and Algorithms	PC	3	3	0	0	3
16.	MC5302	Computer Networks	PC	3	3	0	0	3
17.	MC5303	Web Programming Essentials	PC	3	3	0	0	3
18.	MC5304	Programming with Java	PC	3	3	0	0	3
19.	MC5305	Object Oriented Analysis and Design	PC	5	3	2	0	4
20.	MC5311	Data Structures and Algorithms Laboratory	PC	4	0	0	4	2
21.	MC5312	Web Programming Laboratory	PC	4	0	0	4	2

22.	MC5313	Programming with Java Laboratory	PC	4	0	0	4	2
23.	MC5401	Resource Management Techniques	PC	3	3	0	0	3
24.	MC5402	Mobile Computing	PC	3	3	0	0	3
25.	MC5403	Advanced Databases and Datamining	PC	3	3	0	0	3
26.	MC5404	Web Application Development	PC	5	3	2	0	4
27.	MC5411	Mobile Application Development Laboratory	PC	4	0	0	4	2
28.	MC5412	Web Application Development Laboratory	PC	4	0	0	4	2
29.	MC5501	Cloud Computing	PC	3	3	0	0	3
30.	MC5502	Big Data Analytics	PC	3	3	0	0	3
31.	MC5503	Software Testing and Quality Assurance	PC	3	3	0	0	3
32.	MC5511	Cloud and Big Data Laboratory	PC	4	0	0	4	2
33.	MC5512	Software Testing Laboratory	PC	4	0	0	4	2

EMPLOYABILITY ENHANCEMENT COURSE (EEC)

SL. NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	MC5413	Technical Seminar and Report Writing	EEC	2	0	0	2	1
2.	MC5113	Communication Skills Laboratory	EEC	3	1	0	2	2
3.	MC5513	Mini Project	EEC	4	0	0	4	2
4.	MC5611	Project Work	EEC	24	0	0	24	12

PROFESSIONAL ELECTIVES (PE)*

SEMESTER IV

ELECTIVE I

SL. NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	MC5001	Soft Computing	PE	3	3	0	0	3
2.	MC5002	Accounting and Financial Management	PE	3	3	0	0	3
3.	MC5003	Software Project Management	PE	3	3	0	0	3
4.	MC5004	Security in computing	PE	3	3	0	0	3
5.	MC5005	Adhoc and Sensor Network	PE	3	3	0	0	3

SEMESTER V

ELECTIVE II

SL. NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	MC5006	Professional Ethics	PE	3	3	0	0	3
2.	MC5007	Health Care Management	PE	3	3	0	0	3
3.	MC5008	Geological Information Systems	PE	3	3	0	0	3
4.	MC5009	Human Resource Management	PE	3	3	0	0	3
5.	MC5010	Internet of Things	PE	3	3	0	0	3

SEMESTER V

ELECTIVE III

SL. NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	MC5011	Semantic Web	PE	3	3	0	0	3
2.	MC5012	Service Oriented Architecture	PE	3	3	0	0	3
3.	MC5013	Game Programming	PE	3	3	0	0	3
4.	MC5014	Computational Intelligence	PE	3	3	0	0	3
5.	MC5015	Principles of Programming Languages	PE	3	3	0	0	3

MA5161 MATHEMATICAL FOUNDATIONS FOR COMPUTER APPLICATIONS

L	T	P	C
4	0	0	4

OBJECTIVES:

The primary objective of this course is to provide mathematical background and sufficient experience on various topics of discrete mathematics like matrix algebra, logic and proofs, combinatorics, graphs, algebraic structures, formal languages and finite state automata. This course will extend student's Logical and Mathematical maturity and ability to deal with abstraction and to introduce most of the basic terminologies used in computer science courses and application of ideas to solve practical problems.

UNIT I MATRIX ALGEBRA 12

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

UNIT II BASIC SET THEORY 12

Basic definitions - Venn diagrams and set operations - Laws of set theory - Principle of inclusion and exclusion – Partitions - Permutation and combination – Relations - Properties of relations - Matrices of relations - Closure operations on relations - Functions - Injective, subjective and objective 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 grammars -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 PERIODS

OUTCOMES :

After completing this course, students should demonstrate competency in the following skills:

- Basic knowledge of matrix, set theory, functions and relations concepts needed for designing and solving problems.
- Logical operations and predicate calculus needed for computing skill
- Design and solve Boolean functions for defined problems.
- Apply the acquired knowledge of formal languages to the engineering areas like Compiler Design
- Apply the acquired knowledge of finite automata theory and to design discrete problems to solve by computers.

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. Hopcroft J.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 Mathematics”, 2nd Edition, Volume-II, National Publishing Company, 1989.

MC5101 COMPUTER ORGANISATION L T P C
3 0 0 3

OBJECTIVES:

- To understand the various number systems
- To become familiar with Boolean algebra
- To study the different types of combinational and sequential circuits
- To comprehend the basis operations that happen in a CPU
- To learn the data path and control path implementation
- To become familiar with the memory hierarchy design and I/O design

UNIT I DIGITAL FUNDAMENTALS 8

Number Systems and Conversions – Boolean Algebra an Simplifications – Minimization of Boolean Functions – Karnaugh Map, Quine McClusky Method. Logic Gates – NAND NOR implementation.

UNIT II COMBINATIONAL AND SEQUENTIAL CIRCUITS 10

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

UNIT III BASIC STRUCTURE OF COMPUTER 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 – ALU Design – Fixed point and Floating point operations

UNIT IV PROCESSOR DESIGN 9

Processor basics –CPU Organization – Data Path Design – Control Design – Basic concepts – Hardwired control – Micro Programmed control – Pipe control – Hazards super scale operations

UNIT V MEMORY AND 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 PERIODS

OUTCOMES:

At the end of this course, the students will be able to:

- Perform conversions and arithmetic operations in various number systems
- Simplify using laws of Boolean algebra and Karnaugh map method
- Design various combinational and sequential circuits
- Differentiate between various addressing modes
- Trace the flow of execution of an instruction in a processor
- Differentiate between the various mapping policies used in cache memories
- Discuss the implementation of virtual memory
- Discuss the various types of I/O transfers

REFERENCES:

1. Carl Hamacher, Zvonko Vranesic, Safwat Zaky and Naraig Manjikian, “Computer Organization and Embedded Systems”, Sixth Edition, Tata McGraw Hill, 2012.
2. Carl Hamacher, Zvonko vranesic and Safwat Zaky, fifth edition, “Computer Organisation” Tata Mc Graw Hill, 2002.
3. Charles H. Roth, Jr., “Fundamentals of Logic Design”, Jaico Publishing House, Mumbai, Fourth Edition 1992.
4. 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
5. John P. Hayes, “Computer Architecture and Organization”, Third Edition, Tata McGraw Hill, 1998
6. William Stallings,“Computer Organization & Architecture – Designing for Performance” 6th Edition Pearson Education, 2003.

MC5102	PROBLEM SOLVING AND PROGRAMMING	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To understand the basic concepts of problem solving approaches and to develop the algorithms.
- Apply the techniques of structured (functional) decomposition to break a program into smaller pieces and describe the mechanics of parameter passing.
- To design, implements, test, and apply the basic C programming concepts.

UNIT I INTRODUCTION TO COMPUTER PROBLEM SOLVING 8

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 PROGRAMMING ANDALGORITHMS 9

Programs and Programming – building blocks for simple programs -pseudo code representation – flow charts - Programming Languages - compiler –Interpreter, Loader and Linker - Program execution – Classification of Programming Language - Structured Programming Concept.

UNIT III BASICS OF 'C', INPUT / OUTPUT & CONTROL STATEMENTS 9

Introduction- Identifier – Keywords - Variables – Constants – I/O Statements - Operators - Initialization –Expressions – Expression Evaluation – Lvalues and Rvalues – Type Conversion in C –Formatted input and output functions - Specifying Test Condition for Selection and Iteration- Conditional Execution - and Selection – Iteration and Repetitive Execution- go to Statement – Nested Loops- Continue and break statements.

UNIT IV ARRAYS, STRINGS, FUNCTIONS AND POINTERS 10

Array – One dimensional Character Arrays- Multidimensional Arrays- Arrays of Strings – Two dimensional character array – functions - parameter passing mechanism scope – storage classes – recursion - comparing iteration and recursion- pointers – pointer operators - uses of pointers- arrays and pointers – pointers and strings - pointer indirection- pointers to functions - Dynamic memory allocation.

UNIT V USER-DEFINED DATATYPES & FILES 9

Structures – initialization - nested structures – structures and arrays – structures and pointers - union– type def and enumeration types - bit fields - File Management in C – Files and Streams – File handling functions – Sequential access file- Random access file – Command line arguments.

TOTAL: 45 PERIODS

OUTCOMES:

- Able to design a computational solution for a given problem.
- Able to break a problem into logical modules that can be solved (programmed).
- Able to transform a problem solution into programs involving programming constructs.
- To write programs using structures, strings, arrays, pointer and files for solving complex computational problem.
- Able to introduce modularity using functions and pointers which permit ad hoc run-time polymorphism.

REFERENCES:

1. Byron S Gottfried, —Programming with C‖, Schaums Outlines, Second Edition, Tata McGraw-Hill, 2006.
2. BrianW. Kernighan and Dennis M. Ritchie, "The C programming Language",2006, Prentice-Hall.
3. Cormen, Leiserson, Rivest, Stein, " Introduction to Algorithms", McGraw Hill, Publishers, 2002.
4. Deitel and Deitel, "C How to Program", Pearson Education. 2013,7th Edition.
5. How to Solve it by Computer, R.G.Dromey, Pearson education , Fifth Edition, 2007.
6. Kamthane, A.N., "Programming with ANSI and Turbo C", Pearson Education, Delhi, 2006.
7. Mastering C- by K R Venugopal , Sudeep R Prasad McGraw Hill Education (India) Private Limited; Second edition 2015.
8. PradipDey, Manas Ghosh, —Computer Fundamentals and Programming in C, Second Edition, Oxford University Press, 2013.
9. Peter Norton, "Introduction to Computers", Sixth Edition, Tata McGraw Hill Publications, 2007.
10. ReemaThareja, "Programming in C", Oxford University Press, 2011.
11. Yashavant Kanetkar, "Understanding Pointers In C", 4th Revised & Updated Edition, 2011, BPB Publications.

MC5103 **DATABASE MANAGEMENT SYSTEMS**

L	T	P	C
3	0	0	3

OBJECTIVES:

- To understand the fundamentals of data models and conceptualize and depict a database system using ER diagram.
- To make a study of SQL and relational database design.
- To know about data storage techniques an query processing.
- To impart knowledge in transaction processing, concurrency control techniques and recovery procedures.

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 Languages – 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 PERIODS

OUTCOMES:

- Understand the basic concepts of the database and data models.
- design a database using ER diagrams and map ER into Relations and normalize the
- relations
- Acquire the knowledge of query evaluation to monitor the performance of the DBMS.
- Develop a simple database applications using normalization.
- Acquire the knowledge about different special purpose databases and to critique how
- They differ from traditional database systems.

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. Peter Rob, Carlos Coronel, “Database System Concepts”, Cengage Learning, 2008.
7. Ramez Elamassri and Shankant B-Navathe, “Fundamentals of Database Systems”, Sixth Edition, Pearson Education Delhi, 2010.
8. Raghu Ramakrishnan, —Database Management Systems‖, Fourth Edition, McGraw-Hill College Publications, 2015.

	L	T	P	C
MC5104	**3**	**0**	**0**	**3**

DATA STRUCTURES

OBJECTIVES:

- Be familiar with basic techniques of algorithm analysis.
- Be exposed to the concept of ADTs.
- Learn linear data structures-List, Stack and Queue.
- Learn nonlinear data structures-Tree and Graphs.
- Be exposed to sorting, searching and hashing algorithms

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 - Queue ADT – Operations on Queue - Circular Queue - Applications of Queue.

UNIT IV NON LINEAR DATA STRUCTURES - 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 PERIODS

OUTCOMES:

- Able to analyze algorithms and determines their time complexity.
- Able to understand the concepts of data types, data structures and linear structures.
- Able to apply data structures to solve various problems
- Able to understand non-linear data structures. Able to apply different Sorting, Searching and Hashing algorithms.

REFERENCES:

1. A.K. Sharma, “Data Structures using C”, Pearson Education Asia, 2013.
2. Anany Levitin “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. Reema Thareja, “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.

MC5111 **DATA STRUCTURES LABORATORY**

L	T	P	C
0	0	4	2

OBJECTIVES:

- To develop skills in design and implementation of data structures and their applications
- To learn and implement linear, non linear and tree data structures
- To study, implement and analyze the sorting technique.

LIST OF EXPERIMENTS

1. Array- Insertion and Deletion
2. Application using array of structures
3. Array Implementation of Stack
4. Array Implementation of Queue
5. Infix to postfix conversion
6. Singly Linked List operations
7. Polynomial manipulation- addition, subtraction
8. Binary Tree Traversal
9. Quick Sort
10. Binary Search

TOTAL: 60 PERIODS

OUTCOMES:

Upon Completion of the course, the students will be able to:

- Work with basic data structures that are suitable for the problems to be solved efficiently.
- Design and implement linear, and tree and its applications.
- Design sorting technique, its algorithm design and analysis.

MC5112	DATABASE MANAGEMENT SYSTEMS LABORATORY	L	T	P	C
		0	0	4	2

OBJECTIVES:

- To understand the concepts of DBMS.
- To familiarize with SQL queries.
- To write stored procedures in DBMS.
- To learn front end tools to integrate with databases.

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/SQLOr Transact SQL – Packages
5. Use of Cursors, Procedures and Functions
6. Embedded SQL or Database Connectivity
7. Oracle or SQL Server Triggers – Block Level – Form Level Triggers
8. Working with Forms, Menus and ReportWriters for a application project in any domain
9. Front-end tools – Visual Basic/Developer 2000

TOTAL: 60 PERIODS

OUTCOMES:

Upon Completion of the course, the students will be able to:

- Design and Implement databases
- Formulate complex queries using SQL
- Design and Implement applications that have GUI and access databases for backend connectivity

MC5113	COMMUNICATION SKILL LABORATORY	L	T	P	C
		1	0	2	2

OBJECTIVES:

- To provide opportunities to learners to practice their communicative skills to make them become proficient users of English.
- To enable learners to fine-tune their linguistic skills (LSRW) with the help of technology to communicate globally.
- To enhance the performance of learners at placement interviews and group discussions and other recruitment procedures.

LIST OF EXPERIMENTS:

1. **PC based session (Weightage 40%)**

   A. English Language Lab **(15)**

   1. **Listening Comprehension:**(5) Listening and typing – Listening and sequencing of sentences – Filling in the blanks - Listening and answering questions.
   2. **Reading Comprehension:**(5) Filling in the blanks - Close exercises – Vocabulary building - Reading and answering questions.

3. **Speaking:**(5) Phonetics: Intonation – Ear training - Correct Pronunciation – Sound recognition exercises – Common Errors in English. Conversations: Face to Face Conversation – Telephone conversation– Role play activities

2. **B. Discussion of audio-visual materials (Samples to learn and practice) (6)**

1. Resume / Report Preparation / Letter Writing (1)

Structuring the resume / report - Letter writing / Email Communication - Samples.

2. Presentation skills: (1)

Elements of effective presentation – Structure of presentation - Presentation tools – Voice Modulation – Audience analysis - Body language – Video samples

3. Soft Skills: (2)

Time management – Articulateness – Assertiveness – Psychometrics – Innovation and Creativity - Stress Management & Poise - Video Samples

4. Group Discussion: (1)

Why is GD part of selection process? - Structure of GD – Moderator – led and other GDs Strategies in GD – Team work - Body Language - Mock GD –Video samples

5. Interview Skills: (1)

Kinds of interviews – Required Key Skills – Corporate culture – Mock interviews- Video samples.

3. **II. Practice Session (Weightage – 60%)**

Resume / Report Preparation / Letter writing: **(2)**

4. **SOFT SKILLS (6)**

Hard skills & soft skills – soft skills: self-management skills & people skills - training in soft skills persuasive skills – sociability skills –interpersonal skills – team building skills – leadership skills – problem solving skills – adaptability - stress management – motivation techniques – life skills

5. **PRESENTATION SKILLS (6)**

Preparing slides with animation related to the topic – organizing the material - Introducing oneself to the audience – introducing the topic – answering questions – individual presentation practice–– presenting the visuals effectively – 5 minute presentation

6. **GROUP DISCUSSION SKILLS (5)**

Participating in group discussions – understanding group dynamics - brainstorming the topic -– questioning and clarifying –GD strategies (expressing opinions, accepting or refusing others opinions, turn taking) – activities to improve GD skills – viewing recorded GD - mock GD.

7. **INTERVIEW SKILLS (5)**

Interview etiquette – dress code – body language – mock interview -–attending job interviews – answering questions confidently – technical interview – telephone/Skype interview - practice in different types of questions – one to one interview &panel interview – FAQs related to job interview- Emotional and cultural intelligence

TOTAL: 45 PERIODS

OUTCOMES:

Upon Completion of the course, the students will be able to:

- Students will be able to make presentations and participate in group discussions with high level of self-confidence.
- Students will be able to perform well in the interviews
- They will have adequate reading and writing skills needed for workplace situations

MC5201	OBJECT ORIENTED PROGRAMMING	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To learn how C++ supports Object Oriented principles such as abstraction, polymorphism etc
- To understand and apply the principles hiding, localization and modularity in software development.
- Use the generic programming features of C++ including the STL.
- Design and implement reliable and maintainable object-oriented applications of moderate complexity composed of several classes.

UNIT I FUNDAMENTALS OF OBJECT ORIENTED PROGRAMMING 9

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 andInheritance – Run–Time Type Identifications – Exceptions – Handlers – Standard Exceptions.

TOTAL : 45 PERIODS

OUTCOMES:

- Able to understand and design the solution to a problem using object-oriented programming concepts.
- Able to use proper class protection mechanism to provide security.
- Able to demonstrate the use of virtual functions to implement polymorphism.
- Understand and implement the features of C++ including templates, exceptions and file handling for providing programmed solutions to complex problems
- Able to reuse the code with extensible Class types, User-defined operators and function Overloading.

REFERENCES:

1. Bhushan Trivedi, "Programming with ANSI C++", Oxford Press, Second Edition, 2012.
2. Bhave , " Object Oriented Programming With C++", Pearson Education , 2004
3. E Balagurusamy, "Object oriented Programming with C++", 3 Edition, 2006, Tata McGraw Hill
4. HM Deitel and PJ Deitel "C++ How to Program", Seventh Edition, 2010, Prentice Hall
5. Ira Pohl, "Object–Oriented Programming Using C++", Pearson Education, 2 Edition, 2003
6. Kamthane," Object Oriented Programming with ANSI and Turbo C++", Pearson Education, 2003
7. Ray Lischner, "Exploring C++ : The programmer's introduction to C++" , apress, 2010
8. Stanley B.Lippman, JoseeLajoie, "C++ Primer", Pearson Education, Third Edition, 2005
9. S.B Lippman, Josee, JoseeLajoie, Barbara, " C++ Premier" 4 Edition, Pearson , 2012

MC5202 EMBEDDED SYSTEMS L T P C
3 0 0 3

OBJECTIVES:

- To understand the architecture of embedded processors, microcontrollers, and peripheral devices.
- To appreciate the nuances of programming micro-controllers in assembly for embedded systems.
- To understand the challenges in developing operating systems for embedded systems.
- To learn about programming these systems in high-level languages such as C.

UNIT I EMBEDDED COMPUTING 9

Challenges of Embedded Systems – Embedded system design process. Embedded processors – 8051 Microcontroller, ARM processor – Architecture, Instruction sets and programming.

UNIT II MEMORY AND INPUT / OUTPUT MANAGEMENT 9

Programming Input and Output – Memory system mechanisms – Memory and I/O devices and interfacing – Interrupt handling.

UNIT III PROCESSES AND OPERATING SYSTEMS 9

Multiple tasks and processes – Context switching – Scheduling policies – Interprocess communication mechanisms – Performance issues.

UNIT IV EMBEDDED C PROGRAMMING 9

Programming embedded systems in C – C-looping structures – Register allocation – Function calls – Pointer aliasing – structure arrangement – bit fields – unaligned data and endianness – inline functions and inline assembly – portability issues.

UNIT V EMBEDDED SYSTEM DEVELOPMENT 9

Meeting real time constraints – Multi-state systems and function sequences. Embedded software development tools – Emulators and debuggers. Introduction to Internet of Things - Design issues – Design methodologies – Case studies using IoT– Complete design of example systems.

TOTAL: 45 PERIODS

REFERENCES:

1. Andrew N Sloss, D. Symes, C. Wright, "ARM System Developers Guide", Morgan Kauffman/ Elsevier,2006. (unit 4)
2. Arshdeep Bahga, Vijay Madisetti, "Internet of Things – A hands-on approach", Universities Press, 2015
3. Muhammed Ali Mazidi, Janice Gillispie Mazidi and Rolin D. Mc Kinlay, "The 8051
4. Microcontroller and Embedded Systems", Pearson Education, Second edition, 2007 (unit 1)
5. Michael J. Pont, "Embedded C", Pearson Education , 2007.
6. Steve Heath, "Embedded System Design", Elsevier, 2005.
7. Wayne Wolf, "Computers as Components:Principles of Embedded Computer System Design", Elsevier, 2006.

MC5203 SOFTWARE ENGINEERING

L	T	P	C
3	0	0	3

OBJECTIVES:

- To provide an insight into software life cycle and various software process models
- To estimate the resources for developing the application and to prepare the schedule
- To know the various designing concepts and notations for modeling the software.
- To prepare the test cases for the project, apply various testing techniques, strategies and metrics to evaluate the software.
- To construct software with high quality and reliability.

UNIT I INTRODUCTION 9

Software Engineering Paradigms – Waterfall Life Cycle Model – Spiral Model – Prototype Model – Agile Process Model – Unified Process Model - Planning – Software Project Scheduling – SRS - Case Study: Project Plan and SRS

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 - Testing Tools – 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 - 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 PERIODS

OUTCOMES:

- Able to understand the problem domain to choose process models and to develop SRS
- Able to model software projects using appropriate design notations
- Able to measure the product and process performance using various metrics
- Able to evaluate the system with various testing techniques and strategies
- Able to analyze, design, verify, validate, implement, and maintain software systems.

REFERENCES:

1. Ali Behforroz, Frederick J.Hudson, “Software Engineering Fundamentals”, Oxford Indian Reprint,2012.
2. Jibitesh Mishra, Ashok Mohanty, “Software Engineering”, Pearson Education, First Edition, 2011.
3. Kassem A. Saleh, “Software Engineering”, First Edition, J.Ross Publishing, 2009.
4. Pankaj Jalote, “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, McGrawHill, 2008.
6. Richard Fairley, “Software Engineering Concepts”, Tata McGraw Hill Edition, 2008
7. Roger S. Pressman, “Software Engineering: A Practitioner Approach”, Seventh Edition, Tata McGraw – Hill International Edition, 2009.
8. Sommerville, “Software Engineering”, Tenth Edition, Pearson, 2015.

MC5204 OPERATING SYSTEMS

L	T	P	C
3	0	0	3

OBJECTIVES:

- To be aware of the evolution and fundamental principles of operating system, processes and their communication
- To understand the various operating system components like process management, memory management and
- To know about file management and the distributed file system concepts in operating systems
- To be aware of components of operating system with relevant case study.

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- Stateful Versus Stateless Service-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.

TOTAL : 45 PERIODS

OUTCOMES:

- Able to understand the operating system components and its services
- Implement the algorithms in process management and solving the issues of IPC
- Able to demonstrate the mapping between the physical memory and virtual memory
- Able to understand file handling concepts in OS perspective
- Able to understand the operating system components and services with the recent OS

REFERENCES:

1. Abraham Silberschalz Peter B Galvin, G.Gagne, “Operating Systems Concepts”, 9th Edition, John Wiley & Sons, 2013.
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. H M Deital, P J Deital and D R Choffnes, “Operating Systems”, 3rd edition, Pearson Education, 2011
5. William Stallings, “Operating Systems: Internals and Design Principles”, Seventh Edition, Prentice Hall, 2011

MC5205 **COMPUTER GRAPHICS AND MULTIMEDIA**

L	T	P	C
3	0	0	3

OBJECTIVES:

- To provide knowledge and understanding in the fundamental principles of Computer Graphics and Mathematical concepts related to Computer graphical operations.
- To provide in-depth knowledge of display systems, image synthesis and shape modelling of 3D applications.
- To understand the basic concepts related to Multimedia including data standards, algorithms and software.
- To Experience the development of Multimedia application to display their ability by using Multimedia tools.

UNIT I BASIC CONCEPTS 9

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

UNIT II 3D GRAPHICS 9

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

UNIT III MULTIMEDIA BASICS 9

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 IV MULTIMEDIA COMMUNICATION 9

Multimedia Network Services–Network Protocols–Requirements for Multimedia Communications – Multimedia Conferencing Architectures –QuickTime Movie File Format– MHEG–Multimedia File Sharing –Multimedia & Internet–Real-Time Interchange.

UNIT V MULTIMEDIA APPLICATION DEVELOPMENT 9

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 PERIODS

OUTCOMES:

- Gain proficiency in various algorithms of 2D Computer graphics and trend their use in various real-life systems.
- Enhance the perspective of Modern computer system with modelling, analysis and interpretation of 3D visual information.
- Able to understand different forms of Multimedia and gain knowledge about Audio and Video.
- Able to understand the Networks used for Multimedia and to communicate with Multimedia Applications.
- Able to design and implement a number of Multimedia Applications and to do Research in Multimedia Industry.

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. John F. KoegelBuford , “Multimedia Systems”, Pearson Education, Delhi, 6th Edition, 2009
4. Mohammad Dastbaz, Designing Interactive Multimedia Systems, McGraw-Hill Publishers, 2002
5. Parag Havaldar and Gerard Medioni, “Multimedia Systems-Algorithms, Standards and Industry Practices”,Cengage Learning, 2009
6. Ralf Steinmetz and Klara “Multimedia Computing, Communications and Applications”, Pearson Education,2009
7. Tom McReynolds – David Blythe,“ Advanced Graphics Programming Using OpenGL”, Elsevier, 2005
8. Ze-Nian Li, Mark S Drew and Jiangchuan Liu, “Fundamentals of Multimedia”, Second Edition, Springer, 2014

MC5211 **OBJECT ORIENTED PROGRAMMING LABORATORY**

L	T	P	C
0	0	4	2

OBJECTIVES:

- To develop skills in object oriented programming
- To learn generic data structures using templates
- To learn virtual functions and file handling in C++

LIST OF EXPERIMENTS

1. Write a C++ Program to illustrate Enumeration and Function Overloading
2. Write a C++ Program to illustrate Scope and Storage class
3. Implementation of ADT such as Stack and Queues
4. Write a C++ Program to illustrate the use of Constructors and Destructors and Constructor Overloading
5. Write a Program to illustrate Static member and methods
6. Write a Program to illustrate Bit fields
7. Write a Program to overload as binary operator, friend and member function
8. Write a Program to overload unary operator in Postfix and Prefix form as member and friend function
9. Write a Program to illustrate Iterators and Containers
10. Write a C++ Program to illustrate function templates
11. Write a C++ Program to illustrate template class
12. Write C++ Programs and incorporating various forms of Inheritance
13. Write a C++ Program to illustrate Virtual functions
14. Exception Handling
15. File Handling – Read, Write, Update

TOTAL: 60 PERIODS

OUTCOMES:

Upon Completion of the course, the students will be able to:

- Develop programs in object oriented paradigm
- Implement data structure using C++
- Suggest appropriate data structure for any given data set
- Modify or suggest new data structure for an application.
- File handling in object oriented environment.

MC5212	GRAPHICS AND MULTIMEDIA LABORATORY	L	T	P	C
		0	0	4	2

OBJECTIVES:

- To study the graphics techniques and algorithms
- To understand the concept of geometric, mathematical and algorithmic concepts necessary for programming computer graphics
- To enable the students to develop their creativity using Multimedia concepts and various I/O technologies
- To apply Multimedia data processing and analysis techniques to real world applications

LIST OF EXPERIMENTS

1. Creation of 2Dimensional objects using Graphics functions
2. 2Dimensional Transformations
3. 2Dimensional Composite Transformations
4. Clipping and Windowing of a 2Dimensional Object
5. 3Dimensional Simple Transformations
6. 3Dimensional Composite Transformations
7. Parallel and Perspective Projections
8. Visible Surface Detection of a 3Dimensional Object
9. a) Color to Gray scale conversion of an image
   b) Image optimization
   c) Image manipulation using Filters
   d) Creation of GIF animated images
10. a) Image Compression
    b) Guide layer effects in an image
    c) Frame by Frame Animation
    d) Product Advertisement with Multimedia effects

TOTAL: 60 PERIODS

OUTCOMES:

Upon Completion of the course, the students will be able to:

- Function as designers, applying Mathematics knowledge for various calculations, involving tools for analyzing the world, accessing and interpreting the information and representing what they know to others.
- Gain knowledge about the creation of text, image, graphic and animation files.
- Learn about authoring tools for packaging multimedia systems and to use a variety of common software packages to complete the experiments.

LIST OF SOFTWARE:

1. C/C++/Java
2. OpenGL 4.1 (Precompiled GLUT libraries 4.1 – Open source)
3. Any open source software like GIMP 2.8/ Flash 11.9 /Photoshop

LAB EQUIPMENTS:

- 30 Machines with intel i5/i7 processor with minimum 4GB RAM and 1TB Hard Disk
- C/C++/ Java
- Any open source software such as GIMP 2.8 / Flash 11.9 / Photoshop
- Minimum 4GB Graphics Card

		L	T	P	C
MC5213	**OPERATING SYSTEMS AND EMBEDDED SYSTEMS LABORATORY**	**0**	**0**	**4**	**2**

OBJECTIVES:

- To involve the students to Practice on Workbench /Software Tools/ Hardware Processor Boards with the supporting Peripherals.
- To teach the concepts of algorithm development & programming on software tools and micro controllers with peripheral interfaces.
- Learn shell programming and the use of filters in the UNIX environment.
- Learn to use the system calls and inter process communication.

LIST OF EXPERIMENTS

1. 8051 Microcontroller Based 8-bit Addition & Subtraction
2. 8051 Microcontroller Based 8-bit Multiplication & Division
3. 8051 Microcontroller Based I/O Interfacing to verify timer operations
4. Real Time Systems Program Using RTOS (like LED Display)
5. Basics of UNIX commands and Shell Programming
6. Implement the following CPU scheduling algorithms a) Round Robin b) SJF c) FCFS d) Priority
7. Process creation, Process synchronization & Interprocess communication using semaphores
8. Pipes and message in UNIX environment

TOTAL: 60 PERIODS

OUTCOMES:

Upon Completion of the course, the students will be able to:

- Perform arithmetic operation using 8085 microprocessor and 8051microcontroller along with I/O interfacing.
- Improved Employability and entrepreneurship capacity due to knowledge up gradation on recent trends in embedded systems design.
- Create system calls, processes and implement IPC.
- Compare the performance of various CPU Scheduling Algorithm

MC5301	ADVANCED DATA STRUCTURES AND ALGORITHMS	L	T	P	C
		3	0	0	3

OBJECTIVES:

- Understand and apply linear data structures-List, Stack and Queue.
- Understand the graph algorithms.
- Learn different algorithms analysis techniques.
- Apply data structures and algorithms in real time applications
- Able to analyze the efficiency of algorithm

UNIT I LINEAR DATA STRUCTURES 9

Introduction - Abstract Data Types (ADT) – Stack – Queue – Circular Queue - Double Ended Queue - Applications of stack – Evaluating Arithmetic Expressions - Other Applications - Applications of Queue - Linked Lists - Singly Linked List - Circularly Linked List - Doubly Linked lists – Applications of linked list – Polynomial Manipulation.

UNIT II NON-LINEAR TREE STRUCTURES 9

Binary Tree – expression trees – Binary tree traversals – applications of trees – Huffman Algorithm - Binary search tree - Balanced Trees - AVL Tree - B-Tree - Splay Trees – Heap- Heap operations- -Binomial Heaps - Fibonacci Heaps- Hash set.

UNIT III GRAPHS 9

Representation of graph - Graph Traversals - Depth-first and breadth-first traversal - Applications of graphs - Topological sort – shortest-path algorithms - Dijkstra's algorithm – Bellman-Ford algorithm – Floyd's Algorithm - minimum spanning tree – Prim's and Kruskal's algorithms.

UNIT IV ALGORITHM DESIGN AND ANALYSIS 9

Algorithm Analysis – Asymptotic Notations - Divide and Conquer – Merge Sort – Quick Sort - Binary Search - Greedy Algorithms – Knapsack Problem – Dynamic Programming – Optimal Binary Search Tree - Warshall's Algorithm for Finding Transitive Closure.

UNIT V ADVANCED ALGORITHM DESIGN AND ANALYSIS 9

Backtracking – N-Queen's Problem - Branch and Bound – Assignment Problem - P & NP problems – NP-complete problems – Approximation algorithms for NP-hard problems – Traveling salesman problem-Amortized Analysis.

TOTAL : 45 PERIODS

OUTCOMES:

- Describe, explain and use abstract data types including stacks, queues and lists
- Design and Implement Tree data structures and Sets
- Able to understand and implement non linear data structures - graphs.
- Able to understand various algorithm design and implementation.

REFERENCES:
1. Anany Levitin “Introduction to the Design and Analysis of Algorithms” Pearson Education, 2015
2. E. Horowitz, S.Sahni and Dinesh Mehta, “Fundamentals of Data structures in C++”, University Press, 2007
3. E. Horowitz, S. Sahni and S. Rajasekaran, “Computer Algorithms/C++”, Second Edition, University Press, 2007
4. Gilles Brassard, “Fundamentals of Algorithms”, Pearson Education 2015
5. Harsh Bhasin, “Algorithms Design and Analysis”, Oxford University Press 2015
6. John R.Hubbard, “Data Structures with Java”, Pearson Education, 2015
7. M. A. Weiss, “Data Structures and Algorithm Analysis in Java”, Pearson Education Asia, 2013
8. Peter Drake, “Data Structures and Algorithms in Java”, Pearson Education 2014
9. T. H. Cormen, C. E. Leiserson, R. L. Rivest, and C. Stein, "Introduction to algorithms", Thrid Edition, PHI Learning Private Ltd, 2012
10. Tanaenbaum A.S.,Langram Y. Augestein M.J, “Data Structures using C” Pearson Education , 2004.
11. V. Aho, J. E. Hopcroft, and J. D. Ullman, “Data Structures and Algorithms”, Pearson Education, 1983

MC5302	COMPUTER NETWORKS	L	T	P	C
		3	0	0	3

OBJECTIVES:
- To understand networking concepts and basic communication model
- To understand network architectures and components required for data communication.
- To analyze the function and design strategy of physical, data link, network layer and transport layer
- To acquire basic knowledge of various application protocol for internetsecurity issues and services.

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 – Blue Tooth – Bridges.

UNIT III NETWORK LAYER 9

Network layer – Switching concepts – Circuit switching – Packet switching –IP —Datagrams —IP addresses- 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 AND SECURITY 9

Applications - DNS- SMTP – WWW –SNMP- Security –threats and services - DES- RSA.

TOTAL : 45 PERIODS

OUTCOMES:

- Able to trace the flow of information from one node to another node in the network
- Able to Identify the components required to build different types of networks
- Able to understand the functionalities needed for data communication into layers
- Able to choose the required functionality at each layer for given application
- Able to understand the working principles of various application protocols and fundamentals of security issues and services available.

REFERENCES:

1. Achyut S Godbole,AtulHahate, " Data Communications and Networks", Second edition 2011
2. Andrew S.Tannenbaum David J. Wetherall, "Computer Networks" Fifth Edition , Pearson Education 2011
3. Douglas E. Comer, —Internetworking with TCP/IP (Volume I) Principles, Protocols and Architecture‖, Sixth Edition, Pearson Education, 2013.
4. Forouzan, " Data Communication and Networking", Fifth Edition , TMH 2012.
5. James F. Kurose, Keith W. Ross, "Computer Networking: A Top-down Approach, Pearson Education, Limited, sixth edition,2012.
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7. Larry L. Peterson & Bruce S. Davie, "Computer Networks – A systems Approach", Fifth Edition, Morgan Kaufmann, 2012
8. William Stallings, —Data and Computer Communications‖, Tenth Edition, Pearson Education, 2013
9. Wayne Tomasi, " Introduction to Data communications and Networking" , Pearson 2011

MC5303 WEB PROGRAMMING ESSENTIALS L T P C
3 0 0 3

OBJECTIVES:

- To understand the concepts and architecture of the World Wide Web.
- To understand and practice markup languages
- To understand and practice embedded dynamic scripting on client side Internet Programming
- To understand and practice web development techniques on client-side.

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

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 PHP 9

Introduction - How web works - Setting up the environment (LAMP server) - Programming basics Print/echo - Variables and constants – Strings and Arrays – Operators, Control structures and looping structures – Functions – Reading Data in Web Pages - Embedding PHP within HTML - Establishing connectivity with MySQL database.

TOTAL :45 PERIODS

OUTCOMES:

- Create a basic website using HTML and Cascading Style Sheets.
- Design and implement dynamic web page with validation using JavaScript objects and by applying different event handling mechanisms.
- Design rich client presentation using AJAX.
- Design and implement simple web page in PHP, and to present data in XML format.
- Design front end web page and connect to the back end databases

REFERENCES:

1. David Flanagan, "JavaScript: The Definitive Guide, Sixth Edition", O'Reilly Media, 2011
2. Harvey & Paul Deitel& Associates, Harvey Deitel and Abbey Deitel, "Internet and World Wide Web - How To Program", Fifth Edition, Pearson Education, 2011
3. James Lee, BrentWare , "Open Source Development with LAMP: Using Linux, Apache, MySQL, Perl, and PHP" AddisonWesley, Pearson 2009
4. Thomas A. Powell, "HTML & CSS: The Complete Reference", Fifth Edition, 2010
5. Thomas A Powell, Fritz Schneider, "JavaScript: The Complete Reference", Third Edition, Tata McGraw Hill, 2013
6. Thomas A Powell, "Ajax: The Complete Reference", McGraw Hill, 2008

MC5304	PROGRAMMING WITH JAVA	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To provide an overview of working principles of internet, web related functionalities
- To understand and apply the fundamentals core java, packages, database connectivity for computing
- To enhance the knowledge to server side programming.
- To Understand the OOPS concept & how to apply in programming.

UNIT I JAVA FUNDAMENTALS 9

Java features – Java Platform – Java Fundamentals – Expressions, Operators, and Control Structures – Classes, Methods – Inheritance - Packages and Interfaces – Boxing, Unboxing – Variable-Length Arguments (Varargs), Exception Handling.

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 – Premain method.

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 – Swing Fundamentals - Swing Classes.

UNIT IV OVERVIEW OF DATA RETRIEVAL & ENTERPRISE APPLICATION DEVELOPMENT 9

Tiered Application development - Java Servers, containers –Web Container – Creating Web Application using JSP/Servlets – Web Frameworks Introduction to Spring/ Play Framework – ORM Layer – 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 PERIODS

OUTCOMES:

- Implement Java programs.
- Make use of hierarchy of Java classes to provide a solution to a given set of requirements found in the Java API
- Use the frameworks JSP, Hibernate, Spring
- Design and implement server side programs using Servlets and JSP.

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 Mc Graw Hill, 2014.
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6. R. Nageswara Rao,“Core Java: An Integrated Approach”, DreamTech Press, 2016

MC5305 OBJECT ORIENTED ANALYSIS AND DESIGN

L	T	P	C
3	2	0	4

OBJECTIVES:

- To provide a brief, hands-on overview of object-oriented concepts and its life cycle for software development.
- To learn for modelling the software and to design them using UML diagrams
- To understand the problem domain and to identify the objects from the problem specification.
- To understand, how to apply design axioms and corollaries for the classes and object relational systems.
- To gain knowledge about open source tools for Computer Aided Software Engineering

UNIT I INTRODUCTION 9+6

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+6

Introduction – Survey – Rumbaugh, Booch, Jacobson methods – Unified modelling 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+6

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 9+6

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.

UNIT V CASE TOOLS 9+6

Railway domain : Platform assignment system for the trains in a railway station - Academic domain : Student Marks Analysing 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.

L : 45, T : 30 TOTAL: 75 PERIODS

OUTCOMES:

- Able to understand the object oriented concepts and to apply object oriented life cycle model for a project.
- Able to design static and dynamic models using UML diagrams.
- Able to perform object oriented analysis to identify the objects from the problem specification.
- Able to identify and refine the attributes and methods for designing the object oriented system.
- Able learn the open source CASE tools and to apply them in various domains.

REFERENCES

1. Ali Bahrami, “Object Oriented System Development”, McGraw Hill International Edition, 2008
2. Brahma Dathan, Sarnath Ramnath, “Object-Oriented Analysis, Design and Implementation”, Universities Press, 2010
3. Bernd Bruegge, Allen H. Dutoit, Object Oriented Software Engineering using UML, Patterns and Java, Pearson 2004
4. Craig Larman, Applying UML and Patterns – An Introduction to Object-Oriented Analysis and Design and Iterative Development” , 3rd Edition, Pearson Education, 2005
5. Grady Booch, James Rumbaugh, Ivar Jacobson, “The Unified Modeling Language User Guide”, Addison Wesley Long man, 1999
6. Martin Fowler, “UML Distilled A Brief Guide to Standard Object Modeling Language”, 3rd Edition, Addison Wesley, 2003
7. Russ Miles, Kim Hamilton, “Learning UML 2.0”, O’Reilly, 2008
8. http://staruml.sourceforge.net/docs/StarUML_5.0_Developer_Guide.pdf
9. . http://www.spinellis.gr/umlgraph/doc/index.html

MC5311	DATA STRUCTURES AND ALGORITHMS LABORATORY	L	T	P	C
		0	0	4	2

OBJECTIVES:

- To develop skills in design and implementation of data structures.
- To learn and implement linear, non linear and tree data structures.
- To learn Set ADT and Graph data structures and its applications.
- To study, implement and analyze the different sorting techniques.

LIST OF EXPERIMENTS

1. Array implementation of stack
2. Linked list implementation of Queue
3. Polynomial Addition using Linked List

4. Binary Search tree operations
5. AVL Tree operations
6. Graph Traversals
7. Shortest Path using Dijkstra's Algorithm
8. Minimum Spanning Tree using Prim's Algorithm
9. Dictionary application using any of the data structure
10. Divide and Conquer Method - Merge Sort
11. Back Tracking - 8-Queen's Problem

TOTAL: 60 PERIODS

OUTCOMES:

Upon Completion of the course, the students will be able to:

- Work with basic data structures that are suitable for the problems to be solved efficiently.
- Design and implement linear, tree, and graph structures and its applications
- Design various sorting techniques, its algorithm design and analysis

MC5312	WEB PROGRAMMING LABORATORY	L	T	P	C
		0	0	4	2

OBJECTIVES:

- Try and develop the most important technologies that are being used today by web developers to build a wide variety of web applications.
- To build web applications using proven developer tools and message formats.
- To understand and practice web development techniques on client-side
- Web applications using technologies such as HTML, CSS, Javascript, AJAX, JQuery and JSON.

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.
   - Add External, Internal and Inline CSS styles to know the priority.
   - 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. (a) Create a CGPA Calculator in Web Brower using HTML, CSS and JavaScript. Use functions in JavaScript.
   (b) Create a Quiz Program with adaptive questions using JavaScript.
6. Create a Pan Card Validation form using Object Oriented JavaScript, consider the 10^{th} character to be an alphabet.
   - Get the user's First Name, Last Name and other required fields as input
   - Assume the last digit of the Pan Number to be an alphabet
   - Validate the PAN Number.
7. (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.

8. 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”. Use Javascript or JQuery for parsing.
9. Create a Single Page application allowing to search for a movie and displaying the trailer, poster for various movies.
    - Create an admin login to upload the trailer, poster, keyword and details of the movie.
    - Use Bootstrap and JQuery for designing the User Interface.
    - Form Submission should be handled through Ajax.

10. Using PHP and MySQL, develop a program to accept book information viz. Accession number, title, authors, edition and publisher from a web page and store the information in a database and to search for a book with the title specified by the user and to display the search results with proper headings.
11. Develop a Social Media Web Application using HTML5, CSS3, JQuery, AJAX & PHP.

TOTAL: 60 PERIODS

OUTCOMES:

Upon Completion of the course, the students will be able to:

- Develop simple web applications using scripting languages.
- Implement server side and client side programming develop web applications with various web technology concepts.
- Design a Web application using various technologies such as AJAX, JQuery and JSON.
- Develop an application for social media using HTML5, CSS3, JQuery, AJAX & PHP

MC5313	PROGRAMMING WITH JAVA LABORATORY	L	T	P	C
		0	0	4	2

OBJECTIVES:

Try and develop the most important technologies that are being used today by web developers to build a wide variety of web applications.

To develop Java based web programming.

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

To enhance the knowledge to server side programming

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

LIST OF EXPERIMENTS

1. Writing Java programs by making use of class, interface, package, etc for the following
    - # Different types of inheritance study
    - # Uses of ‘this’ keyword
    - # Polymorphism
    - # Creation of user specific packages
    - # Creation of jar files and using them
    - # 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. Event Handling in Swing
6. Reading and writing text files
7. Writing an RMI application to access a remote method
8. Writing a Servlet program with database connectivity for a web based application such as students result status checking, PNR number enquiry etc.
9. Creation and usage of Java bean
10. Create an Application to search Phone Number using contact Name Using Hash Map.
11. Create an Application which finds the Duplicates in E-mail using Set Interface.
12. FTP Using Sockets.

TOTAL: 60 PERIODS

OUTCOMES:

Upon Completion of the course, the students will be able to:

- Apply the Object Oriented features of Java for programming on the internet
- Implement, compile, test and run Java program,
- Make use of hierarchy of Java classes to provide a solution to a given set of requirements found in the Java API
- Understand the components and patterns that constitute a suitable architecture for a web application using java servlets
- Demonstrate systematic knowledge of backend and front end by developing an appropriate application.
- Implement socket programming and Client side scripting in Java

MC5401	RESOURCE MANAGEMENT TECHNIQUES	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To provide the concept and an understanding of basic concepts in Operations Research Techniques for Analysis and Modeling in Computer Applications.
- To understand , develop and solve mathematical model of linear programming problems
- To understand , develop and solve mathematical model of Transport and assignment problems
- To Understand network modeling for planning and scheduling the project activities

UNIT I LINEAR PROGRAMMING MODELS 9

Mathematical Formulation - Graphical Solution of linear programming models – Simplex method – Artificial variable Techniques.

UNIT II TRANSPORTATION AND ASSIGNMENT MODELS 9

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

UNIT III INTEGER PROGRAMMING MODELS 9

Formulation – 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 PERIODS

OUTCOMES:

- Understand and apply linear, integer programming to solve operational problem with constraints
- Apply transportation and assignment models to find optimal solution in warehousing and Travelling,
- To prepare project scheduling using PERT and CPM
- Identify and analyze appropriate queuing model to reduce the waiting time in queue.
- Able to use optimization concepts in real world problems

REFERENCES:

1. A.M.Natarajan, P.Balasubramani, A.Tamilarasi, “Operations Research”, Pearson Education, Asia, 2005
2. Gross, D. and Harris, C.M., “Fundamentals of Queueing Theory”, Wiley Student, 3rd Edition, New Jersy, 2004
3. Ibe, O.C. “Fundamentals of Applied Probability and Random Processes”, Elsevier, U.P., 1st Indian Reprint, 2007
4. John W. Chinneck “Feasibility and Infeasibility in Optimization Algorithms and Computational Methods’ Springer, 2008.
5. N. D Vohra, Quantitative Techniques in Management,Tata Mcgraw Hill, 2010
6. Prem Kumar Gupta, D.S. Hira, “Operations Research”, S.Chand& Company Ltd, New Delhi, 3rd Edition , 2008
7. Ravindran, Phillips, Solberg,”Operations Research: Principles And Practice”, 2ND ED, John Wiley & Sons,2007
8. Taha H.A., “Operations Research : An Introduction “ 8th Edition, Pearson Education, 2008

MC5402	MOBILE COMPUTING	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To learn the basic concepts, aware of the GSM, SMS, GPRS Architecture.
- To have an exposure about wireless protocols -WLN, Bluetooth, WAP, ZigBee **issues**.
- To Know the Network, Transport Functionalities of Mobile communication.
- To impart knowledge about Mobile Application Development Platform
- To impart the knowledge about basic components needed for Mobile App development

UNIT I WIRELESS COMMUNICATION FUNDAMENTALS, ARCHITECTURE 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 (entity and Protocol).

UNIT II MOBILE WIRELESS SHORT RANGE NETWORKS 9

Introduction-WLAN Equipment-WLAN Topologies-WLAN Technologies-IEEE 802.11 Architecture-WLAN MAC-Security of WLAN, Power Management-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- linking activities with Intents.

UNIT V MOBILE APPLICATION DEVELOPMENT USING ANDROID 9

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

TOTAL : 45 PERIODS

OUTCOMES:

- Gain the knowledge about various types of Wireless Data Networks and Voice Networks.
- understand the architectures, the challenges and the Solutions of Wireless Communication
- Realize the role of Wireless Protocols in shaping the future Internet.
- Able to develop simple Mobile Application Using Android

REFERENCES:

1. Asoke K Talukder, Hasan Ahmed,Roopa R Yavagal “Mobile Computing”, Tata McGraw Hill Pub ,2nd Edition Aug – 2010.
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. Jochen Schillar “Mobile Communications” Pearson Education second Edition.
5. Jerome(J.F) DiMarzio “Android A programmer’s Guide” Tata McGraw-Hill 2010 Edition.
6. Maritn Sauter, ―From GSM to LTE: An Introduction to Mobile Networks and Mobile Broadband‖, John Wiley and Sons, 2011 .
7. Raj Kamal “Mobile Computing” Oxford Higher Education, Second Edition, 2012.
8. Reto Meier,Professional Android 2 Application Development, Wrox’s Programmer to Programmer series.

MC5403	ADVANCED DATABASE AND DATA MINING	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To understand the underlying principles of Relational Database Management System.
- To Understand Data mining principles and techniques and Introduce DM as a cutting edgebusiness intelligence
- To learn to use association rule mining for handling large data
- To understand the concept of classification for the retrieval purposes
- To know the clustering techniques in details for better organization and retrieval of data
- To identify Business applications and Trends of Data mining

UNIT I RELATIONAL MODEL 9

Data Model – Types of Data Models: – Entity Relationship Model – Relational Data Model – Mapping Entity Relationship Model to Relational Model – Structured Query Language – Database Normalization – Transaction Management.

UNIT II 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 andConcept Hierarchy Generation.

UNIT III ASSOCIATION RULE MINING 9

Introduction - Data Mining Functionalities - Association Rule Mining - Mining Frequent Itemsets withand without Candidate Generation - Mining Various Kinds of Association Rules - Constraint-BasedAssociation Mining.

UNIT IV CLASSIFICATION & PREDICTION 9

Classification vs. Prediction – Data preparation for Classification and Prediction – Classification byDecision Tree Introduction – Bayesian Classification – Rule Based Classification – Classification byBack Propagation – Support Vector Machines – Associative Classification – Lazy Learners – OtherClassification Methods – Prediction – Accuracy and Error Measures.

UNIT V CLUSTERING 9

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

TOTAL : 45 PERIODS

OUTCOMES:

- Create relational data models.
- Preprocess the data for mining applications.
- Apply the association rules for mining the data.
- Design and deploy appropriate classification techniques.
- Cluster the high dimensional data for better organization of the data.
- Discover the knowledge imbibed in the high dimensional system.
- Evolve Multidimensional Intelligent model from typical system.
- Evaluate various mining techniques on complex data objects.

REFERENCES:

1. Berson, Alex & Smith, Stephen J, Data Warehousing, Data Mining, and OLAP, TMH Pub. Co. Ltd, New Delhi, 2012
2. G. K. Gupta, “Introduction to Data Mining with Case Studies”, Easter Economy Edition, PrenticeHall of India, 2006
3. Jiawei Han and Micheline Kamber, “Data Mining Concepts and Techniques” Second Edition, Elsevier, Reprinted 2008
4. K.P. Soman, ShyamDiwakar and V. Ajay, “Insight into Data mining Theory and Practice”, EasterEconomy Edition, Prentice Hall of India, 2006
5. Marakas, George M, Modern Data Warehousing, Mining, and Visualiza Visualization, Pearson Education, 2011
6. Pang-Ning Tan, Michael Steinbach and Vipin Kumar, “Introduction to Data Mining”, PearsonEducation, 2007
7. Prabhu Data Warehousing, PHI Learning Private Limited, New Delhi, 2012.
8. Ponniah, Paulraj, Data Warehousing Fundamentals, John Wiley & Sons, New Delhi, 2011.
9. R. Elmasri, S.B. Navathe, “Fundamentals of Database Systems”, Addison-Wesley, 2011

MC5404	WEB APPLICATION DEVELOPMENT	L	T	P	C
		3	2	0	4

OBJECTIVES:

- To acquire knowledge on the usage of recent platforms in developing web applications
- To understand architecture of J2EE and design applications using J2EE, Strut and hypernet
- To understand framework of Spring, Hibernate and struts.
- To Design and develop interactive, client-side, server-side executable web applications LAMP Stack

UNIT I J2EE PLATFORM 9+6

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 9+6

Web Services - Consuming a RESTfull Web 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 WebSocket to build an interactive web application.

UNIT III STRUTS AND HIBERNATE 9+6

STRUTS

Introduction to Struts – MVC framework- Struts Architecture – Business Service – Parameter Passing – Action class & configuration files – Struts.xml Tags – Namespace & Wildcards – Model Driven Action – Value stack & OGNL – Validation – Interceptors - Inbuilt Interceptors – Custom Interceptors .

HIBERNATE

HIBERNATE ORM-Persistence-Relational Database-The object relational impedance mismatch -Using Native Hibernate API's and hbm.xml-Using the java persistence API's-Hibernate Validator – HIBERNATE OGM – configuration of tools -HIBERNATE SEARCH -Enabling full text search capabilities in entities -Indexing-Searching -Introduction to Full text search.

UNIT IV PYTHON 9+6

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+6

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.

L : 45, T : 30 TOTAL: 75 PERIODS

OUTCOMES:

- Design and implement Internet systems for enhancing education and engineering design
- Understand functionality of Internet system
- Design a system according to customer needs using the available Internet technologies
- Design and develop interactive, client-side, server-side executable web applications.
- Develop a rapid application in many areas on most platforms.
- Build better Web apps more quickly and with less code

REFERENCES:

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2. Craig Walls, "Spring in Action, 4th Edition Kindle Edition, Manning Publication, 2015.
3. Jobinesh Purushothaman, "RESTful Java Web Services" Second Edition, Packt Publishing, 2015
4. James Holmes "Struts: The Complete Reference, " 2nd Edition, McGraw Hill, 2007.
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9. Tony Dahbura, Rob Weltman "LDAP Programming with Java", Addison-Wesley Professional, 2000

MC5411 MOBILE APPLICATION DEVELOPMENT LABORATORY

L	T	P	C
0	0	4	2

OBJECTIVES:

- Know the components and structure of mobile application development frameworks like Android /windows /ios.
- Understand how to work with various mobile application development frameworks.
- Learn the basic and important design concepts and issues of development of mobile applications.
- Understand the capabilities and limitations of mobile devices.
- Write applications for the platforms used, simulate them, and test them on the mobile hardware where possible.

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 makes use of database.
5. Develop an application that makes use of RSS Feed.
6. Implement an application that implements Multi threading.
7. Develop a native application that uses GPS location information.
8. Implement an application that writes data to the SD card.
9. Implement an application that creates an alert upon receiving a message.
10. Develop a game application.

TOTAL: 60 PERIODS

OUTCOMES:

Upon Completion of the course, the students will be able to:

- Install and configure Android application development tools.
- Design and develop user Interfaces for the Android platform.
- Apply Java programming concepts to Android application development.
- Familiar with technology and business trends impacting mobile applications.
- competent with the characterization and architecture of mobile applications.

MC5412 WEB APPLICATION DEVELOPMENT LABORATORY

L	T	P	C
0	0	4	2

OBJECTIVES:

- To design applications using J2EE, Struts and Hypernate.
- To develop a web application with n-tier architecture.
- To develop a simple application using Spring MVC.
- To develop a web service using JSON and XML formats.

LIST OF EXPERIMENTS:

1. Develop a car showroom inventory web application with 2-tier architecture. Use JSP and JDBC.
2. Develop 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. Develop a standalone java application or a web application to manage books in an online library, support CURD operations.
4. Develop a simple Spring MVC application that take user input and checks the input using standard validation annotations.
5. Develop a simple database application using Spring JDBC/Struts with CURD functionality.
6. Develop any web application which authenticates Spring LDAP.
7. Design a student identity management web application using struts framework. The application should be able to provide an identity such as student id, access to department assets with department id, access to lab assets with lab id.
8. Create an simple online bookstore using Spring MVC
9. Build an application that uses Spring's RestTemplate to retrieve a random Spring Boot quotation at http://gturnquist-quoters.cfapps.io/api/random
10. Create weather service using spring/struts which will return the temp in JSON format and XML format.

TOTAL: 60 PERIODS

OUTCOMES:

Upon Completion of the course, the students will be able to:

- Design and develop interactive, client-side, server-side executable web applications.
- Develop a simple online application using Spring MVC
- Create applications using web services such as JSON, WSDL and SOAP
- Develop a simple database application using Spring JDBC/Struts with CURD functionality

MC5501	CLOUD COMPUTING	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To introduce the broad perceptive of cloud architecture and model
- To understand the concept of Virtualization and design of cloud Services
- To be familiar with the lead players in cloud.
- To understand the features of cloud simulator
- To apply different cloud programming model as per need.
- To learn to design the trusted cloud Computing system

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 PERIODS

OUTCOMES:

- Compare the strengths and limitations of cloud computing
- Identify the architecture, infrastructure and delivery models of cloud computing
- Apply suitable virtualization concept.
- Choose the appropriate cloud player, Programming Models and approach.
- Address the core issues of cloud computing such as security, privacy and interoperability.
- Design Cloud Services and Set a private cloud

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. James E. Smith, Ravi Nair, “Virtual Machines: Versatile Platforms for Systems and Processes”, Elsevier/Morgan Kaufmann, 2005
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MC5502	BIG DATA ANALYTICS	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To explore the fundamental concepts of big data analytics
- To learn to analyze the big data using intelligent techniques.
- To understand the various search methods and visualization techniques.
- To learn to use various techniques for mining data stream.
- To understand the applications using Map Reduce Concepts

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 – EstimatingMoments – 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- Analyzing the Data with Hadoop- Scaling Out- Hadoop Streaming- Design of HDFS-Hadoop filesystems-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- Systems and applications.

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 PERIODS

OUTCOMES:

- Work with big data platform and Understand the fundamentals of various big data analysis techniques
- Analyze the big data analytic techniques for useful business applications.
- Design efficient algorithms for mining the data from large volumes.
- Analyze the HADOOP and Map Reduce technologies associated with big data analytics
- Explore the applications of Big Data

REFERENCES:

1. AnandRajaraman and Jeffrey David Ullman, “Mining of Massive Datasets”, CambridgeUniversity Press, 2014
2. Chris Eaton, Dirk DeRoos, Tom Deutsch, George Lapis, Paul Zikopoulos, “Understanding BigData: Analytics for Enterprise Class Hadoop and Streaming Data”, McGrawHill Publishing, 2012
3. Da Ruan,Guoquing Chen, Etienne E.Kerre, Geert Wets, Intelligent Data Mining, Springer,2007
4. Franks, “Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streamswith Advanced Analytics”, John Wiley & sons, 2012
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7. Michael Berthold, David J. Hand, “Intelligent Data Analysis”, Springer, 2007
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11. Tom White “ Hadoop: The Definitive Guide” Fourth Edition, O’reilly Media, 2015
12. Zikopoulos, Paul, Chris Eaton, Understanding Big Data: Analytics for Enterprise Class Hadoopand Streaming Data, Tata McGraw Hill Publications, 2011.

		L	T	P	C
MC5503	**SOFTWARE TESTING AND QUALITY ASSURANCE**	**3**	**0**	**0**	**3**

OBJECTIVES:

- To know the behavior of the testing techniques and to design test cases to detect the errors in the software
- To get insight into the levels of testing in the user environment
- To understand standard principles to check the occurrence of defects and its removal.
- To learn the functionality of automated testing tools to apply in the specialized environment.
- To understand the models and metrics of software quality and reliability.

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 – Evaluating Test Adequacy Criteria. Test Case Design Strategies – Using Black Box Approach to Test Case Design – Random Testing – Requirements based 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 - Internationalization 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 – Challenges in Testing for 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 PERIODS

OUTCOMES:

- Able to test the software by applying various testing techniques.
- Able to debug the project and to test the entire computer based systems at all levels.
- Able to test the applications in the specialized environment using various automation tools.
- Able to evaluate the web applications using bug tracking tools.
- Able to apply quality and reliability metrics to ensure the performance of the software

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, Third Edition, Indian Reprint (2011).
4. Edward Kit, " Software Testing in the Real World – Improving the Process", Pearson Education, 1995
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11. Stephan Kan, “Metrics and Models in Software Quality”, Addison – Wesley, Second Edition, 2004
12. William Perry, “Effective Methods of Software Testing”, Third Edition, Wiley Publishing.

CLOUD AND BIG DATA LABORATORY

	L	T	P	C
MC5511	**0**	**0**	**4**	**2**

OBJECTIVES:

- Be exposed to tool kits for cloud and hadoop environment.
- Be familiar with migration of Virtual Machines from one node to another
- Learn to run virtual machines of different configuration.
- Learn to use Hadoop Distributed File System(HDFS) to set up single and multi-node clusters.

LIST OF EXPERIMENTS:

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

1. Find procedure to run the virtual machine of different configuration. Check how many virtual machines can be utilized at particular time
2. 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
3. Install a C compiler in the virtual machine and execute a sample program.
4. Show the virtual machine migration based on the certain condition from one node to the other
5. 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
11. Page Rank Computation

TOTAL: 60 PERIODS

OUTCOMES:

Upon Completion of the course, the students will be able to:

- Use the cloud and big data tool kits.
- Design and Implement applications on the Cloud environment.
- Set up and implement Hadoop clusters
- Use the map reduce tasks for various applications

LAB EQUIPMENT FOR A BATCH OF 30 STUDENTS:

SOFTWARE:

Eucalyptus or Open Nebula or equivalent

HARDWARE:

Standalone desktops 30 Nos

MC5512	SOFTWARE TESTING LABORATORY	L	T	P	C
		0	0	4	2

OBJECTIVES:

- To apply various testing techniques and to detect the errors in the software.
- To generate and apply the test cases using the automated testing tool.
- To learn the functionality of automated testing tools to apply in the specialized environment

LIST OF EXPERIMENTS

1. Using Selenium IDE, Write a test suite containing minimum 4 test cases.
2. Install Selenium server and demonstrate it using a script in Java/PHP.
3. Write and test a program to login a specific web page.
4. Write and test a program to update 10 student records into table into Excel file.
5. Write and test a program to select the number of students who have scored more than 60 in any one subject (or all subjects)
6. Write and test a program to provide total number of objects present / available on the page
7. Write and test a program to get the number of list items in a list / combo box.
8. Write and test a program to count number of check boxes on the page checked and unchecked count

TOTAL: 60 PERIODS

OUTCOMES:

Upon Completion of the course, the students will be able to:

- Able to test the software by applying various testing techniques.
- Able to debug the project and to test the entire computer based systems at all levels.
- Able to test the applications in the specialized environment using various automation tools.
- Able to evaluate the web applications using bug tracking tools.
- Able to apply quality and reliability metrics to ensure the performance of the software

MC5001	SOFT COMPUTING	L	T	P	C
		3	0	0	3

OBJECTIVES:

To learn the key aspects of Soft computing
To know about the components and building block hypothesis of Genetic algorithm.
To understand the features of neural network and its applications
To study the fuzzy logic components
To gain insight onto Neuro Fuzzy modeling and control.
To gain knowledge in machine learning through Support vector machines

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 FUZZY LOGIC 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 PERIODS

OUTCOMES:

- Implement machine learning through neural networks.
- Gain Knowledge to develop Genetic Algorithm and Support vector machine based machine learning system.
- Write Genetic Algorithm to solve the optimization problem.
- Understand fuzzy concepts and develop a Fuzzy expert system to derive decisions.
- Able to Model Neuro Fuzzy system for data clustering and classification.

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", Addison Wesley, 2007
4. 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
5. Elaine Rich, Kevin Knight, Shiva Shankar B. Nair, "Artificial Intelligence", Tata McGraw hill Ltd, 2008
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7. Jyh-Shing Roger Jang, Chuen-Tsai Sun, Eiji Mizutani, "Neuro-Fuzzy and Soft Computing", Prentice-Hall of India, 2003.
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11. Melanie, “An Introduction to Genetic Algorithm”, Prentice Hall, 1998
12. Ross Timothy J, Fuzzy Logic with Engineering Applications, Wiley India Pvt Ltd, New Delhi, 2010
13. S.N.Sivanandam, S.N.Deepa, “Introduction to Genetic Algorithms”, Springer, 2007

MC5002	ACCOUNTING AND FINANCIAL MANAGEMENT	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To understand the basic principles of Double entry system and preparation of balance sheet.
- To understand the process of estimating the cost of a particular product.
- To Prepare the estimate for various business activities such as purchase, sale, production and cash budgets
- To ensure decision making process of an organization.

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-Accounting Ratio Analysis-Funds Flow Analysis-Cash Flow Analysis

UNIT II ACCOUNTING 9

Meaning-Objectives-Elements of Cost-Cost Sheet-Marginal Costing and Cost Volume Profit Analysis- Break Even Analysis-Applications-Limitations-Standard Costing and Variance Analysis-Material- Labor-Overhead-Sales-Profit Variances

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-Computerized Accounting

UNIT IV INVESTMENT DECISION AND COST OF CAPITAL 9

Objectives and Functions of Financial Management-Risk-Return Relationship-Time Value of Money Concepts-Capital Budgeting-Methods of Appraisal-Cost of Capital Factors Affecting Cost of Capital- Computation for Each Source of Finance and Weighted Average Cost of Capital.

UNIT V FINANCING DECISION AND WORKING CAPITAL MANAGEMENT 9

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

TOTAL : 45 PERIODS

OUTCOMES:

- Able to understand the balance sheet preparation and do analysis
- Able to understand the budget preparation and control of a company
- Helps to decide about the state of affairs of a particular firm / company.
- Ensures the preparation of fiscal policies of the organization.
- Ensures the factors to be considered in investment policies.

REFERENCES:

1. Aswat Damodaran, “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
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7. Srivatsava, Mishra, “Financial Management”, Oxford University

MC5003	SOFTWARE PROJECT MANAGEMENT	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To know of how to do project planning for the software process.
- To learn the cost estimation techniques during the analysis of the project.
- To understand the quality concepts for ensuring the functionality of the software

UNIT I SOFTWARE PROJECT MANAGEMENT CONCEPTS 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: Introduction – the effect of 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 PERIODS

OUTCOMES:

- Understand the activities during the project scheduling of any software application.
- Learn the risk management activities and the resource allocation for the projects.
- Can apply the software estimation and recent quality standards for evaluation of the software
- projects
- Acquire knowledge and skills needed for the construction of highly reliable software project
- Able to create reliable, replicable cost estimation that links to the requirements of project planning and managing.

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

MC5004	SECURITY IN COMPUTING	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To understand the basics of cryptography
- learn to find the vulnerabilities in programs and to overcome them,
- know the different kinds of security threats in networks and its solution
- know the different kinds of security threats in databases and solutions available
- learn about the models and standards for security

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.

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 PERIODS

OUTCOMES:

- Apply cryptographic algorithms for encrypting and decryption for secure data transmission
- Understand the importance of Digital signature for secure e-documents exchange
- Understand the program threats and apply good programming practice
- Get the knowledge about the security services available for internet and web applications
- Understand data vulnerability and sql injection
- Gain the knowledge of security models and published standards

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, Mc GrawHill Osborne Media, 2009.
4. Matt Bishop, “Computer Security: Art and Science”, First Edition, Addison- Wesley, 2002.
5. William Stallings, “Cryptography and Network Security : Principles and Practices”, Fifth Edition, Prentice Hall, 2010.

MC5005	AD-HOC AND SENSOR NETWORKS	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To understand the basics of Ad-hoc & Sensor Networks
- To learn various fundamental and emerging protocols of all layers in ad-hoc network
- To study about the issues pertaining to major obstacles in establishment and efficient management of ad-hoc and sensor networks
- To understand the nature and applications of ad-hoc and sensor networks
- To understand various security practices and protocols of Ad-hoc and Sensor Networks

UNIT I ADHOC NETWORKS FUNDAMENTALS & COMMUNICATION PROTOCOLS 9

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 – Target detection and tracking.

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 PERIODS

OUTCOMES:

Work with existing Ad-hoc and sensor network protocols and standards.

- Create a Sensor network environment for different type of applications
- Design ad-hoc and sensor network architectures using QoS and Congestion control mechanisms

- Interpret the various control fields of the protocol in each layer
- Select appropriate routing algorithms for different network environments
- Program ad-hoc and sensor network for various applications
- Deploy security mechanisms in the wireless ad-hoc and sensor networks.

REFERENCES:

1. Adrian Perrig, J. D. Tygar, "Secure Broadcast Communication: In Wired and Wireless Networks", Springer, 2006.
2. Amiya Nayak, Ivan Stojmenovic, : Wireless Sensor and Actuator Networks : Algorithm and Protocols for Scalable Coordination and Data communication John Wiley & Sons 2010
3. Carlos De Morais Cordeiro, Dharma Prakash Agrawal, “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
6. Erdal Çayırcı , Chunming Rong, “Security in Wireless Ad Hoc and Sensor Networks”, John Wiley and Sons, 2009
7. Feng Zhao and Leonidas Guibas, “Wireless Sensor Networks”, Morgan Kaufman Publishers, 2004.
8. Feng Zhao, Leonidas Guibas, “ Wireless Sensor Networks : An information processing Approach “ , Elsevier 2004.
9. Holger Karl, Andreas willig, “Protocols and Architectures for Wireless Sensor Networks”, John Wiley & Sons, Inc .2007.
10. Kazem Sohraby, Daniel Minoli, Taieb Znati , Wireless Sensor Networks: Technology, Protocols and Applications, Wiley Interscience A John Wiley & sons, Inc., Publication 2007.
11. Waltenegus Dargie, Christian Poellabauer, “Fundamentals of Wireless Sensor Networks Theory and Practice”, John Wiley and Sons, 2010

MC5006	PROFESSIONAL ETHICS	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To Understand the concepts of computer ethics in work environment.
- To understand the threats in computing environment
- To Understand the intricacies of accessibility issues
- To ensure safe exits when designing the software projects

UNIT I COMPUTER ETHICS INTRODCUTION 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 – To hack or not to hack? – Ethical positions on hacking.

UNIT II ASPECTS OF COMPUTER CRIME AND INTELLECTUAL PROPERTY RIGHTS 9

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 – Ethical and professional issues – 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 - Ethical and professional issues - 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 PERIODS

OUTCOMES:

- Helps to examine situations and to internalize the need for applying ethical principles, values to tackle with various situations.
- Develop a responsible attitude towards the use of computer as well as the technology.
- Able to envision the societal impact on the products/ projects they develop in their career
- Understanding the code of ethics and standards of computer professionals.
- Analyze the professional responsibility and empowering access to information in the work place.

REFERENCES:

1. Caroline Whitback," Ethics in Engineering Practice and Research ", Cambridge University Press, 2011.
2. George Reynolds, "Ethics in Information Technology", Cengage Learning, 2011.
3. John Weckert and Douglas Adeney, Computer and Information Ethics, Greenwood Press, 1997.
4. Penny Duquenoy, Simon Jones and Barry G Blundell, "Ethical , legal and professional issues in computing", Middlesex University Press, 2008.
5. Richard Spinello, "Case Studies in Information and Computer Ethics", Prentice Hall, 1997.
6. Sara Baase, "A Gift of Fire: Social, Legal, and Ethical Issues for Computing and the Internet", 3rd Edition,Prentice Hall, 2008.
7. http://www.infosectoday.com/Articles/Intro_Computer_Ethics.html

MC5007 HEALTH CARE MANAGEMENT L T P C
3 0 0 3

OBJECTIVES:

- To understand the basic concepts of health care system.
- To know about creating and maintaining health care information systems
- To ensure access of clinical information system on the fly
- To know social media analytics for health care data.
- To learn temporal data mining and visual data analytics for health care.

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 INFORMATION TECHNOLOGY 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 PERIODS

OUTCOMES:

- Develop an understanding of basic research skills applicable to the design, evaluation and implementation of appropriate Healthcare Information Systems (HIS) ;
- Define and analyse the impact, strengths and weaknesses of various HIS in any healthcare settings
- Extract health care data in temporal data mining.
- Perform sensor data and visual data analytics.

REFERENCES:

1. Chandan K. Reddy, Charu C. Aggarwal, “Healthcare Data Analytics”, CRC Press, Taylor & Francis Group, 2015.
2. Kevin Beaver, Healthcare Information Systems, Second edition Best Practices, CRC Press, 2002
3. 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.
4. Marion J. BallHealthcare Information Management Systems: A Practical Guide Springer-Verlag GmbH, 1995

5. Marion J. Ball, Charlotte Weaver, Joan Kiel ,"Healthcare Information Management Systems: Cases, Strategies, and Solutions", Springer, 2010, 3rd edition
6. Rudi Van De Velde and Patrice Degoulet, "Clinical Information Systems: A Component based approach", Springer 2005

MC5008 GEOLOGICAL INFORMATION SYSTEMS

L	T	P	C
3	0	0	3

OBJECTIVES:

- Understand the basic concepts of Geological information systems.
- To provide an exposure to spatial database structures and their utility in GIS.
- Understand the process of scanning, digitizing and georeferencing.
- To introduce the raster and vector geoprocessing capabilities of GIS.

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 PERIODS

OUTCOMES:

- Understand GIS concepts and spatial data representation.
- Able to design spatial data input in raster form as well as vector form.
- Understand vector data analysis and output functions.
- Understand raster data geo processing.
- Able to design a GIS model for real world problem.

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

MC5009	HUMAN RESOURCE MANAGEMENT	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To understand the importance of human resources.
- To describe the steps involved in the human resource planning process
- To understand the stages of employee socialization and training needs.
- To know about the purposes of performance management systems and appraisal.
- To know the list of occupational safety and health administration enforcement priorities

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 – The Changing World of Technology- HR & Corporate Ethics – Equal Employment Opportunities -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 – Recruiting A Global Perspective- Selection Process – Selection from Global Perspective- job offers – Avoiding hiring mistakes - key element for successful predictors.

UNIT III TRAINING AND DEVELOPMENT 9

Introduction – Socialization Process-Purpose of New employee orientation, Employee training- Employee Development– Organization development Calm Waters Metaphor – White-Water Rapids Metaphor – 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 – international appraisal –-rewards –Theories of motivation - compensation administration – job evaluation and pay structure – special cases of compensation – executive compensation programs – employee benefits Voluntary Benefits- International Compensation.

UNIT V SAFE AND HEALTHY WORK ENVIRONMENT 9

Occupational safety and health act -Contemporary Health and Safety Issues –Employee assistance program – International Safety & Health -labor management - employee unions – labor legislation- Unionizing Employees- Collective Bargaining.

TOTAL : 45 PERIODS

OUTCOMES:

- Identify the primary external influences affecting HRM.
- Outline the components and the goals of staffing, training and development.
- Understand the selection procedure in various organizations.
- Understand the practices used to retain the employees and able to evaluate their performance.
- Able to identify the stress and the cause of burn out

REFERENCES:

1. Biswajeet Pattanayak, 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. Human Resource Management, Eugence Mckenna and Nic Beach, Pearson Education Limited, 2002
5. Ivancevich, Human Resource Management, McGraw Hill 2002.
6. Mamoria C.B. and Mamoria S.Personnel Management, Himalaya Publishing Company, 1997.
7. Wayne Cascio, Managing Human Resource, McGraw Hill, 1998.

MC5010	INTERNET OF THINGS	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To understand the fundamentals of Internet of Things
- To learn about the basics of IOT protocols
- To build a small low cost embedded system using Raspberry Pi.
- To apply the concept of Internet of Things in the real world scenario

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 PERIODS

OUTCOMES:

Upon completion of the course, the student should be able to:

- Analyze various protocols for IoT
- Develop web services to access/control IoT devices.
- Design a portable IoT using Rasperry Pi
- Deploy an IoT application and connect to the cloud.
- Analyze applications of IoT in real time scenario

REFERENCES:

1. Arshdeep Bahga, 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, Vlasios Tsiatsis , 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

MC5011	SEMANTIC WEB	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To learn the importance of semantic web.
- To appreciate the merits of semantic web over traditional web.
- To know the methods to discover, classify and build ontology for more reasonable results in searching.
- To learn and appreciate RDF and its taxonomy.
- To describe OWL and its usage in semantic web.
- To implement applications that can access, use and manipulate the ontology

UNIT I INTRODUCTION 9

Introduction to the Syntactic web and Semantic Web – Evolution of the Web – The visual and syntactic web – Levels of Semantics – Metadata for web information - The semantic web architecture and technologies –Contrasting Semantic with Conventional Technologies – Semantic Modeling -Potential of semantic web solutions and challenges of adoption.

UNIT II ONTOLOGICAL ENGINEERING 9

Ontologies – Taxonomies –Topic Maps – Classifying Ontologies – Terminological aspects: concepts,terms, relations between them – Complex Objects –Subclasses and Sub-properties definitions–Upper Ontologies – Quality – Uses - Types of terminological resources for ontology building –Methods and methodologies for building ontologies – Multilingual Ontologies -Ontology Developmentprocess and Life cycle – Methods for Ontology Learning – Ontology Evolution – Versioning.

UNIT III DESCRIBING WEB RESOURCES 9

RDF Overview-The basic elements of RDF-RDF triples-Fundamental rules of RDF-Aggregation and distributed information-RDF tools-RDFS, Taxonomy, and Ontology-Need for RDFS-Core elements of RDFS .

UNIT IV WEB ONTOLOGY LANGUAGE 9

Requirements for Ontology Languages-OWLSublanguages-Description of the OWL Language-Layering of OWL-Examples for OWL-OWL in OWL-Namespaces, Classes of Classes, Class Equivalence, Building Classes from Other Classes, Restricting Properties of Classes.

UNIT V REAL-WORLD EXAMPLES AND APPLICATIONS 9

Swoogle- architecture, usage and examples-FOAF: Friend of a Friend-Basic FOAF vocabulary and examples-Applications-Information publishing, data integration, knowledge management, e-learning, web-services.

TOTAL : 45 PERIODS

OUTCOMES:

- Understand semantic web basics, architecture and technologies.
- Compare conventional web with semantic web.
- Able to understand the semantic relationships among the data elements using Resource Description Framework (RDF)
- Able to design and implement real-world applications that “discovers” the data and/or other web services via the semantic web

REFERENCES:

1. Grigoris Antoniou, Frank Van, “Semantic Web Primer”, MIT Press
2. Karin K. Breitman, Marco Antonio Casanova and Walter Truszowski, “Semantic Web Concepts: Technologies and Applications”, Springer, 2007
3. LiyangYu , “Introduction to the Semantic Web and Semantic web services” Chapman & Hall/CRC, Taylor & Francis group, 2007
4. Peter Mika, “Social networks and the SemanticWeb”, Springer, 1st edition 2007.
5. Robert M. Colomb, “Ontology and the Semantic Web”, Volume 156 ,Frontier in Artificial Intelligence and Applications, IOS Press, 2007

MC5012 SERVICE ORIENTED ARCHITECTURE L T P C
3 0 0 3

OBJECTIVES:

- To learn XML concepts and exposed to build applications based on XML
- To gain knowledge about SOAP, HTTP and UDDI to create web services
- To understand the SOA architecture and principles of Service Oriented Architecture.
- To learn about the role of SOA in J2EE, .NET and web services.
- To know about the Cloud Computing architecture and services.

UNIT I XML AND WEB SERVICES 9

XML structure – Elements – Creating Well-formed XML - Name Spaces – Schema Elements, Types, Attributes – XSL Transformations – Parser – Web Services Overview – Architecture.

UNIT II WSDL, SOAP and UDDI 9

WSDL - Overview Of SOAP – HTTP – XML-RPC – SOAP: Protocol – Message Structure – Intermediaries – Actors – Design Patterns And Faults – SOAP With Attachments – UDDI.

UNIT III SOA BASICS 9

Roots of SOA – Characteristics of SOA - Comparing SOA to client-server and distributed internet architectures – Anatomy of SOA- How components in an SOA interrelate - Principles of service orientation – Service Layers.

UNIT IV SOA in J2EE and .NET 9

SOA platform basics – SOA support in J2EE – Java API for XML-based web services (JAX-WS) - Java architecture for XML binding (JAXB) – Java API for XML Registries (JAXR) - Java API for XML based RPC (JAX-RPC) – JAX-RS SOA support in .NET – ASP.NET web services.

UNIT V CLOUD COMPUTING 9

Vision of Cloud computing – Cloud Definition – Characteristics and Benefits – Virtualization – Cloud computing Architecture – Cloud Reference Model, Types of Clouds – Cloud Platforms in Industry.

TOTAL : 45 PERIODS

OUTCOMES:

- Able to know the structure of XML and to design and store data in XML
- Able to apply SOAP , HTTP and UDDI services in the web applications.
- Able to apply SOA architecture and the underlying design principles for the web projects
- Able to understand the role of SOA in J2EE and .NET.
- Able to know the cloud computing architecture and the types of clouds

REFERENCES

1. Dan woods and Thomas Mattern, “Enterprise SOA designing IT for Business Innovation”, O’REILLY, First Edition, 2006.
2. Frank. P. Coyle, “XML, Web Services And The Data Revolution”, Pearson Education, 2002
3. Heather Williamson, “XML, The Complete Reference”, McGraw Hill Education, 2012.
4. Newcomer, Lomow, “Understanding SOA with Web Services”, Pearson Education, 2009.
5. Rajkumar Buyya, Christian Vecchiola, S. Thamarai Selvi, “Mastering Cloud Computing”, McGraw Hill Education, 2013.
6. Sandeep Chatterjee, James Webber, “Developing Enterprise Web Services. An Architect’s Guide”, Pearson Education, 2009
7. Thomas Erl, “Service-Oriented Architecture: Concepts, Technology, and Design”, Pearson Education, 2008.

MC5013	GAME PROGRAMMING	L	T	P	C
		3	0	0	3

OBJECTIVES:

- 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.
- To create interactive games

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 PERIODS

OUTCOMES:

- Illustrate an understanding of the concepts behind game programming techniques.
- Implement game programming techniques to solve game development tasks.
- Construct a basic game engine using open-source programming libraries.

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
6. Jason Gregory, “Game Engine Architecture”, A K Peters, 2009.
7. JungHyun Han, “3D Graphics for Game Programming”, Chapman and Hall/CRC, 1st Edition, 2011
8. Mike McShaffrfy, “Game Coding Complete”, 3rd Edition, Charles River Media, 2009.
9. Jonathan S. Harbour, “Beginning Game Programming”, Course Technology PTR, 3rd Edition, 2009
10. Jeannie Novak, “Game Development Essentials”, 3rd Edition, Delmar Cengage Learning, 2011.
11. John Hattan, “Beginning Game Programming: A GameDev.net Collection”, Course Technology PTR, 1st Edition, 2009
12. Jim Thompson, Barnaby Berbank-Green, and Nic Cusworth, “Game Design: Principles, Practice, and Techniques - The Ultimate Guide for the Aspiring Game Designer”, 1st Edition, Wiley, 2007.
13. Roger E. Pedersen, “Game Design Foundations”, Edition 2, Jones & Bartlett Learning, 2009.
14. Scott Rogers, “Level Up!: The Guide to Great Video Game Design”, Wiley, 1st Edition, 2010.

MC5014	COMPUTATIONAL INTELLIGENCE	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To understand the fundamentals of computational intelligence
- To know about the various knowledge representation methods
- To understand the features of neural network and its implementation
- To study about various data clustering methods
- To gain knowledge in evolutionary computation and neuro – fuzzy systems

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 PERIODS

OUTCOMES:

- Implement computational intelligence through applications
- Understand knowledge representation methods and apply approximate reasoning
- Apply evolutionary algorithm to solve the optimization problem
- Gain research Knowledge to develop applications using hybrid systems
- Able to Model Flexible Fuzzy Inference systems for dynamic nonlinear data sets

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MC5015	PRINCIPLES OF PROGRAMMING LANGUAGES	L	T	P	C
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OBJECTIVES:

- To understand and describe syntax and semantics of programming languages.
- To understand Data, Data types, and Bindings.
- To learn the concepts of functional and logical programming.
- To explore the knowledge about concurrent Programming paradigms.

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 PERIODS

OUTCOMES:

Upon completion of this course, the students will be able to

- Describe syntax and semantics of programming languages
- Explain data, data types, and basic statements of programming languages
- Design and implement subprogram constructs, Apply object - oriented, concurrency, pro
- and event handling programming constructs
- Develop programs in LISP, ML, and Prolog.

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1. Ghezzi, “Programming Languages”, 3rd Edition, John Wiley, 2008
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