COIMBATORE INSTITUTE OF TECHNOLOGY

(Government Aided Autonomous Institution Affiliated to Anna University, Chennai)

COIMBATORE - 641 014, TAMILNADU, INDIA

DIAMOND JUBILEE

(1956 - 2016)

Department of Computer Applications

Master of Computer Applications

Curriculum and Syllabi

Under Choice Based Credit System

(For the students admitted during 2015 - 2016 and onwards)

INDEX

COIMBATORE INSTITUTE OF TECHNOLOGY

(Government Aided Autonomous Institution Affiliated to Anna University, Chennai)

VISION AND MISSION OF THE INSTITUTE

VISION

The Institute strives to inculcate a sound knowledge in Engineering along with realized social responsibilities to enable its students to combat the current and impending challenges faced by our country and to extend their expertise to the global arena.

MISSION

The Mission of CIT is to impart high quality education and training to its students to make them World-Class Engineers with a foresight to the changes and problems, and pioneers to offer innovative solutions to benefit the nation and the world at large.

DEPARTMENT OF COMPUTER APPLICATIONS

COIMBATORE INSTITUTE OF TECHNOLOGY

VISION AND MISSION

VISION

The Department of Computer Applications strives to groom students with diverse backgrounds into competitive software professionals and pioneering leaders in offering innovative solutions to dynamic global challenges in tune with the needs of the society.

MISSION

The Mission of Department of Computer Application is to :

M1 Provide an environment for students to gain expertise in theoretical foundations of computer applications with emphasis on strong practical training that will enable them to develop real world applications catering to the global needs.

M2 Offer students a quality learning process in a research oriented environment with industrial collaboration that motivates them to innovate and explore.

M3 Develop intellectual curiosity and a commitment to lifelong learning in students, with societal and environmental concerns.

DEPARTMENT OF COMPUTER APPLICATIONS

COIMBATORE INSTITUTE OF TECHNOLOGY

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEOs for MCA programme are designed based on the Department Mission.

MCA Graduates will be able to :

PEO 1 : Develop software solutions to problems across a broad range of application domains through analysis and design.

PEO 2 : Contribute to research of their chosen field and function and communicate effectively, to perform both individually and in a multi-disciplinary team.

PEO 3 : Continue the process of life-long learning through professional activities; adapt themselves with ease to new technologies, while exhibiting high ethical and professional standards.

DEPARTMENT OF COMPUTER APPLICATIONS

COIMBATORE INSTITUTE OF TECHNOLOGY

PROGRAMME OUTCOMES (POs)

The following are Programme Outcomes for the MCA Programme :

PO1 : Graduates will be able to apply knowledge of computing fundamentals, computing specialization and domain knowledge for the abstraction and conceptualization of computing models from defined problems and requirements.

PO2 : Graduates will have the ability to understand and analyze a given real-world problem and propose feasible computing solutions.

PO3 : Graduates will be able to analyze customer requirements, create high level design, implement and document robust and reliable software systems.

PO4 : Graduates will be able to transform complex business scenarios and contemporary issues into problems, investigate, understand and propose integrated solutions using emerging technologies.

PO5 : Graduates will be able to use the techniques, skills and modern hardware and software tools necessary for innovative software solutions.

PO6 : Graduates will possess leadership and managerial skills with best professional ethical practices and social concern.

PO7 : Graduates will recognize the need for self-motivation to engage in lifelong learning.

PO8 : Graduates will be able to master fundamental project management skills, concepts and techniques, set attainable objectives and ensure positive results, meeting scope, time and budget constraints.

PO9 : Graduates will be able to communicate technical information effectively, both orally and in writing

PO10 : Graduates will be able to recognize the social, professional, cultural, and ethical issues involved in the use of computer technology and give them due consideration in developing software systems.

PO11 : Graduates will be able to work collaboratively as a member or leader in multidisciplinary teams.

PO12 : Graduates will be able to assess the need for innovation and initiate the process through entrepreneurship or otherwise.

COIMBATORE INSTITUTE OF TECHNOLOGY

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MASTER OF COMPUTER APPLICATIONS

Curriculum from the Academic Year 2015 - 2016 onwards

Semester I

Course Code	Course Name	L	T	P	C	Category#
	THEORY					
15MCA11	Theory of Computing	3	0	0	3	FC
15MCA12	Data Structures and Algorithms	3	0	0	3	FC
15MCA13	Programming in C	3	0	0	3	PC
15MCA14	Computer Organization	3	0	0	3	FC
15MCA15	Analysis and Design of Information Systems	3	0	0	3	PC
	PRACTICALS					
15MCA16	C Programming Lab	0	0	4	2	PC
15MCA17	Web Programming Lab	0	0	4	2	EEC
15MCA18*	Communication Skills					EEC
	TOTAL CREDITS				**19**	

Semester II

Course Code	Course Name	L	T	P	C	Category#
	THEORY					
15MCA21	Applied Statistics	3	0	0	3	FC
15MCA22	Object Oriented Principles and Programming in C++	3	0	0	3	PC
15MCA23	Computer Networks	3	0	0	3	PC
15MCA24	Principles of Operating System	3	0	0	3	PC
15MCA25	Database Management Systems	3	0	0	3	PC
	PRACTICAL					
15MCA26	Data Structures Lab	0	0	4	2	PC
15MCA27	Object Oriented Programming Lab	0	0	4	2	PC
15MCA28	RDBMS Lab	0	0	4	2	PC
15MCA29*	Professional English					EEC
	TOTAL CREDITS				**21**	

Semester III

Course Code	Course Name	L	T	P	C	Category#
	THEORY					
15MCA31	Operations Research	4	0	0	4	FC
15MCA32	Design and Analysis of Algorithms	3	0	0	3	PC
15MCA33	Internetworking Protocols and Management	3	0	0	3	PC
15MCA34	Java Programming	3	0	0	3	PC
	Elective I	3	0	0	3	PE
	PRACTICAL					
15MCA35	Java Programming Lab	0	0	4	2	PC
15MCA36	Operating Systems Lab	0	0	4	2	PC
15MCA37	Network Programming Lab	0	0	4	2	PC
15MCA38*	Personality Development					EEC
	TOTAL CREDITS				**22**	

Semester IV

Course Code	Course Name	L	T	P	C	Category#
	THEORY					
15MCA41	Accounting and Financial Management	4	0	0	4	FC
15MCA42	Software Engineering	3	0	0	3	FC
15MCA43	Object Oriented Analysis and Design	3	0	0	3	PC
	Elective II	3	0	0	3	PE
	Elective III	3	0	0	3	PE
	PRACTICAL					
15MCA44	Enterprise Computing Lab	0	0	4	2	PC
	Elective Lab	0	0	4	2	PE
15MCA45	Mini Project	0	0	4	2	EEC
	TOTAL CREDITS				**22**	

Semester V

Course Code	Course Name	L	T	P	C	Category#
	THEORY					
15MCA51	Software Testing and Quality Assurance	3	0	0	3	FC
15MCA52	Information Security	3	0	0	3	PC
	Elective IV	3	0	0	3	PE
	Elective V	3	0	0	3	PE
	Elective VI	3	0	0	3	PE
	PRACTICAL					
15MCA53	Software Testing Lab	0	0	4	2	PC
15MCA54	Information Security Lab	0	0	4	2	PC
15MCA55*	Professional Ethics					EEC
	TOTAL CREDITS				**19**	

Semester VI

Course Code	Course Name	L	T	P	C	Category#
15MCA61	Project work and Viva voce				18	EEC
	TOTAL CREDITS				**121**	

PROFESSIONAL ELECTIVES - Theory Subjects

Course Code	Course Name	L	T	P	C	Category#
15MCAE01	Organizational Behavior	3	0	0	3	PE
15MCAE02	Principles of Management	3	0	0	3	PE
15MCAE03	Principles of Environmental Science and Engineering	3	0	0	3	PE
15MCAE04	Human Computer Interaction	3	0	0	3	PE
15MCAE05	Intelligent Agents	3	0	0	3	PE
15MCAE06	Distributed Computing	3	0	0	3	PE
15MCAE07	Ad Hoc Networks	3	0	0	3	PE
15MCAE08	Cloud Computing	3	0	0	3	PE
15MCAE09	Cryptography and Network Security	3	0	0	3	PE
15MCAE10	Software Architecture and Design Patterns	3	0	0	3	PE
15MCAE11	Software Metrics and Measurement	3	0	0	3	PE
15MCAE12	Agile Methods for Software Development	3	0	0	3	PE
15MCAE13	Open Source Technologies	3	0	0	3	PE
15MCAE14	Enterprise Management and Computing	3	0	0	3	PE
15MCAE15	Healthcare Information System	3	0	0	3	PE

Course Code	Course Name	L	T	P	C	Category#
15MCAE16	Geographical Information System	3	0	0	3	PE
15MCAE17	Advanced Database Management Systems	3	0	0	3	PE
15MCAE18	Business Intelligence	3	0	0	3	PE
15MCAE19	Digital Image Processing	3	0	0	3	PE
15MCAE20	Unix Internals	3	0	0	3	PE
15MCAE21	Machine Learning	3	0	0	3	PE
15MCAE22	Internet of Things	3	0	0	3	PE
15MCAE23	Web Services	3	0	0	3	PE
15MCAE24	Data Analytics	3	0	0	3	PE
15MCAE25	E-Commerce	3	0	0	3	PE
15MCAE26	Basics of Robotics	3	0	0	3	PE
15MCAE27	Intelligent Information Retrieval	3	0	0	3	PE
15MCAE28	Mobile Computing	3	0	0	3	PE
15MCAE29	Parallel Programming	3	0	0	3	PE
15MCAE30	Graphics and Multimedia	3	0	0	3	PE
15MCAE31	Principles of Compiler Design	3	0	0	3	PE
15MCAE32	Microprocessors	3	0	0	3	PE
15MCAE33	Data Mining and Warehousing	3	0	0	3	PE
15FY22F	Basic French	3	0	0	3	EEC
15FY22G	Basic German	3	0	0	3	EEC

PROFESSIONAL ELECTIVES - Lab

Course Code	Course Name	L	T	P	C	Category#
15MCAEL01	Business Intelligence Lab	0	0	4	2	PE
15MCAEL02	Graphics and Multimedia Lab	0	0	4	2	PE
15MCAEL03	Assembly Language Programming Lab	0	0	4	2	PE
15MCAEL04	Internet of Things Lab	0	0	4	2	PE
15MCAEL05	Mobile Application Development Lab	0	0	4	2	PE
15MCAEL06	Cloud Computing Lab	0	0	4	2	PE

OPEN ELECTIVES

Course Code	Course Name	L	T	P	C	Category#
15MCAOE01	Accounting and Financial Management	3	0	0	3	OE
15MCAOE02	Basics of Java Programming	3	0	0	3	OE
15MCAOE03	Dot Net Programming	3	0	0	3	OE
15MCAOE04	C# and Dot Net Programming	3	0	0	3	OE
15MCAOE05	Parallel Processing	3	0	0	3	OE
15MCAOE06	Business Intelligence	3	0	0	3	OE

ONE CREDIT COURSES

Course Code	Course Name	L	T	P	C	Category#
15MCAOC01	Document Writing	0	2	0	1	EEC
15MCAOC02	Python	0	2	0	1	EEC
15MCAOC03	MATLAB	0	0	2	1	EEC
15MCAOC04	Cluster Computing Lab	0	0	2	1	EEC

* Pass is required

\# FC - Foundation Course, PC - Professional Core, PE - Professional Elective,
EEC - Employability Enhancement Course.

15MCA11 - THEORY OF COMPUTING

L	T	P	C
3	0	0	3

PRE-REQUISITES

Consent of the Instructor

ASSESSMENT : THEORY

COURSE OBJECTIVE

The course discusses various types of grammars and machine architectures that can understand each grammar type. It also aims at helps students understand the design of components of a programming language and how they interact with each other.

COURSE OUTCOME

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

CO1 *: Design State Machines, Automata, Turing Machines appropriate to a problem.*

CO2 *: Analyze the implementation of the components of a programming language.*

GRAMMARS AND FINITE STATE MACHINES

Chomsky Hierarchy of Grammars, Partial and Primitive recursive functions, Computability. McCarthy's formalism. Deterministic finite state machine, Non deterministic finite state machine, Pumping lemma for Regular grammar. **(9)**

PUSH DOWN AUTOMATA AND TURING MACHINES

Deterministic push down automata. Recognizing context free grammars. Non deterministic push down automata and Ambiguous context free grammars. Turing Machines, recognizing Context sensitive grammars. Types of Turing machines, Halting problem. Properties of an algorithm, Types of algorithms. **(9)**

IMPERATIVE PROGRAMMING

Statements : Structured Programming. Syntax-Directed Control Flow. Design Considerations: Syntax. Special Cases in Loops. Invariants. Partial Correctness. Control flow.

Types: Data Representation. Role of Types. Basic types Arrays. Records. Sets. Pointers. String Tables. Types and Error Checking.

Procedure Activations. Parameter-Passing Methods. Scope Rules for Names. Nested Scopes in Source Text. Activation Records. Lexical Scope. **(9)**

OBJECT-ORIENTED PROGRAMMING

Groupings of Data and Operations. Constructs for Program Structuring. Information Hiding. Design with Modules. Modules and Defined Types. Class Declarations. Dynamic Allocation. Templates: Parameterized Types. Implementation of Objects. Object-Oriented Programming. Object-Oriented Thinking. Inheritance. Object-Oriented Programming. Derived Classes and Information Hiding. **(9)**

FUNCTIONAL PROGRAMMING

Elements of Functional Programming. Language of Expressions. Types: Values, Operations. Function Declarations. Approaches to Expression Evaluation. Lexical Scope. Type Checking. Functional Programming in a Typed Language. Exploring a List. Function Declaration by Cases. Functions as First-Class Values. Functional Programming with Lists. Structure of Lists. List Manipulation. Storage Allocation for Lists. **(4)**

OTHER PARADIGMS

Logic Programming. Computing with Relations. Prolog: Data Structures,. Programming Techniques. Control. Cuts. An Introduction to Concurrent Programming. Parallelism in Hardware. Streams: Implicit Synchronization. Concurrency as Interleaving. Liveness Properties. Safe Access to Shared Data. Synchronized Access to Shared Variables **(5)**

TOTAL : 45

REFERENCE BOOKS

1. *EV Krishnamoorthy, "Introduction to Theory of Computation", East West Press,1983.*
2. *Ravi Sethi , "Programming languages: Concepts and constructs" 2nd Edition, Addison Wesley 1995.*
3. *John E Hopcroft, Jeffrey D Ullman ,"Introduction to Automata theory languages and computation", Addision Wesley 2006.*
4. *Michael Sipser "Introduction to the theory of computation" PWS Publishing, 2006.*
5. *Ellis Horowitz, "Fundamentals of programming languages" Springer-Verlag 1983.*
6. *Terrence W Pratt, Marvin Zelkowitz, "Programming languages Design and Implementation", Pearson Education, 4th edition, 2003.*

15MCA12 - DATA STRUCTURES AND ALGORITHMS

L	T	P	C
3	0	0	3

PRE-REQUISITES

Consent of the Instructor

ASSESSMENT : THEORY

COURSE OBJECTIVE

This course introduces data structures and algorithms and trains the students to design and analyze basic data structures. It makes them apply suitable data structures for solving real world problems.

COURSE OUTCOME

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

CO1 *: Compute efficiency of algorithms using various asymptotic notations.*

CO2 *: Design algorithms using various linked lists, stacks, queues and perform operations on them.*

CO3 *: Apply the concepts of trees/graphs on applications and describe the efficiency of various searching and sorting techniques.*

DATA STRUCTURES

Introduction, pseudo code, Abstract data type, model for ADT - Algorithm efficiency - Performance analysis - asymptotic notations. **(5)**

LINEAR LISTS

Array implementation, Linked list implementation, Linked list algorithms, processing a linked list, linear list applications, complex linked list structures. **(8)**

STACKS AND QUEUES

Stacks, Basic operations, array implementation, linked list implementation, applications - Queues, Basic operations, array implementation, linked list implementation, applications - Recursion, designing recursive Algorithms **(10)**

TREES AND GRAPHS

Trees, concepts, binary trees, binary tree traversal, Expression trees, changing general tree to binary tree, Binary search trees, AVL trees-Heaps, definition, structure, heap algorithms, heap applications Graphs, Terminology, operations, storage structures, applications-Dijkstra algorithm, minimum cost spanning trees. **(12)**

SEARCHING AND SORTING

Linear List searches, Hashed list searches, Collision resolution techniques. Sorting: Insertion sort, selection sort, quick sort, heap sort, radix sort, merge sort **(10)**

TOTAL : 45

REFERENCE BOOKS

1. *Richard F. Gilberg, Behrouz A. Forouzan, "Data Structures, A Pseudocode Approach with C", Second Edition, Brooks /Cole Publishing Company, 2007 .*
2. *Bhagath Singh and Thomas L. Naps. "Introduction to Data Structures", West Publishing Company, 1985.*
3. *Sahni, "Data Structures, Algorithms and Applications in C++", Tata McGraw hill, 1998.*
4. *Ellis Horowitz & Sartaj Sahani, "Fundamentals of Data Structures" Galgotia Publications, 1994.*

15MCA13 - PROGRAMMING IN C

L	T	P	C
3	0	0	3

PRE-REQUISITES

Consent of the Instructor

ASSESSMENT : THEORY

COURSE OBJECTIVE

This course enables students to write program efficiently to solve real world problem satisfying user needs.

COURSE OUTCOME

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

CO1 *: Understand the behavior of primitive data types, arrays, pointers, structures and file.*

CO2 *: Use decision and iteration control structures along with functions to implement simple algorithms and recursive algorithms.*

CO3 *: Write, debug and document well-structured applications.*

ALGORITHMS

Introduction to problem solving - Problem solving Aspect - Top-down Design-Implementation of Algorithms-Program Verification- Modular Design- Flowcharts - Development of Algorithm for simple problems: Exchanging the values of Two Variables- Summation of a set of numbers-Factorial Computation--Generation of Fibonacci Sequence-Reversing the digits of an Integer-Base Conversion-Character to Number Conversion- Greatest Common Divisor of Two Integers-Generating **(8)**

C LANGUAGE

Overview of C - Basic data types - Identifiers Name-Variable Initialization- Constants-symbolic constants -Arrays - Operators-Expressions- Bitwise operators - Character based I/O-Line based I/O-Formatted I/O.

CONTROL STATEMENTS

Selection statements- Iteration statements-Branch statements-Expression statements - Preprocessor phase - Storage classes - Derived data types. **(7)**

FUNCTIONS

General form of a Function - Accessing a function - Scope of a Function - Passing Arguments to function -Function prototype - Call by value - Call by reference- Recursion - storage classes - Auto - Static - Extern and Register. **(8)**

ARRAYS AND POINTERS

Single Dimensional arrays - Multi Dimensional arrays- Passing arrays to a function -Arrays and strings - Pointers:Definition -Pointers type declaration, Pointer assignment, Pointer initialization Pointer variables - Pointer operators - Pointer Expressions, Pointer to an array - Array of pointers - function pointers. **(8)**

STRUCTURES, UNION, ENUMERATIONS AND TYPEDEF

Structures - Array of Structures - Passing Structures to Function - Structure pointer - Self Referential Structures - Unions - Enumerations - Typedef. **(8)**

FILE AND PREPROCESSOR DIRECTIVES

File concept, File opening in various modes and closing of a file, Reading from a file, Writing onto a file. Conditional Compilation directives - Macros- Command Line Arguments. **(6)**

TOTAL : 45

REFERENCE BOOKS

1. *Herbert Schildt, "C- The Complete Reference", McGraw Hill, 4th edition, 2009.*
2. *Schaum's outline series, "Programming with C", Tata McGraw Hill Publication., 2nd Edition, 2010.*
3. *R.G. Dromey, "How to solve it by Computer", Prentice Hall of India, 8th Edition, 2003.*
4. *Kernighan B.W. and Ritchie D.M., "C Programming Language (ANSI C)", Pearson Education, 2004*
5. *Yashawant Kanetkar, "Working with C", BPB, 5th Edition, 2008.*
6. *Herbert Schildt, Jean Paul Tremblay, Richard B Bunt, "Introduction to Computer Science - An Algorithmic Approach", McGraw Hill, 2nd Edition, 1985.*
7. *Terrence W Pratt, "Programming language - Design and Implementation", Prentice Hall of India, 4th Edition, 2001.*

15MCA14 - COMPUTER ORGANIZATION

L	T	P	C
3	0	0	3

PRE-REQUISITES

Consent of the Instructor

ASSESSMENT : THEORY

COURSE OBJECTIVE

This course facilitates the students to infer and explain the operation of the various hardware components of recent computer systems along with the software interface.

COURSE OUTCOME

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

CO1 *: Analyze and describe how a computer system works and why it performs as it is.*

CO2 *: Describe how parallelism can improve the performance of the system.*

CO3 *: Determine the tradeoffs at Hardware/Software Interface.*

INTRODUCTION

Classes of computers - Definition of computer organization and Architecture - Performance of Computers - Instructions: Operations and Operand for computer hardware - Instruction Set Architecture - ARM addressing modes - Parallelism and Instructions - Translating a program - arrays versus pointers - x86 Instructions. **(9)**

ARITHMETIC UNIT

Addition - Subtraction - Multiplications - Division - Floating point Representations and Operations - Associativity between computer Arithmetic and Parallelism. Floating Point Architecture in x86. **(9)**

PROCESSING UNIT

Logic Design - Data path - A simple implementation scheme - pipelining - pipelined data path and control - Data Hazards - Control Hazards - Exceptions - Parallelism and Advanced Instruction-level parallelism **(9)**

MEMORY UNIT

Basics of caches - Measuring and improving Cache performance - Virtual memory - A framework for Memory Hierarchies - Virtual machines - controlling a simple cache - Parallelism and Memory hierarchies. **(9)**

I/O UNIT

Connecting Processors, Memory, and I/O devices - Interfacing I/O Devices to the Processor, Memory, and Operating System - Designing an I/O system - Parallelism and I/O.

Multicores, Multiprocessors, and Clusters: Difficulty of creating Parallel Processing Programs - Shared Memory Multiprocessors - Clusters - Hardware multithreading - SISD, MIMD, SIMD, SPMD, and vector architectures. **(9)**

TOTAL : 45

REFERENCE BOOKS

1. *David A Patterson and John L. Hennessy, "Computer Organization and Design - The Hardware/ Software Interface", Fourth Edition, Morgan Kaufmann Publishers, 2010.*
2. *John L Hennessy and David A Patterson, "Computer Architecture - A Quantitative Approach", Morgan Kaufmann, Fifth Edition, 2007.*
3. *Carl Hamacher, Zuonko Uranesic & Safwat Zoky, "Computer Organization", McGraw Hill, 5th Edition, 2002.*

15MCA15 - ANALYSIS AND DESIGN OF INFORMATION SYSTEMS

L	T	P	C
3	0	0	3

PRE-REQUISITES

Consent of the Instructor

ASSESSMENT : THEORY

COURSE OBJECTIVE

This course enables students to analyze and design an organizations' information system needs.

COURSE OUTCOME

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

CO1 *: Identify the basic building blocks of software system.*

CO2 *: Capture requirements, design and build information systems.*

FOUNDATIONS FOR SYSTEM DEVELOPMENT

The Systems Development Environment - Succeeding as a System Analyst - Managing the Information Systems Project: Definitions, Initiating a project - Planning a project, Executing a project, Closing down a project - Automated tools for system development. **(8)**

MAKING THE BUSINESS CASE

Identifying and Selecting Systems Development Projects, Information system planning, Ecommerce Application - Initiating and Planning Systems Development Projects - Assessing Project Feasibility - Building the Baseline Project Plan. **(8)**

ANALYSIS

Determining System Requirements - Structuring System Process Requirements: Process Modeling - Logic Modeling and Conceptual Data Modeling - Selecting the Best Alternative Design Strategy. **(10)**

DESIGN

Designing Databases - Designing Forms and Reports - Designing Interfaces and Dialogs - Program and Process design - Finalizing Design Specifications - Designing Internet Systems. **(10)**

IMPLEMENTATION AND MAINTENANCE

System Implementation, Software Application Testing - Installation - Documentation-Training - Organizational issues; Project Closedown; Maintaining Information Systems - Conducting System Maintenance - Web site maintenance. **(9)**

TOTAL : 45

REFERENCE BOOKS

1. *Jeffrey A.Hoffer, Joey F.George, Joseph S. Valacich, "Modern Systems Analysis and Design", Pearson Education Ltd, 6th Edition, 2010.*
2. *Kenneth E. Kendall and Julie E. Kendall, "Systems Analysis & Design", Pearson Education Asia, 8th Edition, 2011.*
3. *James A. Senn, "Analysis & Design of Information Systems", McGraw-Hill International Edition, 2nd Edition, 2008.*

15MCA16 - C PROGRAMMING LAB

L	T	P	C
0	0	4	2

PRE-REQUISITES

Consent of the Instructor

ASSESSMENT : PRACTICAL

COURSE OBJECTIVE

This course trains students to write program efficiently to solve real world problems using C constructs and features.

COURSE OUTCOME

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

CO1 *: Understand primitive data types and advanced data type, and know how to use them in programming.*

CO2 *: Understand and utilize functions and files for implementing algorithms in C Programming.*

CO3 *: Gain confidence at having conceptualized, designed and implemented a working medium sized project with their team.*

LIST OF PROGRAMS

1. Simple programs to understand the concepts of data types.
2. Writing programs to get familiarity on using conditional, control and repetition statements.
3. Defining and creating one and two dimensional arrays with storage operations.
4. Working with pointers.
5. Declaring and defining the functions by passing arguments of value type and pointer type.
6. String manipulations.
7. Solving Recursive problems - Factorial.
8. Solving iterative problems - Trigonometric series evaluation.
9. Use dynamic memory allocation functions for storage allocation.
10. Defining and handling structures, array of structures, structure pointers, union and enumeration type.
11. Defining functions with structure.
12. Application Programs using file operations.

15MCA17 - WEB PROGRAMMING LAB

L	T	P	C
0	0	4	2

PRE-REQUISITES

Consent of the Instructor

ASSESSMENT : PRACTICAL

COURSE OBJECTIVE

This course makes students to gain thorough knowledge on designing a web site with basic features, client and server side programming under the MVC Architecture and to decide on the choice of the database technologies for applications as required.

COURSE OUTCOME

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

CO1 *: Create or enhance the existing web sites with better and generic style properties for the entire websites.*

CO2 *: Create complete perfect website under the MVC architecture with basic features and have the ability to work under any web programming language for Client/Server Programming.*

CO3 *: Work independently for database programming for web applications by choosing the best back end for the required application environment.*

CONCEPTS/ TOOLS TO BE COVERED

WEB SITE DEVELOPMENT

1. Using HTML, XHTML, XML
2. Using the features of CSS

WEB APPLICATION DEVELOPMENT

1. Client side scripting using VB Script.
2. Server side scripting using PHP.
3. Database connectivity programming.

15MCA18 - COMMUNICATION SKILLS

PRE-REQUISITES

Consent of the Instructor

ASSESSMENT : PRACTICAL

COURSE OBJECTIVE

This course trains the students to perceive the nuances of LSRW Skills, enrich pronunciation and presentation skills to communicative effectively in all social interactions at work place.

COURSE OUTCOME

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

CO1 : *Communicate effectively at work place.*

CO2 : *Comprehend effectively the different speech sounds.*

CO3 : *Use the structures and produce language fluently, easily and accurately.*

COMMUNICATION SKILLS

Introduction - Code and Content - Stimulus and Response: Source - The Encoding Process - The Channel - The Decoding Process - The Receiver - Speaking Skills - Effective Speaking Guidelines - Communicating Soft Skills: A Self-assessment - Closing Tips on Improving Speaking Skills.

INTRODUCTION TO SPEECH SOUNDS

Pronunciation Etiquette - Phonetics: Phonetic Chart - Exercise - Syllabus - Stress - Accent - Rhythm - Intonation

FOCUS ON LANGUAGE

Synonyms and Antonyms - Idioms - Phrasal Verbs - Nouns-Compound Nouns & Noun Phrases - Gerunds & Infinitives - Subject Verb Agreement- Tenses - Adjectives and Adverbs - Active Passive voice - Cause and Effect Sentences - Purpose and Function.

READING & WRITING

Reading Comprehension - Techniques for Good Comprehension - Skimming & Scanning -Sequencing of Sentences - Paragraph Construction - Paragraph Patterns - Kinds of Paragraph - Writing a First Draft, Revising & Finalizing - Steps to Effective Précis Writing - Process Description - Dialogue Writing

LISTENING & SPEAKING

Importance of Listening & Empathy in Communication - Reasons for Poor Listening - Traits of a Good listener - Listening Modes - Short Dialogues - Short Conversation Achieving Confidence, Clarity & Fluency - Paralinguistic Features - Barriers to Speaking - Types of Speaking - Persuasive Speaking - Public Speaking-Conversations - Telephonic Conversations & Etiquette - Effective Presentation Strategies - Planning - Outlining & Structuring - Nuances of Delivery.

REFERENCE BOOKS

1. *Meenakshi Raman, Sangeeta Sharma, "Technical Communication - English Skills for Engineers", Oxford University Press, New Delhi, 2012.*
2. *Kiranmani Dutt P, "A Course in Communication Skills", Cambridge University Press, 2011.*
3. *Samson T, "Innovate with English", Cambridge University Press, 2012.*
4. *Michael Mc Carthy and Felicity O'Dell, "English Vocabulary in Use", Cambridge University Press, 2012.*

15MCA21 - APPLIED STATISTICS

L	T	P	C
3	0	0	3

PRE-REQUISITES

Consent of the Instructor

ASSESSMENT : THEORY

COURSE OBJECTIVE

This course focuses on random variables, mean and variance various testing of hypothesis, statistical quality control methods and reliability theory.

COURSE OUTCOME

Upon Completion of the course, the students will be:

CO1 *: Equipped with the knowledge of random variables properties and correlation for their study.*

CO2 *: Able to apply Statistical methods on data for analysis and inference.*

CO3 *: Familiar in applying reliability theory to solve real life problems.*

RANDOM VARIABLES AND CORRELATION

Types of random variables - density function - distribution function - mathematical expectation -mean and variance - correlation - regression lines - multiple and partial correlation coefficients. **(9)**

THEORY OF SAMPLING AND ESTIMATION

Test of significance - standard error - level of significance - error in sampling - test of hypothesis - small sample tests - Student t-test, F-test, and Chi-square test - interval estimates- mean, proportion and variance for both small and large samples. **(9)**

TIME SERIES AND ANALYSIS OF VARIANCES

Component of time series - measurement of trend - moving average method - least square method for linear and exponential curves. Basic principles of experimental design - analysis of variance for one way classification - completely randomized design - Latin square design. **(9)**

STATISTICAL QUALITY CONTROL

Statistical basis for control charts - control limits - control chart for variables - mean - range - variance - control chart for attributes - p-chart, np-chart, c-chart - Acceptance sampling by attributes-single sampling plan - Operating characteristic(O.C) curve, Average out going quality (A.O.Q) curve -Average sampling number (A.S.N) curve - double sampling plan - advantages and disadvantages. **(9)**

RELIABILITY

Concept of reliability - hazard rate - mean time to failure - standard reliability models - series and parallel system reliability - simple problems **(9)**

TOTAL : 45

REFERENCE BOOKS

1. *Kandasamy, P. et al., "Probability Statistics and Queuing Theory", S. Chand & Co., 2004.*
2. *Freund, J.R and Miller, I.R., "Probability and Statistics for Engineers", Prentice - Hall of India, 8th Edition, New Delhi., 2010.*
3. *Veerarajan, T. "Probability, Statistics and Random Process" Tata McGraw-Hill, 3rd Edition, 2008.*
4. *Grant, E.L. "Statistical Quality Control", 7th Edition, McGraw Hill Book Company, 2005.*
5. *Gupta, S.C. and Prof. Kapoor, V.K., "Fundamentals of Applied Statistics", Edition, 4, reprint, S. Chand & Co., 2007.*
6. *Murray R. Spiegel, 'Theory and problems of probability and statistics", Tata McGraw-Hill, 4th Edition, 2011.*

15MCA22 - OBJECT ORIENTED PRINCIPLES AND PROGRAMMING IN C++

L	T	P	C
3	0	0	3

PRE-REQUISITES

15MCA13, 15MCA16

ASSESSMENT : THEORY

COURSE OBJECTIVE

This course gives the students an exposure to object-oriented principles and equips them with skills to implement object-oriented principles in C++.

COURSE OUTCOME

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

CO1 *: Identify objects and define objects using object model.*

CO2 *: Implement the object oriented software system using C++.*

INTRODUCTION

Object Oriented Principles - Key concepts of Object Oriented Programming - Introduction to Objects : Abstraction, Interface, Hidden Implementation - Inheritance - Composition - Polymorphism - Creating and Destroying objects - Exception handling : dealing with errors - Analysis and Design - Advantages of C++ - Compiling and building programs **(6)**

BASIC FACILITIES IN C++

Overview of C++ - Types and Declarations - Arrays, Pointers, Structures, References and Functions - Function Overloading - Name spaces - Source Files and Programs.

ABSTRACT DATA TYPE IN C++

Class - Class members and Access control - Constructors- Static members - Default copy constructor - Const member functions - this pointer - Inline function definition - Concrete classes - Destructors - new and delete - Member objects. **(11)**

OPERATOR OVERLOADING

Operator functions - Binary and unary operators - Member and nonmember operators - Friend functions - Large objects - Function call -Increment and Decrement - A string class - Dereferencing. **(8)**

INHERITANCE

Derived Classes - Class Hierarchies - A virtual function- Abstract classes. Templates: Function templates - Derivation and Templates. **(10)**

EXCEPTION HANDLING AND LIBRARY CLASSES

Grouping of exceptions - Catching exceptions - Exceptions that are not errors - Uncaught Exceptions - Standard exceptions - The standard library - I/O streams - File streams. **(10)**

TOTAL : 45

REFERENCE BOOKS

1. *Bruce Eckel, "Thinking in C++", Vol. 1 , 2nd Edition, Prentice Hall, 2000.*
2. *Bjarne Stroustrup, "The C++ Programming Language", 4th Edition, Addison Wesley, 2013.*
3. *Herbert Schildt, "The Complete Reference C++", 4th Edition, Tata McGraw Hill, 2003.*
4. *Stanley B Lippman, Jove Lajoie, and Barbara Moo "C++ Primer", 5th Edition, Addison Wesley, 2012.*

15MCA23 - COMPUTER NETWORKS

L	T	P	C
3	0	0	3

PRE-REQUISITES

Consent of the Instructor

ASSESSMENT : THEORY

COURSE OBJECTIVE

This course introduces the students to fundamental concepts of computer networks and concentrates on building a firm foundation for understanding Computer Networks based around the OSI Reference Model.

COURSE OUTCOME

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

CO1 *: Understand working principles of computer networks along with the network components.*

CO2 *: Explain the data communication mechanism implemented in a computer network through various algorithms and their associated concerns.*

CO3 *: Analyze the operations of application layer protocols and identify required services from underlying network layers.*

INTRODUCTION

Uses of computer networks - Network hardware - Network software - Reference models - Example networks. Physical layer: Theoretical basis for data communication - Guided transmission media - Wireless transmission **(9)**

DATA LINK LAYER

Design issues - Error detection and correction - Elementary data link protocols - Sliding window protocols - Example protocol: HDLC. Medium Access Control sublayer: Channel allocation problem - Multiple access protocols - Ethernet **(9)**

NETWORK LAYER

Design issues - Routing algorithms - Congestion control algorithms - Internet working **(9)**

TRANSPORT LAYER

Transport service - Elements of transport protocols - A Simple transport protocol: UDP **(9)**

APPLICATION LAYER

Domain Name System - Electronic mail - World Wide Web **(9)**

TOTAL : 45

REFERENCE BOOKS

1. *Andrew S Tanenbaum and David J. Wetherall, "Computer Networks", Pearson Education Asia, 5th Edition, 2011.*
2. *Larry L. Peterson and Bruce S. Davie, "Computer Networks: A Systems Approach", Morgan Kaufmann Publishers, 5th Edition, 2011.*
3. *Behrouz Forouzan, "Data Communications and Networking", McGraw-Hill Science/Engineering/Math Publication, 5th Edition, 2012.*
4. *James F. Kurose, Keith W. Ross, "Computer Networking: A Top-Down Approach", Addison-Wesley, 6th Edition, 2008.*

15MCA24 - PRINCIPLES OF OPERATING SYSTEM

L	T	P	C
3	0	0	3

PRE-REQUISITES

Consent of the Instructor

ASSESSMENT : THEORY

COURSE OBJECTIVE

This course aims at providing the students with the concepts and basic principles used in the design of modern operating system.

COURSE OUTCOME

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

CO1 : *Learn about and understand theoretical concepts and principles used in the design of modern Operating System.*

CO2 : *Demonstrate and interpret working of job scheduling algorithms.*

CO3 : *Implement various strategies used for managing memory, process synchronization issues and handle deadlock conditions efficiently.*

INTRODUCTION

Operating system - extended view of resource manager - Over view: Simple batch system - multi programmed batch systems - time sharing systems - parallel systems - distributed systems - real time systems - personal computer systems - system structure: IO structure - dual mode operation - operating system services - system calls - system programs - virtual machines. **(8)**

PROCESS MANAGEMENT

Process concepts - concurrency - process scheduling - operations on process -Threads - Relationship between process and threads - Thread State - Thread Scheduling- Thread Synchronization- inter process communication - process synchronization: critical section problem - mutual exclusion - Dekker's algorithm - synchronization hardware - semaphore - classical problem of synchronization - critical regions - monitors - atomic transaction - race condition. Dead lock characterization - handling dead locks - prevention - avoidance - detection and recovery - combined approach. **(10)**

PROCESSOR MANAGEMENT

Basic concepts - scheduling criteria - preemptive versus non-preemptive scheduling - scheduling algorithms: FIFO - Shortest job first, priority, round robin, multi level queue - multi level feedback queue -multiprocessor scheduling. **(9)**

MEMORY MANAGEMENT

Basic concepts - logical versus physical address - swapping - contiguous allocation - paging - segmentation- combined paging and segmentation - virtual memory - demand paging - performance - page replacement algorithms- thrashing - demand segmentation. **(9)**

I/O AND FILE MANAGEMENT

I/O: hardware - application I/O interface - performance - disk structure - disk scheduling - disk management - swap space management - disk reliability. File management: file concepts - access methods - directory structure - file system structure - allocation methods - free space management - network file system. **(9)**

TOTAL : 45

REFERENCE BOOKS

1. *Abraham Silberschatz. A, Peter Baer Galvin, Greg Gagne, "Operating System Concepts" John Wiley, 2009.*
2. *William Stallings, "Operating Systems: Internals and Design Principles", Prentice-Hall, 2008.*
3. *H.M.Dietel, "An Introduction to Operating Systems", Addison Wesley, 2nd Edition, 1998.*
4. *Andrew S. Tanenbaum, "Modern Operating Systems", Prentice Hall of India Pvt. Ltd, 2003.*

15MCA25 - DATABASE MANAGEMENT SYSTEMS

L	T	P	C
3	0	0	3

PRE-REQUISITES

Consent of the Instructor

ASSESSMENT : THEORY

COURSE OBJECTIVE

This course introduces the students to basic components of DBMS, Designing a database and Writing queries using SQL constructs and programs with PL/SQL.

COURSE OUTCOME

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

CO1 : *Explain the basic concepts of DBMS.*

CO2 : *Design normalized database, store, retrieve and manipulate the data stored in the relations.*

CO3 : *Propose suitable concurrency control mechanism.*

DATABASES AND DATABASE USERS

Introduction - Characteristics of the database approach - Actors - Advantages. Database system - Concepts and Architecture : Data models, schemas and instances - Three schema architecture - Data Independence - DBMS Languages and Interfaces - DBMS component modules - Centralized DBMS architecture - Basic Client/Server Architecture. **(6)**

DATABASE DESIGN

Using high-level conceptual data models - Entity types, Entity sets, Attributes and Keys, Relationship types, Relationship sets, roles and structural constraints, Weak entity types - Refining the ER design - Naming conventions - EER modeling - Relationship types of degree higher than two. **(4)**

RELATIONAL MODEL

Relational model concepts - Relational model constraints - Relational database schemas - Update operations and dealing with constraint violations. Relational Algebra - Unary operations - set operations - binary operations - additional operations. ER and EER to Relational Mapping. **(6)**

SQL

Schema Definition, Basic constraints and Queries :SQL Data Definition - Specifying basic constraints - Schema Change Statements - Basic queries - complex queries - other DML statements - Views - Programming with PL/SQL. **(8)**

NORMALIZATION

Informal Design guidelines - Functional Dependencies - Definition - Inference rules - Normal Forms based on Primary keys - General Definitions of 1NF, 2NF, 3NF and BCNF - Properties of relational decompositions. **(6)**

DATA STORAGE AND INDEXING

File Organizations and Indexes - Buffering of blocks - Placing File records on disk - Files of ordered and unordered records - Hashing Techniques - RAID Technology - Indexing structures for files. **(8)**

TRANSACTION PROCESSING CONCEPTS

Introduction-Transaction and System concepts - Characterizing schedules based on recoverability and conflict serializability. Concurrency control techniques-Two phase locking-Concurrency based on Time stamp ordering. Recovery - Database recovery concepts - Recovery techniques based on Deferred Update and Immediate Update-Shadow paging. **(7)**

TOTAL : 45

REFERENCE BOOKS

1. *Ramez Elmasri, Shamkant B. Navathe Durvasula, V.L.N. Somayajulu, Shyam K. Gupta, "Fundamentals of Database Systems", 4th Edition, Pearson Education, 2006.*
2. *Christopher Allen, Simon Chatwin, Catherine A. Creary, "Introduction to Relational Databases and SQL Programming", Tata McGraw-Hill.*
3. *Abraham Silberscatz, Henry F. Korth, S. Sudharshan, "Database System Concepts", 6th Edition, Mc Graw Hill International Edition, 2011.*

15MCA26 - DATA STRUCTURES LAB

L	T	P	C
0	0	4	2

PRE-REQUISITES

15MCA12, 15MCA13

ASSESSMENT : PRACTICAL

COURSE OBJECTIVE

This course makes the students proficient in using data structures for solving various classes of problems and trains them analyze their efficiency.

COURSE OUTCOME

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

CO1 *: Implement algorithmic solutions for any real world applications using arrays, linked lists, stacks, queues and perform operations on them.*

CO2 *: Implement and solve applications using trees/graphs.*

CO3 *: Implement various sorting and searching techniques and compute and compare their efficiency.*

CONCEPTS TO BE COVERED

1. Applications of 2D, 3D arrays
2. Compute time and space complexity for simple programs
3. Implement linear linked list, doubly linked list
4. Basic operations of stack- Array, linked list implementation
5. Building applications using stack
6. Basic operations of queue- Array, linked list implementation
7. Implementing priority queue, circular queue
8. Recursion - Towers of Hanoi, Fibonacci series
9. Building Binary Search Tree, operations on BST operations on AVL trees
10. Operations on Heap
11. Implement Sorting & Searching technique

15MCA27 - OBJECT ORIENTED PROGRAMMING LAB

L	T	P	C
0	0	4	2

PRE-REQUISITES

15MCA13, 15MCA16, 15MCA22

ASSESSMENT : PRACTICAL

COURSE OBJECTIVE

This course enables students to practice object-oriented principles and provide an environment for developing real-life object-oriented applications.

COURSE OUTCOME

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

CO1 *: Apply object-oriented principles.*

CO2 *: Implement object-oriented applications to meet the industry standards.*

CONCEPTS TO BE COVERED IN C++

1. Define class with data members and member functions.
2. Automatic creation and deletion of objects using constructors and destructors.
3. Reuse of functions and operators using function and operator overloading.
4. Prevent creation of class instance using static data members and member functions
5. Provide unbounded communication using friend functions.
6. Demonstrate class reusability through single, multiple and multilevel inheritance.
7. Demonstrate run-time polymorphism using Abstract and Virtual functions and classes
8. Generic programming with Template functions and classes.
9. Demonstrate Container class templates.
10. Demonstrate exceptional handling mechanism.
11. Use I/O and File stream classes to develop real time application and incorporate object-oriented principles appropriately.

15MCA28 - RDBMS LAB

L	T	P	C
0	0	4	2

PRE-REQUISITES

15MCA25

ASSESSMENT : PRACTICAL

COURSE OBJECTIVE

This Laboratory aims at making students to use the facilities of SQL ,write the various Queries and write PL/SQL blocks.

COURSE OUTCOME

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

CO1 *: Design and create a database.*

CO2 *: Work with SQL in Oracle.*

CO3 *: Develop PL/SQL programs using the features of exception handling, views, cursors, procedures and functions, packages and triggers.*

CONCEPTS TO BE COVERED

1. Creating and managing tables
2. Basic SQL SELECT statements
3. Restricting and sorting data
4. Single row functions
5. Displaying data from multiple tables
6. Aggregating data using Group function - Group By
7. Sub queries
8. Constraints
9. Views, Sequence, Index, Synonym
10. SET operators, Date time functions
11. PL/SQL Programs
12. Exception Handling, Cursors, Functions, Procedures, Package, Triggers

15MCA29 - PROFESSIONAL ENGLISH

PRE-REQUISITES

Consent of the Instructor

ASSESSMENT : PRACTICAL

COURSE OBJECTIVE

This course enables students to understand the intricacies of Soft skills and develop knowledge in the key areas of communication for various professional purposes at work place

COURSE OUTCOME

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

CO1 *: Gain access to the various technical writing skills required for a professional.*

CO2 *: Equip themselves with soft skills required for a professional.*

CO3 *: Enhance their awareness about work ethics and work culture.*

TECHNICAL WRITING

Introduction to Technical Writing - Formal, Informal and Technical Reports - Formal and Informal Letters, Business Letters - Quotations, Complaint Letters and Enquiry Letters - Job Applications: Writing Resume or Curriculum Vitae: Introduction - Difference between a Resume and a CV - The Strategy of Resume Writing - A Favourable First Impression - The Main Body of the Resume - A Fresher's Resume - A Few Helpful Tips - E-mails.

SOFT SKILLS

Introduction to Soft Skills - Lessons from the Three Case Studies - Change in Today's Workplace: Soft Skills as a Competitive Weapon - Antiquity of Soft Skills - Classification of Soft Skills: Time Management - Attitude - Responsibility - Ethics, Integrity, Values and Trust - Self-confidence and Courage - Consistency and Predictability - Teamwork and Interpersonal Skills - Communication and Networking - Empathy and Listening Skills - Problem Solving, Troubleshooting and Speed Reading - Leadership.

TELEPHONING SKILLS & NEGOTIATIONS

Preparing to make a telephone call - Receiving calls - Taking and leaving messages - Asking for and giving repetition - The secretarial barrier - Cross-cultural communication on the telephone - Setting up appointments - Changing arrangements - Ending a call - Cross-cultural communication on the telephone - Problem-solving on the telephone - Complaints - Negotiations: Types of negotiation - Preparation for a negotiation - Making an opening statement - Bargaining and making concessions - Accepting and confirming - Summarizing and looking ahead - Types of negotiator - Dealing with conflict - Rejecting - Ending the negotiation

SPEAKING

Job Interviews: Introduction - Types of Interviews - Groundwork before the Interview -Importance of body Language in Interview - Need for proper Articulation - Concluding an Interview - Telephonic or Video Interview - A Mock Interview - Group Discussion: Introduction - Ability to Work as a Team - Communication Skills - Active Listening - Non-verbal Communication - Leadership and Assertiveness - Reasoning - Ability to Influence - Innovation. Creativity, and Lateral Thinking - Flexibility - Key Steps to Succeed in a Group Discussion - The Responsibility of the First Speaker - Concluding the Discussion - Dos and Don'ts during a Group Discussion

COMMON ERRORS IN ENGLISH

Errors in Tenses - Phrasal Verbs - Idioms and Phrases - Prepositional Errors and Pronoun Errors.

REFERENCE BOOKS

1. *Meenakshi Raman, Sangeeta Sharma, "Technical Communication - Principles and Practice", 2nd edition, Oxford University Press, New Delhi, 2012.*
2. *Simon Sweeney, "English for Business Communication", Cambridge University Press, 2010.*
3. *Mukhopadhyay Lina, "Poly Skills: A Course in Communication Skills and Life Skills" Cambridge University Press, 2012.*
4. *Krishna Mohan & Merra Banerji, "Developing Communication Skills", 2nd Edition. Macmillan Publishers India Ltd. 2012.*

15MCA31 - OPERATIONS RESEARCH

L	T	P	C
4	0	0	4

PRE-REQUISITES

Consent of the Instructor

ASSESSMENT : THEORY

COURSE OBJECTIVE

This course makes the students to analyze any decision situation and offer solutions for the best utilization of limited resources, to improve the efficiency and productivity of any organization.

COURSE OUTCOME

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

CO1 *: Apply linear programming model, assignment model, transportation model and dynamic programming to domain specific situations.*

CO2 *: Analyze the inventory and queuing theories and apply them in real world problems.*

CO3 *: Apply the concepts of PERT and CPM for decision making and optimally managing projects.*

LINEAR PROGRAMMING

Development of operations research - modeling - structure of mathematical models - definition and properties of linear programming problems - canonical and standard forms- formulation - graphical solution - simplex method. **(10)**

DUALITY

Dual of LPP, primal - dual relationships. Applications of LPP : Assignment model - Hungarian Techniques.Transportation model - Vogels approximation method - degeneracy, unbalanced problems. **(10)**

DYNAMIC PROGRAMMING

Characteristics of dynamic programming - Bellmans principle of optimality. Application - stage coach problem, resource allocation problems, cargo loading problem. **(10)**

INVENTORY

Need for the inventory - Costs involved in inventory - Concepts of average inventory - Economic order quantity.

Deterministic model: Fixed ordering quantity models - EOQ model with uniform demand, finite / infinite replacement with / without shortages. Dynamic ordering quantity model, EOQ with one price break.

Inventory control - Buffer stock - Determination of optimum buffer stock - EOQ system of ordering - Multi item order model - ABC analysis. **(10)**

QUEUING THEORY

Characteristics of queuing systems, steady state M/M/1 model. Simulation-Monte Carlo method-applications to queuing and inventory problems **(10)**

PERT & CPM NETWORKS

Time estimate - earliest expected time, latest allowable occurrence time & slack - critical path - probability of meeting a scheduled date of completion of the project. Calculation on the CPM network - floats - critical path. Time - cost analysis-crashing-Least cost schedule algorithm. **(10)**

TOTAL : 60

REFERENCE BOOKS

1. *Hamdy, A Taha, "Operations Research - An introduction", Pearson Education India ,2004.*
2. *S. D. Sharma, "Operations Research", Kedar Nath Ram Nath & Co publishers, 2004.*

15MCA32 - DESIGN AND ANALYSIS OF ALGORITHMS

L	T	P	C
3	0	0	3

PRE-REQUISITES

15MCA12

ASSESSMENT : THEORY

COURSE OBJECTIVE

This course introduces and trains the students apply various design techniques and advanced tree structures to real world scenarios and make them analyze and compare their efficiency

COURSE OUTCOME

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

CO1 *: Students have knowledge in understanding the features of BST, AVL, B-Tree, Red-Black trees.*

CO2 *: Students are able to choose appropriate algorithm design techniques to solve real world problems.*

CO3 *: Analyze the complexities of various problems in different domains.*

TREES

AVL Trees, Properties, rotations, operations - Multiway trees, Definition - m-way search tree B-trees - operations - Trie structures - B+ tree, Red Black trees, properties, rotations, operations **(8)**

ALGORITHM DESIGN TECHNIQUES

Divide & Conquer : General method - Binary Search, Merge Sort, Insertion Sort, Quick Sort **(9)**

Greedy method : General method - Knapsack problem -Minimum cost spanning trees-Prim's & Kruskal's algorithm, Single source shortest paths **(10)**

Dynamic Programming : General method - Multistage graph- All pairs shortest paths, Single source shortest paths-General weights, Traveling salesperson problem **(8)**

Back tracking : General method - Eight queen's problem, Graph coloring

Branch & Bound : LC search, Bounding functions, 0/1 Knapsack Problem, Traveling sales person problem. **(10)**

TOTAL : 45

REFERENCE BOOKS

1. *Richard F. Gilbery, Behrouz A.Forouzan, "Data structures - A Pseudocode Approach with C", 2002 Edition, Thomson Asia Pvt Ltd. (AVL Trees and Multiway trees)*
2. *Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran, "Fundamental of Computer Algorithms", 2nd Edition, Universities Press, Hyderabad, 2008. (Algorithm Design Techniques)*

3. *Thomas H.Cormen, Charles E.Leiserson, Ronald L. Rivert, Clifford Stein "Introduction to Algorithms", 2nd Edition, Prentice Hall of India, Publications, New Delhi, 2007. (Red Black Trees).*
4. *Anany Levitin, "Introduction: The Design & Analysis of Algorithm", 2003 Edition, Pearson Education Inc.*
5. *S.K. Basu, "Design Method & Analysis of Algorithm", PHI, 2005 Edition*
6. *Mark Allen Weiss, "Data structures and Algorithm Analysis in C", 2nd Edition, 1997, Pearson Education Inc.*

15MCA33 - INTERNETWORKING PROTOCOLS AND MANAGEMENT

L	T	P	C
3	0	0	3

PRE-REQUISITES

15MCA13, 15MCA23

ASSESSMENT : THEORY

COURSE OBJECTIVE

- *To introduce the syntax, semantics and working principles of various Internetworking protocols for Unicast, Broadcast and Multicast Communications.*
- *To provide an overview on network management and socket programming.*

COURSE OUTCOME

The students shall be able to:

CO1 *: Understand the working principles of TCP/IP protocol suite*

CO2 *: Identify basic requirements for Network Monitoring and Network Control*

CO3 *: Develop TCP and UDP based Socket programs*

LAYER I & II PROTOCOLS

Introduction to TCP/IP Reference model - Link layer - Internet Protocol - Address Resolution Protocol- Internet Control Message Protocol- IP Routing - Dynamic Routing Protocols **(9)**

UDP AND APPLICATIONS

User Datagram Protocol - Broadcasting and Multicasting - Internet Group Management Protocol - Trivial File Transfer Protocol - Bootstrap Protocol **(9)**

TRANSMISSION CONTROL PROTOCOL

Connection Establishment and Termination - TCP Interactive Data Flow - TCP Bulk Data Flow - Timeout and Retransmission - TCP Timers **(9)**

NETWORK MANAGEMENT

Introduction - Network Monitoring - Network Control. SNMPv1: Concepts - Management information Standard MIBs - Simple Network Management Protocol **(9)**

SOCKET PROGRAMMING

Introduction to Sockets - Socket Addresses - Elementary Socket System Calls-Client Server Communication using Sockets: Connection Oriented Protocol, Connection less Protocol - Advanced Socket System Calls - Socket Options **(9)**

TOTAL : 45

REFERENCE BOOKS

1. *Kevin R. Fall, W. Richard Stevens, "TCP/IP Illustrated, Volume 1:The Protocols", Pearson Education Asia, 2nd Edition, 2012.*
2. *William Stallings, "SNMP, SNMPv2, SNMPv3 and RMON 1 and 2", Pearson Education Asia, 3rd Edition, 2013.*
3. *W. Richard Stevens, "UNIX Network Programming", Prentice Hall India, 2nd Edition, 2009.*
4. *Behrouz A. Forouzan, "TCP/IP Protocol Suite", Tata McGraw-Hill Publishing Company Limited, New Delhi, 4th Edition, 2010.*

15MCA34 - JAVA PROGRAMMING

L	T	P	C
3	0	0	3

PRE-REQUISITES

15MCA22, 15MCA27

ASSESSMENT : THEORY

COURSE OBJECTIVE

The students can apply object-oriented programming paradigm in Java like objects, classes, inheritance, interfaces, packages and Exception handling.They can understand the String Class along with merits and demerits.It will finally include a short introduction to the Java Collection Framework and the Java API.

COURSE OUTCOME

CO1 *: Understand the concept of OOP as well as the purpose and usage of inheritance, polymorphism, encapsulation and method overloading.*

CO2 *: Identify classes, objects, members of a class and the relationships among them needed for a specific problem.*

CO3 *: Create Java application programs using sound OOP practices (e.g., interfaces and APIs) and proper program structuring (e.g., by using access control identifiers, automatic documentation through comments, error exception handling)*

INTRODUCTION

Overview of Java- Data Types, Variables and Arrays -Operators - Control Statements - Classes and Objects - Overloading Methods and Constructors - Passing and Returning Objects as Parameters - Access control - Variable length Arguments - overloading vararg - Wrapper Classes - String Handling - String Arrays - Methods - String Buffer class. **(9)**

INHERITANCE

Basics - usage of super keyword - Multilevel Hierarchy - Method overriding - Dynamic Method Dispatch - Using Abstract Classes - Using Final with Inheritance - The Object Class **(7)**

PACKAGES AND INTERFACES

Defining, Finding and Importing Packages - Access Protection. Interfaces: Define, Implement and Apply Interfaces - Nested Interfaces - Variables in Interfaces. **(7)**

EXCEPTION HANDLING

Fundamentals - Exception Types - Using Try and Catch - Multiple catch - Nested try - throw - throws and finally.

Threads : Java Thread Model - Lifecycle of a Thread - Priorities - Synchronization - Creating a Thread - Extending a Thread - Creating Multiple Threads -Using Thread Methods - Thread Exceptions - Inter-thread communication. **(9)**

COLLECTIONS

Overview - wrapper classes - AutoBoxing facilitates the use of Primitive Types - For-Each Style for Loop - Collection Interface - Collection Class - Accessing a Collection via an Iterator - Working with Maps - Comparators - String Tokenizer - sort, shuffle and search Algorithms. **(9)**

I/O and Applets - I/O Basics, Reading and writing console Input / Output - PrintWriter Class - Reading and writing Files - JDBC - Applet Fundamentals - Trasient and Volatile Modifiers - Using instance of. **(4)**

TOTAL : 45

REFERNCE BOOKS

1. *Herbert Schildt, "Java The Complete Reference", Tata MCGraw Hill Publishing Company Limited, 8th Edition, 2011.*
2. *E. Balagurusamy, "Programming with Java : A Primer", Tata MCGraw Hill Publishing Company Limited, 5th Edition, 2015.*
3. *Cay S. Horstmann, Gray Cornell, "Core Java Volume I - Fundamentals", Pearson Education, 9th Edition, 2013.*
4. *Herbert Schildt, "Java : A Beginners Guide", Tata MCGraw Hill Publishing Company Limited, 6th Edition, 2014.*

15MCA35 - JAVA PROGRAMMING LAB

L	T	P	C
0	0	4	2

PRE-REQUISITES

15MCA22, 15MCA27

ASSESSMENT : PRACTICAL

COURSE OBJECTIVE

The students can apply object-oriented programming paradigm in Java including Inheritance, Polymorphism and Interfaces. They will learn to implement various algorithms using Collections Framework. They can develop Multi-threaded applications and they can apply the knowledge of Database connectivity in real world scenarios.

COURSE OUTCOME

Students will be able to

CO1 *: Apply fundamental concepts of OOPS using java*

CO2 *: Apply basic concepts like inheritance, polymorphism and exception handling.*

CO3 *: Apply advanced techniques for developing complex applications.*

CONCEPTS TO BE COVERED

1. Implementation of Objects
2. Inheritance
3. Polymorphism
4. Runtime Polymorphism using Abstract Class and Interface
5. Packages
6. Exceptions
7. Multithreading
8. Algorithms using Collection Class
9. Event Handling
10. JDBC

15MCA36 - OPERATING SYSTEMS LAB

L	T	P	C
0	0	4	2

PRE-REQUISITES

15MCA24, 15MCA13

ASSESSMENT : PRACTICAL

COURSE OBJECTIVE

At the end of the course students are able to use Linux operating system for study of operating system concept and write code to implement and modify various concepts in operating systems.

COURSE OUTCOME

CO1 *: Students will be able to work with system calls, simulate various UNIX commands.*

CO2 *: They will be able to write scheduling algorithms*

CO3 *: They will be able to write applications using inter process communication, semaphores and memory management schemes*

LIST OF PROGRAMS

1. Write programs using the following system calls of UNIX operating system: Open, Close , Fork, exec, getpid, exit, wait, stat, opendir, readdir
2. Simulate the system calls of UNIX operating system (read, write, ls,grep)
3. Write a program where parent process counts number of vowels in the given sentence and child process will count number of words in the same sentence. Use FORK and JOIN construct.
4. Given the list of processes, their CPU burst times and arrival times, display/print the Gantt chart for FCFS and SJF. For each of the scheduling policies, compute and print the average waiting time and average turnaround time.
5. Given the list of processes, their CPU burst times and arrival times, display/print the Gantt chart for Priority and Round robin. For each of the scheduling policies, compute and print the average waiting time and average turnaround time
6. Implement the solution for Bounded Buffer (Producer-Consumer) problem using inter process communication technique - Semaphores
7. Simulate Bankers Algorithm for Dead Lock Avoidance and Dead lock prevention algorithm.
8. Implementation of Contiguous allocation techniques: (a) Worst-Fit (b) Best-Fit (c) First-Fit

15MCA37 - NETWORK PROGRAMMING LAB

L	T	P	C
0	0	4	2

PRE-REQUISITES

15MCA13, 15MCA16, 15MCA23, 15MCA33

ASSESSMENT : PRACTICAL

COURSE OBJECTIVE

To make the students to expertise in Socket API and to understand the operation of various internetworking protocols and the features of NS-2.

COURSE OUTCOME

CO1 *: The students will be able to develop network applications using Socket API*

CO2 *: The students will be able use NS-2 to understand and test protocols*

The students must be trained to develop

1. TCP and UDP applications by exploiting Socket API - concurrent and iterative
2. Applications making use of the various socket options
3. Debugging and maintenance tools with the help of RAW sockets and SOCK_PACKET
4. Programs using SIGALRM, SO_RCVTTIMEO, non-blocking sockets
5. Programs using I/O multiplexing
6. Simple scenarios using NS-2 and study the operation of various Internet work protocols

15MCA38 - PERSONALITY DEVELOPMENT

PRE-REQUISITES

Consent of the Instructor

ASSESSMENT : PRACTICAL

COURSE OBJECTIVE

The course will help the students to develop interpersonal skills and personality traits so that they will be able to function as successful professionals.

COURSE OUTCOME

CO1 : *Various managerial capabilities including leadership qualities would have improved through group dynamics.*

CO2 : *The students would be able to deliver persuasive presentations and also write effectively.*

CO3 : *They would be able to build up a positive mindset leading to healthy thinking through developing various personality traits.*

NONVERBAL COMMUNICATION

Kinesics - Proxemics - Chronemics - Paralanguage - Artifacts ; Nonverbal devices in written communication

BARRIERS TO COMMUNICATION

Physical barrier - Social barrier - Language barrier - Psychological barrier - Hierarchical barrier

INTERVIEW SKILLS

Interviewing with Potential Employees : How interviewers learn about applicants - What employers look for - What applicants need to find out - How to appear for a job interview - How to be interviewed - Face to face interviews and Telephonic interviews

PRESENTATION

Preparing for a Presentation : Selecting a topic; Audience analysis; Gathering materials; Organizing and outlining - Presentation: Using language; Delivery; Using audiovisual aids - Feedback

GROUP DISCUSSIONS AND CASE STUDIES

Extensive group discussions - Video recordings of Group discussion - Simulated interview sessions - Review of group discussions and interviews - Real time Case Studies.

LEADERSHIP AND ENTREPRENEURSHIP

Self awareness - Creative skills - Developing personality traits like integrity, assertiveness, positive thinking and forgiveness.

CURRICULUM VITAE AND RESUMÉ WRITING

Types of C.V and Techniques of Resumé Writing

REFERENCES BOOKS

1. *Dr.Julius Fast. "Body Language" Pocket Books Inc., New York, 1996.*
2. *K.Muralidharan. "Communication Techniques for your Success Everywhere" CBH Publishers, Chennai, 2004.*
3. *Gerald I.Nierenberg& Henry H. Calero. "How to Read a Person like a Book" Pocket Books Inc., New York, 1993.*
4. *Courtland L.Bovee and John V.Thill. "Business Communication Today" Second Edition, McGraw-Hill Publishing Company, New York, 1989.*
5. *Stephen E.Lucas. "The Art of Public Speaking", Third Edition, Random House, New York, 1989.*

15MCA41 - ACCOUNTING AND FINANCIAL MANAGEMENT

L	T	P	C
4	0	0	4

PRE-REQUISITES

Consent of the Instructor

ASSESSMENT : THEORY

COURSE OBJECTIVE

To help the students to gain knowledge on various types of accounting their uses merits and demerits and to educate them on the need for financial accounting and its basic concepts, conventions and accounting procedures to ascertain the profit. Also assist them to work on the various methods and techniques for preparation and analysis of costs and cost statements and provide knowledge on various strategic financial management techniques and methods of capital budgeting.

COURSE OUTCOME

CO1 *: The student will be aware of various types of accounting and can prepare statements of financial accounting to ascertain the profit for any trading or manufacturing organization and develop computer models for them.*

CO2 *: The student can identify various costs and prepare cost sheet and apply the Cost Volume Profit analysis to prepare statements of profit under marginal costing technique.*

CO3 *: The student can prepare statements to assist for strategic decision, using various techniques like ratio analysis, budgeting, working capital management and capital budgeting and generate software for the above techniques.*

ACCOUNTING

Introduction : Accounting Concepts, Principles and Conventions - basic accounting procedures - Journal and Ledger, Trial Balance. **(15)**

FINAL ACCOUNTS

Manufacturing and Trading Account, Profit and Loss Account, Balance Sheet. Final accounts with adjustments - Working with excel worksheets for automating Final Accounts.

Depreciation. Type - Straight Line Method, Written-Down Value Method, Sinking Fund Method - Preparation of Depreciation Account **(15)**

COST ACCOUNTING

Methods and Techniques of Cost Accounting - Classification of Cost - Material Cost, Labour Cost, Overheads, Fixed and Variable Costs, Cost-Volume-Profit Analysis - Marginal Costing and Decision Making **(9)**

FINANCIAL MANAGEMENT

Objectives and scope of Financial Management - Analysis and Interpretation of Financial Management - Ratio Analysis - financial system - Working Capital Management - capital investment decision through Pay-back Period Method, Average Rate of Return - Internal Rate of Return - cost of capital - discounted cash flow analysis by using spread sheet. **(12)**

BUDGETING AND BUDGETARY CONTROL

Ttypes of budgets - preparation of various functional budgets - preparation of cash budgets - flexible budgets - advantages of budgeting and budgetary control **(9)**

TOTAL : 60

REFERENCE BOOKS

1. *Grewal T S, "Double entry book keeping - Finanacial Accounting", Sultan Chand & Sons, 2012.*
2. *Sharad K. Maheswari, Maheswari S.N , "Principles of Management Accounting Vol. I & II", Sultan Chand & Sons, 2007.*
3. *Vinayakam N, Mani P.L., Nagarajan K.L., "Principles of Accountancy", S.Chand & Co., Ltd., 2008.*
4. *Jain S.P. & Narang K.L., "Advanced Accountancy Vol 1" Kalyani Publishers, 2012.*
5. *Sashi K. Gupta & Sharma R.K., "Management Accounting", Kalyani Publishers, 2011.*
6. *Khan M.Y. and Jain P.K., "Financial Management", Tata McGraw hill, 2007.*

15MCA42 - SOFTWARE ENGINEERING

L	T	P	C
3	0	0	3

PRE-REQUISITES

15MCA15

ASSESSMENT : THEORY

COURSE OBJECTIVE

- *Students should be able to apply software engineering theory, principles, tools and processes to development of software systems.*
- *Futher, they must be able to build solutions using different architectures and life-cycle approaches in the context of customer requirements.*

COURSE OUTCOME

The students will have the

CO1 *: Ability to develop software applying knowledge of software life-cycle models*

CO2 *: Ability to use techniques and skills for software development and testing*

INTRODUCTION TO SOFTWARE ENGINEERING

The Evolving Role of Software - Software - The changing nature of software - Legacy software - Software Myths - Software Engineering: A Layered Technology Process Framework - The Capability Maturity Model - Process Patterns - Process Assessment - Software Process Models. **(7)**

SOFTWARE ENGINEERING PRACTICE

System Engineering : Computer Based Systems - The System Engineering Hierarchy - Business Process Engineering - Product Engineering - Requirements Engineering. **(8)**

BUILDING THE ANALYSIS MODEL

Requirements Analysis - Analysis Modeling Approaches - Scenario Based Modeling - Flow Oriented Modeling - Creating a Behavioral Model. **(8)**

DESIGN ENGINEERING

Design within the Context of Software Engineering - The Design Process and Design quality - Design Principles - Design Concepts - Effective Modular Design - Design Heuristics for Effective Modularity - The Design model - Design Documentation. **(8)**

ARCHITECTURAL DESIGN

Software Architecture - Data Design - Architectural Styles and Patterns - Architectural Design - Assessing Alternative Architectural Design-Mapping Data Flow Into a Software Architecture. **(7)**

TESTING STRATEGIES

A Strategic Approach to Software Testing - Strategic Issues - Test Strategies for Conventional Software - Test Strategies for Object Oriented Software - Validation Testing - System Testing - The Art of Debugging. **(9)**

TESTING TACTICS

White Box Testing-Basis Path Testing-Control Structure Testing-Black Box Testing **(7)**

TOTAL : 45

REFERENCES BOOKS

1. *Roger S. Pressman "Software Engineering - A Practitioner's approach", McGraw Hill International edition, 7th Edition, 2009.*
2. *Ian Somerville, "Software Engineering", Addison - Wesley, 9th Edition, 2010.*
3. *Pankaj Jalote, "An Integrated Approach to Software Engineering", Narosa Publishing house, 3rd Edition, 2011.*

15MCA43 - OBJECT ORIENTED ANALYSIS AND DESIGN

L	T	P	C
3	0	0	3

PRE-REQUISITES

15MCA15, 15MCA22

ASSESSMENT : THEORY

COURSE OBJECTIVE

- *To introduce the techniques of identifying objects, carrying out analysis , design and provide solution to the given scenario.*

COURSE OUTCOME

CO1 *: Students will get an exposure on activities of identifying objects and its relationships.*

CO2 *: Students can describe the system as analysis model and design model.*

CO3 *: Students will be able to validate the developed system.*

I INTRODUCTION

An overview - Object basics - Object state and properties - Behavior - Methods - Messages - Information hiding - Class hierarchy - Relationships - Associations - Aggregations- Identity - Dynamic binding - Persistence - Metaclasses - Object oriented system development life cycle. **(10)**

II METHODOLOGY AND UML

Introduction - Rumbaugh, Booch, Jacobson methods - Patterns - Frameworks - Unified approach - Unified modeling language - Static and Dynamic models - UML diagrams - Class diagram - Usecase diagrams - Dynamic modeling - Model organization - Extensibility. **(9)**

III OBJECT ORIENTED ANALYSIS

Identifying Usecase - Business object analysis - Usecase driven object oriented analysis - Usecase model - Documentation - Classification - Identifying object, relationships, attributes, methods - Super-sub class - A part of relationships Identifying attributes and methods - Object responsibility **(9)**

IV OBJECT ORIENTED DESIGN

Design process - Axioms - Designing classes - Class visibility - Refining attributes - Methods and protocols - Object storage and object interoperability - Databases - Object relational systems - Designing interface objects - The purpose of a view layer interface

(9)

UNIT V TESTING & QUALITY

Quality assurance - Testing strategies - Object orientation testing - Test cases - Test Plan - Debugging principles - Usability - Satisfaction - Usability testing - Satisfaction testing **(8)**

TOTAL : 45

REFERENCE BOOKS

1. *Ali Bahrami, "Object Oriented System Development", McGraw Hill International Edition, 1999.*
2. *Craig Larman, Applying UML and Patterns, 2nd Edition, Pearson, 2002.*
3. *Grady Booch, James Rumbaugh, Ivar Jacobson, "The Unified Modeling Language User Guide", Addison Wesley Long man, 1999.*
4. *Bernd Bruegge, Allen H. Dutoit, Object Oriented Software Engineering using UML, Patterns and Java, Pearson 2004*

15MCA44 - ENTERPRISE COMPUTING LAB

L	T	P	C
0	0	4	2

PRE-REQUISITES

15MCA34, 15MCA36

ASSESSMENT : PRACTICAL

COURSE OBJECTIVE

- *The students can build customized software components using J2EE technology and create robust distributed applications by integrating off-the-shelf or new components.*

COURSE OUTCOME

The students will be able to :

CO1 *: Gain Practical knowledge in designing components for enterprise applications.*

CO2 *: Develop different components using Java based technologies.*

CO3 *: Develop distributed components using J2EE concepts.*

CONCEPTS TO BE COVERED

1. Developing Web pages using JSP concepts.
2. Use of XML in Web programming.
3. Building Database applications using JDBC.
4. Creating Java Servlets.
5. Creating EJB.
6. Develop components / applications using RMI concepts.
7. Develop components / applications using CORBA / DCom standards.

15MCA45 - MINI PROJECT

L	T	P	C
0	0	4	2

PRE-REQUISITES

Consent of the Instructor

COURSE OBJECTIVE

- *This course provides a platform for practicing software engineering principles in developing software solutions for problems*

COURSE OUTCOME

Students will be able to

CO1 *: Apply problem solving techniques learned in the theory.*

CO2 *: Develop design models.*

CO3 *: Develop software solutions by applying domain knowledge and choosing relevant technologies.*

15MCAE51 - SOFTWARE TESTING AND QUALITY ASSURANCE

L	T	P	C
3	0	0	3

PRE-REQUISITES

15MCA42

ASSESSMENT : THEORY

COURSE OBJECTIVE

- *This course introduces the principles of software testing and its associated methods*

COURSE OUTCOME

The student will be able to:

CO1 *: Appreciate need for quality*

CO2 *: Develop test plans, test processes, test scenarios and test cases to achieve quality goal*

CO3 *: Use range of techniques to achieve quality goals for software product through a) inspection/ reviews b) black box/ white box testing techniques.*

INTRODUCTION

The role of process in software quality - Testing as a process - Overview of the Testing Maturity Model (TMM) - Basic definitions - Software testing principles - Origins of defects - Defect classes, Defect repository - Test design - Defect example : the coin problem. **(9)**

TESTING STRATEGIES

Test case design strategies - Black box approach - Random testing - Equivalence class partitioning - Boundary value analysis - Cause and Effect graphing - State transition testing - Error guessing - White box approach - Test adequacy criteria - Coverage and control flow graphs - Covering code logic - Data flow and white box test design - Loop testing - Mutation testing - Evaluating test adequacy criteria. **(12)**

LEVELS OF TESTING

Unit test : functions, procedures, classes and methods as units - Unit test planning - Designing test units - The class as a testable unit - The test harness - Integration test: goal - Integration strategies for procedures and functions - Integration strategies for classes - Designing integration test - System test - The different types - Regression testing - Alpha, beta and acceptance test - Test planning - Test plan components - Test plan attachments - Reporting test results. **(10)**

SOFTWARE QUALITY

Defining Quality - importance of quality - Quality control v/s quality assurance - Quality assurance at each phase of SDLC - Quality assurance in software support projects - SQA function - Quality management system in an organization - Software quality assurance plans - Product quality. **(7)**

SOFTWARE METRICS AND MODELS

Walkthroughs and Inspections - Software Configuration Management - ISO:9001 Model - CMM Model - CMM and ISO comparative analysis - CMM-I **(7)**

TOTAL : 45

REFERENCE BOOKS

1. *IIene Burnstein, "Practical Software Testing", Springer International Edition, First Indian reprint, 2004.*
2. *Nina S Godbole, "Software Quality Assurance, Principles and Practice", Narosa Publishing House, 2004.*
3. *P.C. Jorgensen, "Software Testing - A Craftman's Approach", CRC press, 1995.*
4. *Boris Beizer, van Nostrand Reinhold, "Software Testing Techniques", 2nd Edition, 1990.*

15MCA52 - INFORMATION SECURITY

L	T	P	C
3	0	0	3

PRE-REQUISITES

15MCA23,15MCA24, 15MCA25

ASSESSMENT : THEORY

COURSE OBJECTIVE

- *To introduce the core concepts and principles of information security, training and management*
- *To provide knowledge on legal, ethical and professional issues, concepts of risk management*

COURSE OUTCOME

The students shall be able to :

CO1 : *Understand the principles of information security and employ them to secure the information*

CO2 : *Identify and prioritize assets and threats to perform effective risk management*

CO3 : *Know information security policies, standards, models and various technological aspects*

INTRODUCTION

Concepts of Information Security - Critical Characteristics of Information - Components of an Information System - Securing the Components - The Systems Development Life Cycle - The Security SDLC - Security Professionals - Need for Security **(9)**

SECURITY INVESTIGATION

Threats - Attacks - Secure Software Development - Professional, Legal, and Ethical Issues **(9)**

SECURITY ANALYSIS

Risk Management: Risk Identification, Risk Assessment, Risk Control Strategies, Selecting a Risk Control Strategy **(9)**

SECURITY PLAN

Information Security Policy, Standards and Practices - The Information Security Blueprint: ISO 27000, NIST Security Models, Design of Security Architecture - Security Education, Training, and Awareness - Continuity Strategies - Credentials for Information Security Professionals **(9)**

SECURITY TECHNOLOGY

Access Control - Intrusion Detection and Prevention Systems - Scanning and Analysis Tools - Biometric Access Controls - Cryptographic Algorithms - Cryptographic Tools - Protocols for Secure Communication **(9)**

TOTAL : 45

REFERENCE BOOKS

1. *Michael E Whitman and Herbert J Mattord, "Principles of Information Security", Fourth Edition, Cengage Learning, 2012.*
2. *Charles P. Pfleeger, Shari Lawrence Pfleeger, and Jonathan Margulies, "Security in Computing", Fifth Edition, Pearson Education, 2015.*
3. *William Stallings, "Cryptography and Network Security: Principles and Practices", Sixth Edition, Prentice Hall, 2013.*

15MCA53 - SOFTWARE TESTING LAB

L	T	P	C
0	0	4	2

PRE-REQUISITES

15MCA22, 15MCA42

ASSESSMENT : PRACTICAL

COURSE OBJECTIVE

The course helps students appreciate the importance and scope of testing through use of different software. Tools help students in getting a hands on approach to the nuances of testing a software.

COURSE OUTCOME

Student will be able to

CO1 *: Develop and automate test cases.*

CO2 *: Apply appropriate testing techniques.*

CONCEPTS TO BE COVERED

1. Develop test cases from requirements
2. Automating test scenarios
3. Test data generation
4. Generating Test reports
5. Understanding testing activities in the scope of the SDLC
6. Tools : Rational Suite, J Unit, Selenium

15MCA54 - INFORMATION SECURITY LAB

L	T	P	C
0	0	4	2

PRE-REQUISITES

15MCA23, 15MCA25

ASSESSMENT : PRACTICAL

COURSE OBJECTIVE

To introduce the basic concepts of information security, security policy and procedures, and to introduce various security algorithms to design and provide security to information

COURSE OUTCOME

The student should be able to

CO1 *: Identify security issues in different domains.*

CO2 *: design and implement security algorithms to protect information resources*

LIST OF PROGRAMS

1. Implementing Substitution and Transposition cipher
2. Implementing DES, AES algorithm
3. Implementing SHA, MD5 algorithm
4. Implementing RSA, ECC algorithm
5. Learning to install and work with Packet capturing tool Wireshark
6. Learning to install and work with Port scanning tool Nmap
7. Learning to install and work with Packet filtering firewall Retina
8. Learning to install and work with Intrusion Detection tool Snort
9. Learning to install and work with Mac Spoofing tool Smac
10. Learning to install and work with TrueCrypt
11. Mini project on - Steganography

15MCA55 - PROFESSIONAL ETHICS

PRE-REQUISITES

Consent of the Instructor

ASSESSMENT : PRACTICAL

COURSE OBJECTIVE

- *Educate on the need for knowing professional ethics.*
- *Expose the basic ethical theories.*
- *Give thorough knowledge about environmental and computer ethics.*
- *Help the students to understand Professional and Employee Rights, conflicts of interest, moral dilemmas and occupational crime and learn how to react to such behavior of colleagues*

COURSE OUTCOME

CO1 : *The student will be aware of basic professional ethics and rights.*

CO2 : *The student can identify moral dilemmas and make judicious decisions.*

CO3 : *The student will be able to distinguish right from the wrong, and will be able to work collaboratively by reducing conflicts.*

PROFESSIONAL ETHICS

Ethics and Professionalism : Profession and Professionalism - Responsibility - Moral Reasoning-Ethical Dilemmas - Codes of Ethics - Ethical Relativism - Practical Ethics: Common Morality. Case Study: The Challenger.

Moral Frameworks : Utilitarianism - Rights Ethics and Duty Ethics - Virtue Ethics - Self Interest - Self Realization. Social and Value Dimensions of Technology - Intellectual Property Rights. Technological Progress: Cautious Optimism - Moral Leadership

Engineer's Responsibilities : Engineers as Responsible Experimenters - Moral Autonomy - Accountability. Commitment to Safety - Case Studies: Bhopal Gas Tragedy, Three Miles Island.

Work Place Responsibilities : Team Work - Confidentiality - Conflicts of Interest - Whistle Blowing - Rights of Engineers - Honesty - Forms of Dishonesty - Integrity - Expert Witnessing.

Ethics : Environmental Ethics - Global Issues: Multinational Corporations - Computer Ethics and Internet - Weapons Development.

REFERENCE BOOKS

1. *Mike Martin and Roland Schinzinger, Ethics in Engineering, McGraw Hill, 4th Edition, 2005.*
2. *Charles E Harris, Micheal S. Pritchard, Micheal Rabins, "Engineering Ethics - Concepts and Cases", Thompson Learning, 5th Edition, 2013.*
3. *Charles D Fledderman, Engineering Ethics, Prentice Hall, New Mexico, 4th Edition, 2007.*

15MCA61 - PROJECT WORK AND VIVA VOICE

Credit
18

PRE-REQUISITES

Should have undergone all core and elective papers

COURSE OBJECTIVE

- *This course provides an exposure on software development process in Software Industries.*

COURSE OUTCOME

The students can able to

CO1 *: Apply and demonstrate the software development standards followed in software industries.*

CO2 *: Analyze the issues in software solutions.*

CO3 *: Work in a team to develop solutions for real time applications and solve research issues.*

15MCAE01 - ORGANIZATIONAL BEHAVIOUR

L	T	P	C
3	0	0	3

PRE-REQUISITES

Consent of the Instructor

ASSESSMENT : THEORY

COURSE OBJECTIVE

To understand the concepts of organizational behaviour and its application in managing people and to enhance the human relationships within the organisation

COURSE OUTCOME

CO1 : *Analyse the behaviour of individuals and groups in organisations in terms of the key factors.*

CO2 : *Analyze the functions of organizational behavior in assisting the managers to see the value of workforce diversity, as well as to improve quality, productivity and the overall performance of the organization*

CO3 : *Evaluate the key concepts of organizational behavior: the individual behavior, group behavior and organization system.*

INTRODUCTION TO ORGANIZATIONAL BEHAVIOUR

Concept, Nature, Characteristics, Conceptual Foundations and Importance, Models of Organizational Behaviour, Management Challenge, A Paradigm Shift, Relationship with Other Fields, Organizational Behaviour: Cognitive Framework, Behaviouristic Framework and Social Cognitive Framework **(8)**

PERCEPTION AND ATTRIBUTION

Concept, Nature, Process, Importance. Management and Behavioural Applications of Perception. Attitude: Concept, Process and Importance, Attitude Measurement. Attitudes and Workforce Diversity. Personality: Concept, Nature, Types and Theories of Personality Shaping, Personality Attitude and Job Satisfaction. Learning: Concept and Theories of Learning. **(10)**

MOTIVATION

Concepts and Their Application, Principles, Theories, Employee Recognition, Involvement, Motivating a Diverse Workforce. Leadership: Concept, Function, Style and Theories of Leadership-Trait, Behavioural and Situational Theories. Analysis of Interpersonal Relationship, Group Dynamics: Definition, Stages of Group Development, Group Cohesiveness, Formal and Informal Groups, Group Processes and Decision Making, Dysfunctional Groups. **(10)**

ORGANIZATIONAL POWER AND POLITICS

Concept, Sources of Power, Distinction Between Power, Authority and Influence, Approaches to Power, Political Implications of Power: Dysfunctional Uses of Power. Knowledge Management & Emotional Intelligence in Contemporary Business Organisation.

ORGANIZATIONAL CHANGE

Concept, Nature, Resistance to change, Managing resistance to change, Implementing Change, Kurt Lewin Theory of Change. **(8)**

CONFLICT

Concept, Sources, Types, Functionality and Dysfunctionality of Conflict, Classification of Conflict Intra, Individual, Interpersonal, Intergroup and Organizational, Resolution of Conflict, Meaning and Types of Grievance and Process of Grievance Handling. Stress: Understanding Stress and Its Consequences, Causes of Stress, Managing Stress. Organizational Culture: Concept, Characteristics, Elements of Culture, Implications of Organisation culture, Process of Organisational Culture. **(9)**

TOTAL : 45

REFERENCE BOOKS

1. *Newstrom John W. - Organizational Behaviour: Human Behavour at Work (Tata Mc Graw Hill, 12th Edition) 2007.*
2. *Luthans Fred - Organizational Behaviour (Tata Mc Graw Hill)*
3. *Mc Shane L. Steven, Glinow Mary Ann Von & Sharma Radha R. - Organizational Behaviour (Tata Mc Graw Hill, 3rd Edition) 2004.*
4. *Robbins Stephen P. - Organizational Behaviour (Pearson Education, 12th Edition) 2009.*
5. *Hersey Paul, Blanchard, Kenneth H and Johnson Dewey E. - Management of Organizational Behavior: Leading Human Resources (Pearson Education, 8th Edition)*
6. *Greenberg Jerald and Baron Robert A. - Behavior In Organisations: Understanding and Managing the Human Side of Work (Prentice Hall of India)*
7. *Davis, Keith - Human Behaviour at Works - Tata Mc Graw Hill, New Delhi, 2012.*
8. *Pareek, Udai - Behavioural Process in Organization (Oxford 4 IBH, New Delhi) 2000.*

15MCAE02 - PRINCIPLES OF MANAGEMENT

L	T	P	C
3	0	0	3

PRE-REQUISITES

Consent of the Instructor

ASSESSMENT : THEORY

COURSE OBJECTIVE

- *To gain a basic understanding of principles of management including planning, organizing and controlling.*
- *To improve your ability to examine managerial issues and problems and to develop feasible alternatives that can result in better decision-making.*

COURSE OUTCOME

CO1 *: Can able to play the roles and responsibilities of managers.*

CO2 *: Recognise and apply the skills necessary for carrying out effective management decision- making and strategic management planning.*

CO3 *: Adapt to corporate culture in the business environment.*

MANAGEMENT

Concept, Nature, Importance, Management: Art and Science, Management as a Profession, Management Vs. Administration, Management Skills, Levels of Management, Characteristics of Quality Managers. Evolution of Management: Early contributions, Taylor and Scientific Management, Fayol's Administrative Management, Bureaucracy, Hawthorne Experiments and Human Relations, Social System Approach, Decision Theory Approach. Business Ethics and Social Responsibility: Concept, Shift to Ethics, Tools of Ethics. **(9)**

INTRODUCTION TO FUNCTIONS OF MANAGEMENT

Planning : Nature, Scope, Objectives and Significance of Planning, Types of Planning, Process of Planning, Barriers to Effective Planning, Planning Premises and Forecasting, Key to Planning, Decision Making. Organizing: Concept, Organisation Theories, Forms of Organisational Structure, Combining Jobs: Departmentation, Span of Control, Delegation of Authority, Authority & Responsibility, Organisational Design. **(11)**

STAFFING

Concept, System Approach, Manpower Planning, Job Design, Recruitment & Selection, Performance Appraisal Directing: Concept, Direction and Supervision Motivation: Concept, Motivation and Performance, Theories Of Motivation, Approaches for Improving Motivation, Pay and Job Performance, Quality of Work Life, Morale Building. **(9)**

LEADERSHIP

The Core of Leadership : Influence, Functions of Leaders, Leadership Style, Leadership Development.

Communication : Communication Process, Importance of Communication, Communication Channels, Barriers to Communication. Controlling: Concept, Types of Control, Methods: Pre-control: Concurrent Control: Post-control, An Integrated Control System, The Quality Concept Factors affecting Quality, Developing a Quality Control System, Total Quality Control, Pre-control of Inputs, Concurrent Control of Operations. Post Control of Outputs. Change and Development: Model for Managing Change, Forces for Change, Need for Change, Alternative Change Techniques, New Trends in Organisational Change. **(9)**

Training and Development : Need for training, advantages of training programme, Types of training programmes, Training methods, Selection of a training method, Evaluation of training and development, Training practices in India. **(7)**

TOTAL : 45

REFERENCE BOOKS

1. *Robbins S.P., Coulter Mary & Niharika Vohra - Management - 10th edition (Pearson Education), 2010*
2. *S.A. Sherlekar - Ethics in Management,2012, Himalayan Publishing company.*
3. *Essentials of Management: An International Leadership Perspective by H. Koontz. McGraw Hill Publication, 2008.*
4. *Principles and Practices of Management by L.M. Prasad. Sultan Chand & Sons, 2012.*

15MCAE03 - PRINCIPLES OF ENVIRONMENTAL SCIENCE AND ENGINEERING

L	T	P	C
3	0	0	3

PRE-REQUISITES

Consent of the Instructor

ASSESSMENT : THEORY

COURSE OBJECTIVE

This course is intended to provide a basic knowledge about the environment, reasons for environmental deterioration, role of individual in environmental protection, to understand the social issues and responsibilities related to the environment and also to appreciate and recognize the necessity for environmental legislation and sustainable development.

COURSE OUTCOME

CO1 : *After successful completion of this course, the students will be able to have better understanding of the concept of environment and the role of biotic and abiotic components*

CO2 : *The students are able to find out the causes for the deterioration of the environment and the measure to be taken for its preservation and the need for a sustainable development and growth.*

CO3 : *As a responsible citizen, he / she could carry out the activities in the society and shoulder the responsibilities in a better manner for a safer and much greener earth.*

ENVIRONMENTAL CHEMISTRY

Chemistry and the Environment - Environmental segments - Composition and Characteristics of Atmosphere, Hydrosphere, Lithosphere, and Biosphere: Chemical species and particulates present in the environment - reactions occur in the atmosphere. Photochemical smog. Impact of man on the environment. Impact of Environment upon humans. **(9)**

ECOSYSTEMS AND BIODIVERSITY

Concepts of an ecosystem : types, structure and functions of the ecosystem. Food chains, food webs and ecological pyramids. Biodiversity: Definition - Genetic, species, ecosystem and landscape diversities - India as a mega diversity nation - Hot spots of biodiversity. Importance of biodiversity - loss of biodiversity - causes of reduction in biodiversity. Conservation of biodiversity - restoration of biodiversity. **(9)**

ENVIRONMENTAL POLLUTION

Sources, causes, effects and management of Air, Water, Soil, Marine, Noise and Radioactive pollution. Sources of Solid, Hazardous, Biomedical and Chemical wastes. Solid Waste Disposal and treatment **(9)**

ENERGY AND ENVIRONMENT

Energy resources - Growing energy needs - renewable and non-renewable energy sources - use of alternate energy sources - Solar, Wind, Tidal, Geothermal and OTEC - (Principles only) merits and limitations. **(3)**

SOCIAL ISSUES AND THE ENVIRONMENT

Sustainable development - Urban Population - problems related to energy - Water Conservation. Rainwater harvesting - Environment Ethics - Green house effect, Global warming, climate change, Nuclear hazards and accidents. Issues involved in enforcement of environment legislation - precautionary principle - polluter pays principle - the Beneficiary pays principle - role of an Individual in Environment protection - Environment (Protection) Act - Air (Prevention and Control of Pollution) Act. Water (Prevention andControl of Pollution) Act. Wildlife Protection Act and Forest (Conservation) Act. **(9)**

BIOTECHNOLOGY AND GREEN CHEMISTRY

Biotechnology and its applications in environmental protection - Bioinformatics - Bioremediation. Biological purification of contaminated air. Green chemistry for clean technology: Significance of green chemistry - Basic components of Green chemistry. Industrial applications of green chemistry. Green fuels - e - green propellants and Biocatalysts. **(6)**

TOTAL : 45

REFERENCE BOOKS

1. *Dara, S.S. " A Text Book of Environmental Chemistry and Pollution Control" 8th Revised Edition, S. Chand and Company Ltd, 2008.*
2. *Kaushik, A. and Kaushik, C.P. `Environmental Science and Engineering' 2nd Edition, New Age International (P) Limited Publishers, 2006.*
3. *Dr. Raghavan Nambiar, K. 'Text Book of Environmental Studies' Scitech Publications (India) Pvt. Ltd, Chennai, 2007.*
4. *Benny Joseph, "Environmental Studies" Tata McGraw Hill Publishing Company Ltd, 2008*
5. *Surinder Deswal and Anupama Deswal, "A Basic course in Environmental Studies" Dhanpat Rai and Co. (P) Ltd, 2006.*

15MCAE04 - HUMAN COMPUTER INTERACTION

L	T	P	C
3	0	0	3

PRE-REQUISITES

13MCA12, 13MCA35

ASSESSMENT : THEORY

COURSE OBJECTIVE

This course is intended to familiarize students with basic concepts of how human perceives and interacts with computers, focuses on psychological and physiological aspects of interface design, graphical user interface design.

COURSE OUTCOME

After completing this course, students will be able to :

CO1 *: Interpret the contributions of human factors and technical constraints on Human-Computer interaction.*

CO2 *: Apply Human-computer Interaction techniques and methods to the design of software*

CO3 *: Practice in developing Human-Computer Interfaces with respect to usability.*

FOUNDATIONS

Introduction-human memory-thinking reasoning and problem solving-text entry devices-display devices-controls, sensors and special devices. **(9)**

MODELS OF INTERACTION

Ergonomics-interaction styles-context of interaction-paradigms for interaction-design, golden rule of design-user focus-navigation design. **(9)**

SCREEN DESIGN AND LAYOUT

Usability engineering-principles to support usability-guidelines-golden rules and heuristics-universal design principles-multi-model interaction-design for diversity. **(9)**

SOCIO FACTOR

Organizational issues and stakeholders requirements-capturing requirements-task decomposition. knowledge-based analysis-entity-relationship based techniques. **(9)**

DIALOG NOTATIONS AND DESIGN

Dialog-dialog design notations-diagrammatic notations-textual dialog notations-dialog semantics-dialog analysis and design. **(9)**

TOTAL : 45

REFERENCE

1. *Human Computer Interaction, Alan Dix, Janet Finlay, Gregory D. Abowd, Russell Beale, Pearson Education, 3rd Edition, 2004.*

15MCAE05 - INTELLIGENT AGENTS

L	T	P	C
3	0	0	3

PRE-REQUISITES

15MCA12, 15MCA22, 15MCA25

ASSESSMENT : THEORY

COURSE OBJECTIVE

- *The primary objective of this course is to provide an introduction to the basic principles and applications of Artificial Intelligence.*
- *To have an idea for the engineering issues underlying the design of AI systems.*
- *To have an understanding of the basic issues of knowledge representation and heuristic search, as well as an understanding of other topics such as machine learning, handling uncertainty.*
- *To have a basic understanding of some of the more advanced topics of AI in learning, prepare them for application areas like Data Mining.*

COURSE OUTCOME

CO1 *: Understand the engineering issues of the design of AI Systems*

CO2 *: Introduced to the basics of machine learning, agents and planning.*

CO3 *: Introduced to the application of AI techniques in Design, Diagnosis problem and Handle large problem.*

ARTIFICIAL INTELLIGENCE

Introduction-Intelligent Agents-Problem solving: Solving Problems by Searching-Informed Search and Exploration-Constraint Satisfaction Problems-Adversarial Search. **(10)**

KNOWLEDGE AND REASONING

Logical Agents- First-order Logic-Inference in First-order logic-Knowledge Representation **(10)**

PLANNING

Planning and Acting in the Real world, Uncertain Knowledge and Reasoning: Uncertainity- Probabilistic Reasoning- Making Simple Decisions. **(13)**

LEARNING

Learning from Observations-Knowledge in Learning-Statistical Learning Methods-Reinforcement Learning. **(12)**

TOTAL : 45

REFERENCES BOOKS

1. *Stuart J.Russel and Peter Norvig, "Artificial Intelligence- A Modern Approach", Pearson Education series, 2nd Edition, 1995.*
2. *Nils J Nilsson, "Artificial Intelligence - A new Synthesis", Morgan Kauffmann Publishers, 1998*
3. *Thomas L. Dean, James Autor Allen and John Aloimonos"Artificial Intelligence : Theory and Practice", Benjamin / Cummings Publications, 1995.*
4. *Patrick Henry Winston, "Artificial Intelligence", Addisson Wesley Publishers, 3rd Edition, 1992*
5. *Elaine Rich and Kevin Knight, "Artificial Intelligence", McGraw Hill,1990*

15MCAE06 - DISTRIBUTED COMPUTING

L	T	P	C
3	0	0	3

PRE-REQUISITES

15MCA24

ASSESSMENT : THEORY

COURSE OBJECTIVE

To provide an understanding of distributed system architectures, resource management and various fault tolerant techniques in a distributed environment.

COURSE OUTCOME

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

CO1 *: Articulate advantages and disadvantages of various models for a distributed system.*

CO2 *: Analyze various distributed operating system characteristics.*

CO3 *: Identify appropriate complexity measures and analyze solutions to Fault tolerance in distributed environment.*

INTRODUCTION

Characterization of Distributed Systems : Example of Distributed Systems,Resource Sharing and Web,Challenges-System Models:Architectural Models and Functional Models-Distributed Objects and

Remote Invocation : Communication between Distributed Objects,RPC,Events and Notifications. **(7)**

OPERATING SYSTEM SUPPORT

Introduction-Operating System Layer-Protection-Process and Threads-Communication and Invocation-OS Architecture.

DISTRIBUTED FILE SYSTEMS

Introduction-File Service Architecture-Sun Network File System. **(8)**

NAME SERVICES

Name Services and DNS-Directory and Discovery Services-Global Name Service-X.500 Directory Service.

CLOCK SYNCHRONIZATION

Clocks, Events and Process States-Synchronization-Logical time and Logical Clocks-Global States.

COORDINATION AND AGREEMENT

Distributed Mutual Exclusion-Elections-Multicast Communication. **(12)**

DISTRIBUTED TRANSACTION MANAGEMENT

Transaction and Concurrency Control: Transactions, Nested Transactions, Locks, Optimistic Concurrency Control, Time Stamp Ordering, Comparison of Methods for Concurrency Control-Distributed Transaction: Flat and Nested, Atomic Commit Protocols, Concurrency Control, Distributed Deadlock, Transaction Recovery-Replication: System model and Group Communication, Fault Tolerant Services, Highly Available Services, Transactions with Replicated Data. **(12)**

DISTRIBUTED SHARED MEMORY

Design and Implementation Issues, Sequential and Release Consistency-Other Consistency Models. **(6)**

TOTAL : 45

REFERENCE BOOKS

1. *George Colouris, Jean Dollimore and Tim KindBery,"Distributed Systems,Concepts and Design", Pearson Education 2004.*
2. *Andrew S Tanenbaum, Maarten Van Steen, "Distributed Systems, Principles and Paradigms", Peasrson Asia 2004.*
3. *Sloman M Kramer J, "Distributed System and Computer Networks", Prentice Hall of India, 1990.*

15MCAE07- AD HOC NETWORKS

L	T	P	C
3	0	0	3

PRE-REQUISITES

15MCA23, 15MCA33

ASSESSMENT : THEORY

COURSE OBJECTIVE

This course provides fundamental concepts and design issues of Ad Hoc Wireless Networks. It explains the architectures, protocols and recent trends of Ad Hoc Networks, WSN and Mesh networks.

COURSE OUTCOME

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

CO1 *: Describe the fundamental aspects of Ad hoc Networks, Medium access control Protocols and their classification.*

CO2 *: Classify the MAC, Routing and TCP for ad hoc networks and WSN.*

CO3 *: Develop simple QoS and Routing solutions for ad hoc, WSN and Mesh networks.*

AD HOC MAC

Introduction - Issues in Ad hoc Wireless Networks. MAC Protocols - Issues, Classifications of MAC protocols, Multi channel MAC & Power Control MAC Protocol. **(9)**

AD HOC NETWORK ROUTING & TCP

Issues - classifications of routing protocols-Hierarchical and Power aware. Multicast routing - Classifications, Tree based, Mesh based. Ad hoc Transport Layer Issues. TCP over Ad Hoc- Feedback based, TCP with explicit link, TCO-Bus, Ad Hoc TCP, and Split TCP. **(9)**

WSN - MAC

Introduction - Sensor Network Architecture, Data dissemination, Gathering. MAC Protocols - Self - organizing, Hybrid TDMA/FDMA and CSMA based MAC **(9)**

WSN ROUTING, LOCALIZATION & QOS

Issues in WSN routing - OLSR, AODV, Localization - Indoor and Sensor network Localization. QoS in Wsn **(9)**

MESH NETWORKS

Necessity for Mesh Networks - MAC enhancements - IEEE 802.11s Architecture - Opportunistic routing - Self configuration and Auto configuration - Capacity Models - Fairness- Heterogeneous Mesh Network Vehicular Mesh Networks. **(9)**

TOTAL : 45

REFERENCE BOOKS

1. *C. Siva Ram Murthy and B.S. Manoj, "Ad Hoc Wireless Networks - Architectures and Protocols", Pearson Education, 2004.*
2. *Feng Zhao and Leonidas Guibas, "Wireless Sensor Networks", Morgan Kaufman Publishers, 2004.*
3. *C.K.Toh, "Ad Hoc Mobile Wireless Networks", Pearson Education, 2002.*
4. *Thomas Krag and Sebastin Buettrich, "Wireless Mesh Networking", O'Reiily Publishers, 2007.*
5. *Charles E.Perkins, "Ad Hoc Networking", Addison Wesley 2001.*

15MCAE08 - CLOUD COMPUTING

L	T	P	C
3	0	0	3

PRE-REQUISITES

15MCA14,15MCA24

ASSESSMENT : THEORY

COURSE OBJECTIVE

- *To provide a comprehensive overview on principles of cloud computing, its convergence with high performance computing and distributed computing.*
- *To create an awareness of application and technology trends that are shaping the future of computing through various case studies*

COURSE OUTCOME

The students shall be able to:

CO1 *: Understand how data centers facilitate management, debugging, migration and disaster recovery through virtualization*

CO2 *: Design innovative applications of parallel, distributed and cloud computing systems*

CO3 *: Identify appropriate tools and techniques for the development of high-performance, scalable and reliable systems using evolving technology*

DISTRIBUTED SYSTEM MODELS AND ENABLING TECHNLOGIES

Scalable Computing over the Internet - Technologies for Network-based Systems - System Models for Distributed and Cloud Computing **(6)**

COMPUTER CLUSTERS FOR SCALABLE PARALLEL COMPUTING

Clustering for Massive Parallelism - Computer Clusters and MPP Architectures - Design Principles of Computer Clusters

VIRTUALIZATION

Implementation Levels of Virtualization - Virtualization Structures/Tools and Mechanisms - Virtualization of CPU, Memory, and I/O Devices **(12)**

CLOUD PLATFORM ARCHITECTURE

Cloud Computing and Service Models - Architectural Design of Compute and Storage Clouds - Public Cloud Platforms: GAE, AWS and Azure

CLOUD MANAGEMENT

Inter-cloud Resource Management - Cloud Security and Trust Management **(9)**

SOFTWARE ENVIRONMENTS

Services and Service-Oriented Architecture - Message Oriented Middleware -Features of Cloud and Grid Platforms - Parallel and Distributed Programming Paradigms

CLOUD PROGRAMMING

Programming Support of Google App Engine - Programming on Amazon AWS and Microsoft Azure - Open Source Eucalyptus and Nimbus **(12)**

UBIQUITOUS CLOUDS

Case Studies: Cloud Trends in Supporting Ubiquitous Computing - Online Social and Professional Networking **(6)**

TOTAL : 45

REFERENCE BOOKS

1. *Kai Hwang, Geoffrey C.Fox, Jack J Dongarra, "Distributed and Cloud Computing", Morgan Kaufmann Publishers, Elsevier, 2012.*
2. *James E. Smith, Ravi Nair, "Virtual Machines: Versatile Platforms for Systems and Processes", Elsevier/Morgan Kaufmann, 2005.*

15MCAE09 - CRYPTOGRAPHY AND NETWORK SECURITY

L	T	P	C
3	0	0	3

PRE-REQUISITES

15MCA23

ASSESSMENT : THEORY

COURSE OBJECTIVE

This Course provides basic understanding of mathematics behind Cryptography. It discusses standard algorithms used to provide confidentiality, integrity and authenticity. It also provides knowledge of various security practices applied in the field of information technology to students.

COURSE OUTCOME

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

CO1 *: Analyze the basic security algorithms required by any computing system.*

CO2 *: Predict the vulnerabilities across any computing system.*

CO3 *: Design a security solution for any computing system.*

FUNDAMENTALS AND MATHEMATICS OF CRYPTOGRAPHY

Overview - Classical Crypto Systems - Substitution Ciphers -Transposition Ciphers - Stream and Block Ciphers - Introduction to Number Theory - Congruences - Chinese Remainder theorem - Modular Arithmetic- Modular Exponentiation - Fermats and Eulers Theorem - Finite Fields - GF(2n) Fields. **(9)**

ENCRYPTION TECHNIQUES

Data Encryption Standard - Advanced Encryption Standard - Confidentiality using Symmetric Encryption - Public-Key Cryptography and RSA - Key Management - Diffie-Hellman Key Exchange - Elliptic Curve Cryptography - Symmetric Key Distribution - Kerberos - X.509 Authentication Service. **(9)**

HASH FUNCTIONS AND SIGNATURES

Message Authentication and Hash Functions - Description of MD Hash Family - Secure Hash Algorithms - SHA-512 - Digital Signatures and Authentication Protocols - Digital Signature Standard - Process - Services - Attacks on Digital Signature - Digital Signature Schemes. **(9)**

NETWORK SECURITY

Security at the application layer - E-Mail - Pretty Good Privacy - S/MIME - Security at the transport layer - SSL Architecture - Protocols - Message Formats - TLS - Security at the Network Layer - IPSec - Two modes - Authentication Header (AH) - Encapsulating Security Payload (ESP) - Security Policy - Security Association - Internet Key Exchange. **(9)**

SYSTEM SECURITY

Intruders - Intrusion Detection - Password Management - Malwares and Related Threats - DOS Attacks - Distributed Denial of Service Attacks - Firewalls - Firewall Types-Configuration and Implementation - Demilitarized zone-Firewall Forensics- Services and Limitations-Intrusion prevention system **(9)**

TOTAL : 45

REFERENCE BOOKS

1. *William Stallings, "Cryptography and Network Security - Principles and Practices", 4th Edition, Pearson Education, 2006.*
2. *Behrouz A. Forouzan, Debdeep Mukhopadhyay, "Cryptography and Network Security", 2nd Edition, Tata Mc Graw Hill, 2010.*
3. *Atul Kahate, "Cryptography and Network Security", Tata McGraw Hill, 2003.*
4. *Joseph Migga Kizza, "A Guide to Computer Network Security", Springer International Edition, 2010.*
5. *Charles B. Pfleeger, Shari Lawrence Pfleeger, "Security in Computing", 4th Edition, Pearson Education, 2007.*

15MCAE10 - SOFTWARE ARCHITECTURE AND DESIGN PATTERNS

L	T	P	C
3	0	0	3

PRE-REQUISITES

15MCA35, 15MCA42

ASSESSMENT : THEORY

COURSE OBJECTIVE

To introduce different types of design and architectural patterns and make the students understand their roles of patterns in designing objects and architecture of system.

COURSE OUTCOME

On Completion of the course, the students should be able to

CO1 *: Describe the various types of software patterns and their needs in software development.*

CO2 *: Apply design patterns to solve the issues in designing the objects.*

CO3 *: Design the software architectures using appropriate architectural patterns based on the quality attributes and documenting them.*

INTRODUCTION TO PATTERNS

Definition - Making a pattern - Pattern categories - Relationship between patterns - Patterns and software architecture **(8)**

DESIGN PATTERNS

Introduction - Creational patterns - Structural patterns - Behavioral patterns - Case study **(10)**

INTRODUCTION TO SOFTWARE ARCHITECTURE

Software architecture definition and needs. Introduction: Architectural patterns - Reference models - Reference architecture - Architectural structures and views **(8)**

ARCHITECTURAL STYLES

Pipes and filters - Data abstraction and object oriented organization - Event based, Implicit invocation - Layered style - Repository - Interpreter - Process control - Distributed - Case study. **(10)**

THE ARCHITECTURAL BUSINESS CYCLE

Creating an architecture: Understanding quality attributes - Achieving qualities - Designing the architecture- Documenting the architecture - Case study. **(9)**

TOTAL : 45

REFERENCE BOOKS

1. *Frank Buschmann, Regine Meunier, Hans Rohnex, Peter Sommerland & Michael, "Pattern - Oriented Software Architecture - A Systems of Patterns Volume - I", 1996 (Reprint 2001) (Para - I)*
2. *Erich Gamma, Richard Helm, Ralph Johnson, John Vlissides, "Design Patterns - Elements of reusable Object Oriented Software", Pearson Education, 1999. (Para II)*
3. *Mary Shaw, David Garlan, "Software Architecture - Perspectives on an Emerging Discipline", PHI,1996 (Para IV)*
4. *Len Bass, Paul Clements, Rick Kazman, "Software Architecture in Practice", 2nd Edition, Pearson Education, First Indian Reprint, 2003. (Para III & V)*

15MCAE11 - SOFTWARE METRICS AND MEASUREMENT

L	T	P	C
3	0	0	3

PRE-REQUISITES

15MCA22, 15MCA42, 15MCA43

ASSESSMENT : THEORY

COURSE OBJECTIVE

To understand methods of data collection, basic software metrics, measurements, related terminology and analysis of results.

COURSE OUTCOME

CO1 : *Students shall acquire knowledge of various software metrics.*

CO2 : *Students will be able to apply metrics on software projects.*

FUNDAMENTALS OF SOFTWARE MEASUREMENT

Measurement in software engineering - Scope of software metrics - Representational theory of measurement - Measurement and Models - Measurement scales and scale types - Classifying software measures - Determining what to measure - Software measurement validation. Software metrics data collection - Analyzing software measurement data: Introduction - Analyzing the results of experiments - Simple analysis Techniques, Overview of statistical tests. **(11)**

SOFTWARE METRICS

Product quality metrics - In- Process quality metrics - Complexity metrics and models - Size metrics - Effort, Cost and Time measurement - Object Oriented Metrics - Software maintenance metrics - In-process metrics for Software Testing. **(12)**

SOFTWARE RELIABILITY MEASUREMENT

Basics of Reliability Theory - Software Reliability Problem - Parametric Reliability Growth Models - The recalibration of software reliability growth predictions. **(9)**

METRICS TO MANAGE PROJECTS

Tracking software progress - Software project metrics - Utilization and efficient project management.**(6)**

MEASUREMENT AND MANAGEMENT

Planning a measurement program - Metrics plan - Developing goals, questions and metrics - Mapping measures to activities - Measurement tools - Measures, analysts and audience - Measurement in practice. **(7)**

TOTAL : 45

REFERENCE BOOKS

1. *Stephen H Kan, "Metrics and Models in Software Quality Engineering", Pearson Education, Second Indian Reprint, New Delhi, 2007.*
2. *Norman Fenton and Shari Lawrence Pfleeger, 'Software Metrics - A Rigorous & Practical Approach', Second Edition, Revised printing, Thomson Asia Pvt Ltd, Singapore, 2002.*
3. *International Function Point Users Group 'IT Measurement : Practical Advice from the Experts', Addision - Wesley Professional, 1st Edition, 2002.*

15MCAE12 - AGILE METHODS FOR SOFTWARE DEVELOPMENT

L	T	P	C
3	0	0	3

PRE-REQUISITES

15MCA42

ASSESSMENT : THEORY

COURSE OBJECTIVE

To introduce students to several agile methods for software development and be able to construct tailored agile processes that best fit the technical and market demands of a modern software project

COURSE OUTCOME

CO1 : *Students will be able to apply agile methodologies to the project based on its scope, team and complexity.*

CO2 : *Students will be equipped with test first programming skill.*

INTRODUCTION TO AGILE DEVELOPMENT

What is Agility - Agile Software Development Ecosystems - Customer Delivery Principles - Practices that deliver useful features - Encouraging Collaboration and Technical Excellence. Iterative and Evolutionary-Motivation-Evidence. Agile Overview-Evolution of Agile Methodologies-Agile outside Software Development. **(9)**

AGILE METHODOLOGIES

User Stories and Story Cards - Scrum - Dynamic Systems Development Methodology - Crystal Methods - Feature Driven Development **(9)**

AGILE METHODOLGOIES

Lean Development - Extreme Programming - Adaptive Software Development - Unified Process **(9)**

AGILE ENVIRONMENT

Developing an Agile Software Development Environment - Articulating Ecosystem - Designing your agile methodology **(8)**

TESTING FRAMEWORK

JUNIT

Automatic Tests-Junit's Goal-Fixtures-Testing Exceptions-Junit's Implementation-Junit API-Test First Programming-Stub-Other Uses for Tests-Extending Junit-Junit and Ant-Running Junit Standalone-Junit and IDEs-Test Infection. **(10)**

TOTAL : 45

REFERENCE BOOKS

1. *Jim Highsmith, “Agile Software Development Ecosystems”, Addison-Wesley Professional, 1st Edition, 2002.*
2. *Craig Larman, "Agile and Iterative Development: A Manager's Guide", Addison-Wesley Professional, 2003.*
3. *Alistair Cockburn, "Agile Software Development: The Cooperative Game", Addison-Wesley, 2nd Edition, 2007*
4. *Kent Beck, "J Unit Pocket Guide", O'Reilly Media, 1st Edition, 2004.*

15MCAE13 - OPEN SOURCE TECHNOLOGIES

L	T	P	C
3	0	0	3

PRE-REQUISITES

15MCA17, 15MCA42, 15MCA53

ASSESSMENT : THEORY

COURSE OBJECTIVE

- *To introduce open source technologies*
- *To develop web applications using python and ruby*
- *To understand the use of content management system*

COURSE OUTCOME

CO1 *: Analyze the various open web frameworks*

CO2 *: Write web applications using python and ruby*

CO3 *: Design for extendibility and code reuse*

INTRODUCTION

Need for free and open source software - Overview of linux - Distributions - Desktop environment - KDE - GNOME - Development environment tools and systems - using version control system - FOSS practices - programming guidelines **(9)**

PYTHON

Introduction to Django - templates - models - forms - deploying django - caching - Integrating with legacy databases and applications - security **(9)**

RUBY

Ruby on rails - introduction - ruby, ruby gems, rails and git - deploying - building a demo app -static and dynamic pages - rails flavored ruby - users **(9)**

CONTENT MANAGEMENT SYSTEMS

Drupal / Joomla - Creating a basic page - Modules - User Interface - Media Management - Event Management - Multilingual capabilities **(9)**

APPLICATIONS

Case study - Web applications using django - web sites using ruby on rails **(9)**

TOTAL : 45

REFERENCES BOOKS

1. *Jesús M. González-Barahona, Joaquín Seoane Pascual, Gregorio Robles, Introduction to Free Software, Free Technology Academy, Europe, 2009 (http://ftacademy.org/materials/fsm/1#1).*
2. *Adrian Holovaty, Jacob Kaplan-Moss, The Definitive Guide to Django: Web Development Done Right, Apress, 2009*
3. *Michael Hartl, Ruby on Rails tutorial: Learn Web development with Rails, Addison-Wesley Professional Ruby Series, 2012*
4. *Angela Byron, Addison Berry, Bruno De Bondt, Using Drupal 2nd edition, O' Reilly, 2012*
5. *http://sixrevisions.com/resources/git-tutorials-beginners/*

15MCAE14 - ENTERPRISE MANAGEMENT AND COMPUTING

L	T	P	C
3	0	0	3

PRE-REQUISITES

Consent of the Instructor

ASSESSMENT : THEORY

COURSE OBJECTIVE

To make students familiarize with concepts of E-commerce, Supply chain Management and Enterprise Resource Planning.

COURSE OUTCOME

CO1 *: Will have an in-depth knowledge in business applications & recent trends in the E- commerce.*

CO2 *: Will acquire the ability to design and develop effective enterprise applications*

E-COMMERCE

Introduction - History of E- Commerce, Emergence of Internet, Intranet, World Wide Web - Definition- Advantages- Disadvantages- VPN- Business models for E-Commerce. Transaction Parties- Transaction Types- Software Agents- Types- E-Commerce Opportunities for Industries - Planning E-Commerce Project. **(12)**

ENTERPRISE RESOURCE PLANNING

An Overview - Benefits of ERP- Business Models in an ERP system - ERP Implementation - ERP Related Technologies- Business Process Reengineering- Data Technologies- Data Mining - On-line Analytical Processing. **(10)**

SUPPLY CHAIN MANAGEMENT

Understanding the Supply Chain- Strategic Fit and Scope- Supply Chain Drivers and Obstacles - Demand Forecasting - Aggregate Planning - Planning Supply and Demand in a Supply Chain- Managing Economics of Scale- Managing Uncertainty- Determining Optimal Level of Product Availability. **(13)**

CASE STUDY

Development of Enterprise Software for Hospital, University and Manufacturing Firm - Usage of Popular Frameworks for Software Development. **(10)**

TOTAL : 45

REFERENCE BOOKS

1. *P.T. Joseph, S.J "E-Commerce - An Indian Prespective". Second edition, prentice Hall of India 2005.*
2. *Alexis Leon "ERP Demystified" Tata McGraw - Hill , 2003.*
3. *Sunil Chopra , Peter Meindl, "Supply Chain Management" Strategy, Planning and Operation, Prentice Hall of India. Second Edition, 2004.*
4. *Sarika Kulkarni , Ashok Sharma , "Supply Chain Management ", Tata McGraw Hill Publishing Company Ltd, 2000.*
5. *KogenT Solutions Inc. "Java Server Programming" Dereamtech Press 2007.*

15MCAE15 - HEALTHCARE INFORMATION SYSTEM

L	T	P	C
3	0	0	3

PRE-REQUISITES

15MCA15

ASSESSMENT : THEORY

COURSE OBJECTIVE

- *Develop a better understanding of current and emerging issues in healthcare information technology management*
- *To provide context for the growing discussion on electronic medical records, health information exchange and its impact on the internal and external environments shaping the healthcare industry.*

COURSE OUTCOME

Students will be able to

CO1 *: Analyze emerging new technologies in Health care Information Systems such as robotics, tele-medicine and social media and its standards.*

CO2 *: Examine the importance of security standards and the challenges in managing information technology.*

INTRODUCTION

Introduction to health care information - Health care data quality - Health care information regulations, laws and standards. **(9)**

HEALTH CARE INFORMATION SYSTEM

History - Evolution of health care information systems - Current Emerging use of clinical information systems - System acquisition - System implementation and support. **(9)**

INFORMATION TECHNOLOGY

Information architecture and technologies that support health care information systems - Health care information system standards - Security of health care information systems. **(9)**

MANAGEMENT OF IT CHALLENGES

Organizing information technology services - IT alignment and strategic planning - IT governance and management. **(9)**

IT INITIATIVES

IT Initiatives - Management role in IT initiatives - Assessing & achieving value in health care information systems. **(9)**

TOTAL : 45

REFERENCE BOOKS

1. *Karen A Wager, Frances Wickham Lee, John P Glaser, "Managing Health Care Information Systems: A Practical Approach for Health Care Executives", Jossey-Bass/Wiley, 2005.*
2. *Rudi Van De Velde and Patrice Degoulet, "Clinical Information Systems: A Componenet based approach", Springer 2005.*

15MCAE16 - GEOGRAPHICAL INFORMATION SYSTEM

L	T	P	C
3	0	0	3

PRE-REQUISITES

15MCA12

ASSESSMENT : THEORY

COURSE OBJECTIVE

- *To introduce the fundamentals of Geographic Information System.*
- *To provide details about Spatial data, Spatial data base structures, Data structures and their utility in GIS*

COURSE OUTCOME

Student will be able to:

CO1 *: Identify and integrate the components for Geographic Information System.*

CO2 *: Apply the spatial database structures and data structures to the applications in GIS.*

FUNDAMENTALS OF GIS

Map - Definition - Types of Maps, Characteristics of Maps, Map Projections - GIS -Definition - History of GIS - Basic Components of GIS - Hardware, Software, Data, Methods, People - List of GIS Software : Popular software, Open Source software **(9)**

DATA STRUCTURE/ DATA MODEL

Raster Data Model - Grid Cell/Pixel - Tessellations - Regular, Irregular - Geometry of Regular Tessellations: Shape, Adjacency, Connectivity, Orientation - Size of Grid Cell -Data Encoding: Rule of dominance, Rule of importance, Centre of Cell - Data Compression: Run length, Chain, Block and Quadtree coding - Vector Data Model - Topology - Euler Equation, Rules for Topological Consistency - Arc-Node Data Structure- Raster vs.Vector Comparison **(9)**

DATA INPUT

Vector Data Input - Digitizer: Principles, Co-ordinate transformation - Errors in digitizing - Scanner: Principles, On Screen Digitization, Georeferencing - Raster File Formats, Vector File formats - Import/ Export Functionality - Linking Non-spatial data with Spatial data - Linking digital databases: ODBC - GP data integration **(9)**

CONTINUOUS SURFACE REPRESENTATION

Discrete and Continuous Surfaces - Interpolation Techniques - Digital Elevation Models- Sources of DEM: Ground Survey, Photogrammetry, Stereo Satellite data, Airborne Laser Terrain Mapping- DEM representation - Gridded DEM, TIN structure - Extraction of Topographic Parameters: Slope, Aspect, Delineation of Watershed and Drainage Network - DEM Applications. **(9)**

GIS CUSTOMISATION AND APPLICATIONS

Customisation of GIS : Need, Uses - 3D data visualization - Object Oriented GIS - Web GIS: Web GIS Architecture, Applications, Mobile Mapping **(9)**

TOTAL : 45

REFERENCE BOOKS

1. *Lo, C.P. and Yeung, Albert K.W., Concepts and Techniques of Geographic Information Systems Prentice Hall, 2002.*
2. *Peter A. Burrough, Rachael A. McDonnell, Principles of GIS, Oxford University Press, 2000*
3. *Robert Laurini and Derek Thompson, Fundamentals of Spatial Information Systems, Academic Press, 1996*
4. *Paul Longley, Geographic Information Systems and Science, John Wiley & Sons Inc, 2001*

15MCAE17 - ADVANCED DATABASE MANAGEMENT SYSTEMS

L	T	P	C
3	0	0	3

PRE-REQUISITES

15MCA25

ASSESSMENT : THEORY

COURSE OBJECTIVE

To learn the advanced database concepts and object data model for real world applications.

COURSE OUTCOME

The students will be able to

CO1 *: Implement the algorithms for optimizing query execution.*

CO2 *: Explain the parallel and distributed database architectures.*

CO3 *: Choose the proper data model for a given application and structure data using XML.*

QUERY PROCESSING

Overview- Measures of query Cost- Selection Operations- Sorting- Join Operations- Other Operations- Evaluation of Expressions

QUERY OPTIMIZATION

Overview- Heuristics in query Optimization **(7)**

PARALLEL DATABASES

Introduction- I/O Parallelism- Interquery Parallelism-Intraquery Parallelism- Intraoperation Parallelism - Interoperation Parallelism.

DISTRIBUTED DATABASES

Homogenous and Heterogenous Databases- Distributed Data Storage- Distributed Transactions- Commit Protocols- Concurrency Control in Dsitributed Databases- Availability- Distributed Query Processing- Heterogenous Distributed Database- Cloud Based Databases. **(12)**

XML

Structure of XML Data-XML Document Schema- Querying and Transformation- Application Program Interfaces to XML- Storage of XML Data- XML Applications. **(9)**

OBJECT AND OBJECT RELATIONAL DATABASES

Introduction to Complex objects-Object model of ODMG-ODL-OQL-Object Relational and Extended-Relational Systems-SQL and its Relational Features-Nested Relational Model. **(8)**

ENHANCED DATA MODELS FOR ADVANCED APPLICATIONS

Active Database Concepts-Temporal Database Concepts-Multimedia Database Concepts-Spatial Database concepts-Geographic Information Systems. **(9)**

TOTAL : 45

REFERENCE BOOKS

1. *Abraham Silberschatz, Henry F. Korth, S. Sudharshan, "Database System Concepts", 6th Edition, Mc Graw Hill International Edition, 2011.*
2. *Ramez Elmasri,Shamkant B.Navathe, "Fundamentals of Database Systems", 4th Edition, Pearson Education, 2006*
3. *Raghu Ramakrishnan, Johannes Gehrke, "Databases Management Systems", 3rd Edition, Mc Graw Hill, 2003.*

15MCAE18 - BUSINESS INTELLIGENCE

L	T	P	C
3	0	0	3

PRE-REQUISITES

15MCA25, 15MCA44

ASSESSMENT : THEORY

COURSE OBJECTIVE

This course Introduces the concepts and techniques of business intelligence to facilitate the students to develop business intelligence projects and to make timely and better decisions.

COURSE OUTCOME

CO1 *: Students will be able to apply Business Intelligence methods and techniques in addressing strategic business problems in organizations*

CO2 *: Students will be able to make better decisions by conducting in-depth analysis to both technical and business problems.*

BASICS OF BUSINESS INTELLIGENCE

Business intelligence: Definition - Effective and timely decisions - data, information and knowledge - role of mathematical models - BI architectures. Decision Support Systems: Definition - Representation of the decision-making process - Evolution of information systems - - development of DSS. Mathematical models for decision making: Structure - development of a model - classes of models **(10)**

BUSINESS INTELLIGENCE STAGES AND STEPS

BI definition - BI decision support initiatives - development approaches - engineering stages and the development steps - parallel development tracks - BI project team structure.

Business Case Assessment: justification-drivers-Business Analysis issues - Risk assessment -activities - Deliverables - roles. **(9)**

BI PROJECT PLANNING AND REQUIREMENTS DEFINITION

BI project : managing - defining - planning - activities - deliverables - roles. Project Requirements Definition: General and specific requirements - activities - deliverables - roles. **(8)**

DATA ANALYSIS AND APPLICATION PROTOTYPING

Data Analysis : Business focused data analysis - top-down logical data modeling - bottom up source data analysis - data cleansing - activities - deliverables-roles.

Prototyping : Purpose - best practices - types - building successful prototypes - application prototyping activities - deliverables - roles. **(9)**

DATABASE DESIGN AND ETL DESIGN

Differences in database design - logical and physical database design - activities - deliverables - roles. ETL Design: Implementation strategies - Preparing for ETL process - Designing the extract programs, transformation programs, load programs, ETL process flow - Evaluating ETL tools - activities - deliverables - roles. **(9)**

TOTAL : 45

REFERENCE BOOKS

1. *Carlo Vercellis, "Business Intelligence: Data mining and Optimization for Decision Making", John Wiley and Sons, 2009.*
2. *Larissa T.Moss and Shaku Atre, "Business Intelligence Roadmap: The Complete project lifecycle for decision support applicatons", Addison Wesley, 2003.*
3. *Efraim Turban, Ramesh Sharda, Dursun Delen and Janine E. Aronson, "Business Intelligence - A Managerial Approach", Second Edition, Pearson Prentice Hall, 2010.*

15MCAE19 - DIGITAL IMAGE PROCESSING

L	T	P	C
3	0	0	3

PRE-REQUISITES

Consent of the Instructor

ASSESSMENT : THEORY

COURSE OBJECTIVE

To introduce fundamental concepts of various image processing techniques and its applications.

COURSE OUTCOME

Students will be able to

CO1 *: Apply mathematical transforms necessary for image processing.*

CO2 *: Analyse Image enhancement, restoration, segmentation and representation techniques*

CO3 *: Choose suitable image compression procedures for any type of image.*

FUNDAMENTALS OF IMAGE PROCESSING

Introduction - Elements of visual perception, Steps in Image Processing Systems - Image Acquisition - Sampling and Quantization - Pixel Relationships - Colour Fundamentals and Models, File Formats. Introduction to the Mathematical tools. **(9)**

IMAGE ENHANCEMENT AND RESTORATION

Spatial Domain : Gray level Transformations, Histogram Processing, Spatial Filtering - Smoothing and Sharpening. Frequency Domain: Filtering in Frequency Domain - DFT, FFT, DCT, Smoothing and Sharpening filters - Homomorphic Filtering, Noise models, Constrained and Unconstrained restoration **(9)**

IMAGE SEGMENTATION AND FEATURE ANALYSIS

Detection of Discontinuities - Edge Operators - Edge Linking and Boundary Detection - Thresholding - Region Based Segmentation - Motion Segmentation, Feature Analysis and Extraction. **(9)**

MULTI RESOLUTION ANALYSIS AND COMPRESSIONS

Multi Resolution Analysis : Image Pyramids - Multi resolution expansion - Wavelet Transforms, Fast Wavelet transforms, Wavelet Packets. Image Compression: Fundamentals - Models - Elements of Information Theory - Error Free Compression - Lossy Compression - Compression Standards - JPEG/ MPEG. **(9)**

APPLICATIONS OF IMAGE PROCESSING

Representation and Description, Image Recognition- Image Understanding - Image Classification - Video Motion Analysis - Image Fusion - Steganography - Colour Image Processing **(9)**

TOTAL : 45

REFERENCE BOOKS

1. *Rafael C.Gonzalez and Richard E.Woods, "Digital Image Processing", 3rd Edition, Pearson Education, 2008.*
2. *Milan Sonka, Vaclav Hlavac and Roger Boyle, "Image Processing, Analysis and Machine Vision", Third Edition, 3rd, Brooks Cole, 2008.*
3. *Anil K.Jain, "Fundamentals of Digital Image Processing", Prentice Hall India, 2007.*
4. *Madhuri A. Joshi, 'Digital Image Processing: An Algorithmic Approach", Prentice Hall India, 2006.*
5. *Rafael C.Gonzalez, Richard E.Woods and Steven L. Eddins, "Digital Image Processing Using MATLAB", 2nd Edition, Pearson Education, 2010.*

15MCAE20 - UNIX INTERNALS

L	T	P	C
3	0	0	3

PRE-REQUISITES

15MCA24

ASSESSMENT : THEORY

COURSE OBJECTIVE

To make the students to understand the basics of operating systems, system calls, shell programming, IPC and distributed systems.

COURSE OUTCOME

Students will be able to

CO1 *: Understand basics of UNIX operating system.*

CO2 *: Design internals of new operating system and develop shell scripts.*

CO3 *: Use advanced concepts in operating system.*

OVERVIEW OF UNIX OPERATING SYSTEM

File system- processor, memory management - hardware interrupts and exceptions - processor execution levels - architecture of UNIX OS - system concepts - kernel data structure.

Buffer cache : Buffer headers - Structure of the buffer pool - Advantages and disadvantages of the buffer cache.

Internal representation of files : Inodes-Structure of a regular file- Directories-Conversion of a pathname to an Inode-Super block-Other files types. **(10)**

THE STRUCTURE OF PROCESSES & PROCESS SCHEDULING

Process states and transitions - Layout of system memory - The context of a process - Saving the context of a process. Process Control: Process creation - Signals - Process termination - Awaiting process termination - Invoking other programs - The shell - System boot and the INIT process. Process Scheduling **(8)**

MEMORY AND I/O SYSTEM

Memory management policies : Swapping - Demand paging - hybrid system. IO sub system: Driver interfaces - disk drivers- terminal drivers - streams. **(9)**

SHELL PROGRAMMING

UNIX for beginners - The file system - Using the Shell - Filters - Shell Programming - Programming with Standard I/O -UNIX system calls **(10)**

INTER-PROCESS COMMUNICATION AND DISTRIBUTED SYSTEMS

System V IPC - message- semaphore-shared memory-sockets. Multiprocessor systems - Distributed UNIX system **(8)**

TOTAL : 45

REFERENCE BOOKS

1. *Maurice J. Bach, "The Design of the Unix Operating System", Prentice Hall of India, 2004.*
2. *Brian W.Kernighan & Rob Rike, "The UNIX Programming Environment", Pearson Education, 2006.*
3. *Vahalia, "UNIX Internals: The New Frontiers", Pearson Education Inc, 2003.*
4. *Sumitabha Das, "UNIX Concepts and Applications", 4th Edition, Tata McGraw Hill Publications, 2005.*

15MCAE21 - MACHINE LEARNING

L	T	P	C
3	0	0	3

PRE-REQUISITES

15MCAE05

ASSESSMENT : THEORY

COURSE OBJECTIVE

To understand the basics of machine learning, understand the need for machine learning, techniques, the problems faced and the current state of art.

COURSE OUTCOME

CO1 : *The learners shall understand the machine learning techniques - Clustering, Induction. Bayesian,Decision Tree, Analytical and Instance based learning and to apply the techniques in computing.*

CO2 : *The learners shall be able to compare the various machine learning techniques and design issues in machine learning.*

INTRODUCTION

Designing a learning system - Perspectives and Issues in machine learning - Concept learning task - Concept learning as search - Version spaces - Candidate Elimination learning algorithm - Inductive Bias. **(9)**

DECISION TREE LEARNING

Decision Tree representation - Appropriate Problems for Decision Tree Learning - Basic Decision tree learning algorithm - Hypothesis space search and Inductive Bias in Decision tree learning - Issues in Decision Tree Learning **(7)**

ANN

Perceptrons - Back propagation Algorithms. Evaluating Hypothesis: Deriving confidence intervals - Hypothesis testing - comparing learning algorithms. **(5)**

BAYESIAN LEARNING

Bayes Theorem and Concept learning - Maximum Likelihood and Least Squared error hypothesis - Maximum Likelihood hypotheses for predicting probabilities - Minimum description Length principle - Bayes optimal classifier - Gibbs algorithm - Naïve Bayes classifier - Bayesian Belief networks -EM algorithm. **(9)**

ANALYTICAL AND COMBINING ANALYTICAL AND INDUCTIVE LEARNING

Analytical learning - Explanation based learning - Inductive Analytical approaches to learning - Using prior knowledge to, initialize the hypothesis, alter the search objective and augment search operators. **(6)**

INSTANCE-BASED AND REINFORCEMENT LEARNING

K - nearest neighbor learning -Locally weighted regression - Radial Basis functions - Case based reasoning - Reinforcement learning: Learning task-Q Learning-Q function - Algorithm for learning Q-convergence - updating sequence - Temporal difference learning - Non deterministic rewards and actions. **(9)**

TOTAL : 45

REFERENCE BOOKS

1. *Tom M Mitchell, "Machine Learning", McGraw Hill, 1st Edition, 2003.*
2. *EthemAlpaydin, "Introduction to Machine Learning", MIT Press, 2nd Edition, 2010.*
3. *Stephan Marsland, "Machine Learning - An Algorithmic Perspective", Chapman and Hall, 1st Edition, 2009.*
4. *Nils Nilsson, "Introduction to Machine Learning", MIT Press, 1997.*
5. *Jude Shavil, Thomas G Dietterich, "Readings in Machine Learning", Morgan Kaufmann Publishers, 1990.*

15MCAE22 - INTERNET OF THINGS

L	T	P	C
3	0	0	3

PRE-REQUISITES

15MCA23,15MCA33

ASSESSMENT : THEORY

COURSE OBJECTIVE

The course provides the insight of

- *the characteristics, building blocks and enabling technologies of Internet of Things*
- *the design methodology for Internet of Things*

COURSE OUTCOME

CO1 *: The students will be able to critically reflect on the role of connected products in everyday settings*

CO2 *: The students will be able to articulate the future possibilities and potential directions for the field*

CO3 *: Be able to explain how IOT, cloud computing and big data analytics can work together*

INTRODUCTION

Definition and characteristics of IoT - Physical design of IoT - Logical design of IoT - Enabling technologies - IoT Levels - Domain specific IoTs **(6)**

DEVELOPING INTERNET OF THINGS

IoT and M2M - IoT System Management with NETCONF-YANG - IoT Design Methodology - Case Study: Weather monitoring - Motivation for using Python- Logical design using Python: Programming constructs - Python packages for IoT **(9)**

IoT PHYSICAL DEVICES AND ENDPOINTS

Building blocks of an IoT device - Intel Galileo board - Raspberry pi **(10)**

IoT PHYSICAL SERVERS AND CLOUD SUPPORT

Cloud storage models and communication API - WAMP-AutoBahn for IoT - Xively cloud for IoT - Django - Designing a RESTful Web API - Amazon Web services for IoT

Data Analytics for IoT : Apache Hadoop - Using mapreduce for batch data analytics **(10)**

CASE STUDIES ILLUSTRATING IoT DESIGN

Home Automation - Cities - Environment - Agriculture - Productivity Applications **(10)**

REFERENCE BOOKS

1. *Arshdeep Bahga and Vijay Madisetti, "Internet of Things: A Hands-on Approach", Universities Press, 2014.*
2. *Agus Kuniawa, "Getting started with Intel IoT and Intel Galileo", Kindle edition, 2015.*

15MCAE23 - WEB SERVICES

L	T	P	C
3	0	0	3

PRE-REQUISITES

15MCA17

COURSE OBJECTIVE

To explore the foundations and techniques of distributed services and to demonstrate ways to create and use web services in applications.

COURSE OUTCOME

CO1 *: Ability to design and develop simple to complex web services*

CO2 *: Gain ability to build platform independent distributed applications*

CO3 *: Develop dynamic web applications using RESTful web services.*

DISTRIBUTED INFORMATION SYSTEMS

Design of an Information System-Architecture of an Information System-Communication in an Information System-Understanding middleware-RPC-TP Monitors-Object Brokers-Message Oriented Middleware- Web Technologies for supporting remote clients. **(12)**

INTRODUCTION TO WEB SERVICES

Web Services and their Approach to Distributed Computing-Web Service Technologies-Web Services Architecture. **(10)**

WEB SERVICES TECHNOLOGY

SOAP-WSDL-UDDI-RESTful Web Service: Architecture- RESTful Web Service Design. **(12)**

ADVANCED CONCEPTS

An Introduction to Service Co-ordination Protocols- WS Coordination- WS Transactions- Applicability of Web Services- Creating Web Service Applications in Java. **(11)**

TOTAL : 45

REFERENCE BOOKS

1. *Web Services: Concepts, Architecture and Applications, Gustavo Alonso, Fabio Casati, Harumi Kuno, Vijay Machiraju, Springer Science and Business Media, 2004.*
2. *RESTful Java Web Services, Jose Sandoval, Packt Publishing, 2009.*
3. *James Mcgovern, Sameer Tyagi, Michael E. Stevens, Sunil Mathew, Java Web Service Architecture, Morgan Kaufmann Publishers, An Imprint of Elsevier, Indian Reprint 2005.*
4. *Ethan Cerami , Web Services Essentials, O' Reilly Publishers, 2002.*
5. *Ron Schmelzer, XML and Web Services Unleashed, Pearson Edition, 2008.*

15MCAE24 - DATA ANALYTICS

L	T	P	C
3	0	0	3

PRE-REQUISITES

15MCA21, 15MCA25

ASSESSMENT : THEORY

COURSE OBJECTIVE

To give an exposure on the basic concepts, phases, methods, technology and tools of data analytics.

COURSE OUTCOME

- *The student can describe the big data system and the need of analytical process.*
- *The student can perform data analysis using appropriate method.*
- *The student can develop data analytical project by using appropriate technology and tool.*

INTRODUCTION

Introduction to big data analytics: Big data overview - State of the practice in Analytics - Key role for the new big data ecosystem- Examples of big data analytics.Data Analytics Lifecycle: Overview - Discovery - Data Preparation - Model Planning - Model Building - Communicate Results - Operationalize - Case Study. **(9)**

DATA ANALYTICAL METHODS

Basic Data Analytic Method Using R : Introduction to R - Exploratory Data Analysis - Statistical Methods for Evaluation. **(5)**

Clustering and Association Rules : Overview of Clustering - K-means - Overview of Association Rules - Apriori Algorithm- Evaluation of Candidate Rules - Application of Association Rules - Case Study. **(7)**

Regression,Classification, Time Series and Text Analysis : Linear Regression - Logistic Regression - Decision Trees - Naïve Bayes - Time Series Analysis - ARIMA Model - Text Analysis Steps with Example - Collecting, Representing Text - Categorizing Documents by Topics - Determining Sentiments. **(10)**

DATA ANALYTICS - TECHNOLOGY AND TOOLS

MapReduce and Hadoop : Analytics for Unstructured Data - The Hadoop Ecosystem - NoSQL. **(8)**

DATA ANALYTICS PROJECT

Communicating and Operationalizing an Analytics Project - Creating the Final Deliverables - Data Visualization. **(6)**

TOTAL : 45

REFERENCE BOOKS

1. *EMC Education Services, " Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data", Wiley, 2015.*
2. *Thomas A. Runkler," Data Analytics - Models and Algorithms for Intelligent Data Analysis", Springer Vieweg, 2012.*

15MCAE25 - E-COMMERCE

L	T	P	C
3	0	0	3

ASSESSMENT : THEORY

COURSE OBJECTIVE

To help the students to understand that web is a boon to business, the aspects of online business involving exchanges among customers, business partners and vendors, the online strategies for launching and organizing a site and the legal and ethical issues of internet.

COURSE OUTCOME

The student can

CO1 *: Understand the importance of E-Commerce for Indian business.*

CO2 *: Describe the components of Business Models and Processes like e-marketing, e-security and e- payment.*

CO3 *: Can explore career opportunities on management process like CRM, SCM, SKM and ERP.*

INTRODUCTION

History - Early Business Information Interchange Efforts - Emergence of - internet, WWW. E-Commerce - Advantages, Disadvantages - BAM Models - Transition to E-Commerce in India, E-Transmission Challenges, The Information Technology Act 2000 - Business Models - Enabling Technologies of WWW. **(6)**

ELECTRONIC MARKETING, SECURITY AND PAYMENT

Traditional Marketing - Web Presence Goal - Browsing Behavior Model - Online Marketing, E-Advertising, Trends, E-branding, Strategies. E- Security - Internet Security, E-business Risk Management Issues, Information Security Environment in India. E-Payment - Concerns in Internet Banking, Digital Payment Requirements, Token Based E-Payment Classification, E-Cash, Cheque Payment, Risk and E-Payment. **(9)**

CRM, SCM & SKM

E-CRM Solutions - Business Touch Points - Case Studies. Supply Chain - The new way, e-logistics, Fulfilling Customer's Needs, Smart Chains Smarter Gains. Real Time Benefits and Strategies - Advantages. Knowledge as Key Business Asset, Changes in - Global Business Economy, Technology. Knowledge - Definition, Management - Knowledge Management, Data Warehousing and Data Mining. Virtual value chain - 7 Dimensions - E-Commerce Strategy - planning E-Commerce Project. **(10)**

MOBILE COMMERCE AND TECHNOLOGIES

E-Business Portals. What? - Issues - Wireless, Cellular, Wireless Spectrum. - Success Stories. Technologies - mobile commerce, WAP Wireless Generations. Portals - Different Types, benefits, features. Requirements for Intell **(10)**

ERP & EDI

Introduction -ERP and E2RP - Business Problems, New Paradigm, Drivers - Business processes and supporting processes. Architecture, Implementation, ERP Processes. ERP - Cloud and Open Sources. EDI - Concepts and Technology. **(10)**

TOTAL : 45

REFERENCE BOOKS

1. *P.T. Joseph S.J, "E-Commerce - An Indian Perspective", PHI Learning Private Limited, 4th Edition, 2012.*
2. *Sandeep Desai, Abhishek Srivastava, " ERP to E2RP - A Case Study Approach", Eastern Economy Edition, PHI Learning Pvt. Ltd.2013.*
3. *Kamalesh K. Bajaj, Debjani Nag, "E-Commerce - The Cutting Edge of Business",McGraw Hill Education (India) Private Limited, 2nd edition (3 September 2005).*
4. *Ravi Kalakota, Marcia Robinson, "e - Business 2.0- Roadmap for Success", Addison-Wesley Professional, 2001.*

15MCAE26 - BASICS OF ROBOTICS

L	T	P	C
3	0	0	3

PRE-REQUISITES

15MCAE05

ASSESSMENT : THEORY

COURSE OBJECTIVE

- *The primary objective of this course is to provide basic knowledge with introduction to the learning systems and applications in the latest cutting edge technology area in Robotics.*
- *To initiate basic knowledge in the development of robotics.*
- *To enhance knowledge as a Mechanism for the development and execution of complex behaviors in autonomous robots involving adaptation and learning.*
- *To Study and analyze the basic problems in Robotics and to develop a solution with a logical blend of knowledge in Robotics and Automation.*

COURSE OUTCOME

CO1 *: Learn the basics of robotics and applications pathway for future research and development*

CO2 *: After learning this subject the knowledge gained will be able to Identify the problems evolved in robotics which helps in solving problems.*

CO3 *: Investigation studies will result as an outcome for developing solutions using Interdisciplinary areas like Fusion Technologies in robotics*

INTRODUCTION TO ROBOTIC PARADIGMS

Robots-Intelligent Robots-Paradigm-Robotic Paradigms-Primitives Sense-Plan-Act-Overview of Three Paradigms-Hierarchical, Reactive and Hybrid Deliberative/Reactive-Architectures **(7)**

BASICS OF MECHANICS AND CONTROL

Description of position and orientation Mechanics-Kinematics-Forward and Inverse kinematics of manipulators-Dynamics. Introduction to Jacobian of the Manipulator-Trajectory generation- Programming Robots-Off-line Programming and simulation **(9)**

ROBOT PROGRAMMING LANGUAGES AND SYSTEMS

Levels of Robot Programming- A Sample Application in industrial robot - Requirements of a Robot Programming Language-Internal world model versus external reality-Context Sensitivity- Error Recovery **(9)**

TELEOPERATION TO AUTONOMY

Overview-Machine Intelligent-Use of Robots-Implications-Brief History-Industrial Manipulators-Space Robotics and the AI approach-Teleoperation-Telepresence-Semi-autonomous control- Seven Areas of Robotic AI **(10)**

BASICS OF ROBOTICS TECHNOLOGY AND AUTOMATION

Introduction - End-Effectors-Drive System for Grippers-Mechanical, Magnetic, Vaccum and Adhesive-Design of Multiple DOF-Sensory Devices-Types of Sensors-Robot Vision Systems-Low Level, Sensing, Digitizing,-Preprocessing techniques-Noise reduction-enhancement. **(10)**

TOTAL : 45

REFERENCE BOOKS

1. *Robin R. Murphy "Introduction to AI Robotics" Prentice-Hall of India, New Delhi, 2007.*
2. *John J. Craig, "Introduction to Robotics - Mechanics and Control" Pearson Education Inc, 3rd Edition.2013*
3. *S.R. DEB, S.DEB "Robotics Technology and Flexible Automation" Tata McGraw Hill Education 2nd Edition, 2011.*
4. *S.K. Saha "Introduction to Robotics" Tata McGraw Hill Education 4th Edition, 2011.*
5. *Robert J.Schilling, "Fundamentals of Robotics - Analysis & Control", PHI Learning, 2010.*
6. *Mikell P Groover, Mitchel Weiss, Roger N Nagel, Nicholas G Odrey, Ashish Dutta, "Industrial Robotics Technology, Programming and Applications", 2e, 2012.*

15MCAE27 - INTELLIGENT INFORMATION RETRIEVAL

L	T	P	C
3	0	0	3

PRE-REQUISITES

15MCA25

ASSESSMENT : THEORY

COURSE OBJECTIVE

This course Introduces the design, implementation and evaluation of information retrieval systems and emerging technologies to build the next generation of intelligent and personalized search tools and Web information systems.

COURSE OUTCOME

CO1 *: Students will have knowledge on the underlying retrieval models, algorithms, and system implementations.*

CO2 *: Students get familiar with intelligent information retrieval from text, concept discovery, world wide web, etc. using various techniques.*

BASICS OF INFORMATION RETRIEVAL

Boolean retrieval - The term vocabulary and posting lists - Scoring, term weighting and the vector space model - Computing scores in a complete search system - Evaluation in information retrieval. **(11)**

IR MODELS

XML Retrieval - Probabilistic information retrieval : Review - Ranking principle - Binary independence model - Language models for information retrieval : Language models - query likelihood model. **(8)**

TEXT CLASSIFICATION AND SVM MODEL

Text classification and Naïve Bayes : Text classification problem - Naïve Bayes text classification - Bernoulli model - Properties of Naïve Bayes - Feature selection. Support vector machines and Machine learning on documents : SVM models - machine learning methods. **(9)**

CLUSTERING AND MATRIX DECOMPOSITIONS

Flat Clustering : problem statement - K-means - Hierarchical clustering: agglomerative clustering - Centroid clustering- Divisive clustering - Matrix decompositions and latent semantic indexing. **(9)**

WEB SEARCH AND IR

Web search basics - Web crawling and indexes : Overview - Crawling - Link analysis : Pagerank. **(8)**

TOTAL : 45

REFERENCE BOOKS

1. *Christopher Manning, Prabhakar Raghavan and Hinrich Schutze, " Introduction to Information Retrieval", Cambridge University Press. 2012.*
2. *Ricardo Baeza - Yates, BerthierRibeiro - Neto, Modern Information Retrieval: The concepts and Technology behind Search (ACM Press Books), Second Edition 2011*

15MCAE28 - MOBILE COMPUTING

L	T	P	C
3	0	0	3

PRE-REQUISITES

15MCA23, 15MCA33

ASSESSMENT : THEORY

COURSE OBJECTIVE

This course provides an understanding of fundamental concepts underlying current developments in Wireless Communication systems.

COURSE OUTCOME

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

CO1 *: Analyze the architectures, functions and emerging techniques in GSM, GPRS, WLAN, Blue Tooth, Mobile IP and WAP communication*

CO2 *: Analyze the issues and techniques used in the design of MAC and Routing protocols for Wireless communication.*

CO3 *: Develop solutions for simple applications to wireless communication*

WIRELESS COMMUNICATION FUNDAMENTALS

Introduction - Wireless transmission - Frequencies for Radio transmission - Signals - Antennas - Signal Propagation - Multiplexing - Modulations - Spread spectrum - MAC - SDMA - FDMA - TDMA - CDMA - Cellular Wireless Networks. **(9)**

TELECOMMUNICATION SYSTEMS

GSM - System Architecture - Protocols - Connection Establishment - Frequency Allocation - Routing - Handover - Security - GPRS **(11)**

WIRELESS NETWORKS

Wireless LAN - IEEE 802.11 Standards - Architecture - services - HIPERLAN - Ad Hoc Network - Blue Tooth. **(9)**

NETWORK LAYER

Mobile IP - Dynamic Host Configuration Protocol - Routing - DSDV - DSR - AODV - ZRP - ODMR. **(9)**

TRANSPORT AND APPLICATION LAYERS

over Wireless Networks - Indirect TCP - Snooping TCP - Mobile TCP - Fast Retransmit / Fast Recovery - Transmission/Timeout Freezing - Selective Retransmission - Transaction Oriented TCP - WAP - WAP Architecture - WDP - WTLS - WTP - WSP - WML - WML Script - WAE - WTA. TCP **(7)**

TOTAL : 45

REFERENCE BOOKS

1. *Jochen Schiller, "Mobile Communications", Prentice Hall of India / Pearson Education, 2nd Edition, 2003.*
2. *William Stallings, "Wireless Communications and Networks", Prentice Hall of India / Pearson Education, 2nd Edition, 2004.*
3. *Kaveh Pahlavan, Prasanth Krishnamoorthy, "Principles of Wireless Networks", Pearson Education, 2003.*
4. *Uwe Hansmann, Lothar Merk, Martin S. Nicklons and Thomas Stober, "Principles of Mobile Computing", Springer, New York, 2nd Edition, 2003.*
5. *C. K. Toh, "Ad Hoc Mobile Wireless Networks", Prentice Hall Inc., 2002.*

15MCAE29 - PARALLEL PROGRAMMING

L	T	P	C
3	0	0	3

PRE-REQUISITES

Consent of the Instructor

ASSESSMENT : THEORY

COURSE OBJECTIVE

- *Enable students to understand architecture of Modern GPUs and parallel programming concepts*
- *To develop skills for writing parallel programs in performing general purpose GPU Computing*

COURSE OUTCOME

CO1 *: Students efficiently map parallelism to accelerators and understand synchronizations available*

CO2 *: Students can write parallel programs using OpenACC and CUDA*

INTRODUCTION

GPU as parallel computers, Architecture of Modern GPUs, Motivation, Parallel programming Models - OpenMP, MPI, OpenACC, CUDA. **(10)**

OpenACC

Introduction, Memory Model, Execution Model, Basic OPenACC programs **(5)**

BASICS OF CUDA

CUDA Program structure, Example - Matrix-Matrix Multiplication, Device Memories and Data Transfer, Kernel Functions and Threading. **(10)**

CUDA THREAD ORGANIZATION

Using BlockIdx and ThreadIdx, Synchronization and Transparent Scalability, Thread Assignment, Thread Scheduling and Latency Tolerance. **(10)**

CUDA DEVICE MEMORY

Memory types, Strategy for reducing global memory traffic, Memory as a limiting factor to parallelism. Case study. **(10)**

REFERENCE BOOKS

1. *David. B. Krik and Wen-Mei W. Hwu, "Programming Massively parallel processors- A Hands on Approach", Second Edition, Margan and Kaufmann Publishers, 2010.,*
2. *Anath Grama, Anshul Gupta, George Karypis and Vipin Kumar, " Introduction to Parallel Computing" Second Edition, Pearson Education, 2003.*
3. *Michael J Quinn, " Parallel Programming in C and OpenMP", Tata McGraw-Hill Edition, 2003.*
4. *CUDA programming guide 2.3. Santa Clara, CA: NVIDIA.*

15MCAE30 - GRAPHICS AND MULTIMEDIA

L	T	P	C
3	0	0	3

PRE-REQUISITES

Consent of the Instructor

ASSESSMENT : THEORY

COURSE OBJECTIVE

- *Guide the students to identify the need for a graphical system.*
- *Help the students to understand the primitive operations of graphic design.*
- *Help the students to be aware of the latest issues on graphics design and handling multimedia features.*

COURSE OUTCOME

Students will be able to :

CO1 *: Write algorithms for any primitive and advanced graphic operations*

CO2 *: Develop multimedia systems with various emerging technologies of graphics and animation*

INTRODUCTION

Graphics hardware - raster and random scan - display devices - input devices -hard copy devices. Implementation algorithms for graphic primitives - line, poly line, circle, ellipse, curves - attributes - fill styles **(8)**

TRANSFORMATIONS AND VIEWING

Two dimensional geometric transformations - translation - scaling - rotation - reflection - shearing - composite transformations. Two dimensional viewing - window port, viewport - clipping - point - line - Cohen-Sutherland, Liang-Barsky, Nicholl-Lee-Nicholl. Three-Dimensional Geometric Transformations - Translation - Scaling - Rotation - reflection - shearing - affine transforms. **(10)**

COMPUTER ANIMATIONS

Raster methods - double buffering - raster operations - morphing - simulating accelerations - motion specifications - character animations - motion capture - OpenGL animation procedures. **(8)**

INTRODUCTION TO MULTIMEDIA

Multimedia Applications - Multimedia Systems Architecture - evolving technologies - defining objects - Compression and Decompression - Binary image compression - Color , gray scale, Still-video images - JPEG compression - video Image Compression. **(10)**

FILE FORMATS AND MULTIMEDIA I/O

Flich - text format - TIFF - RIFF - MIDI file formats , JPEG DIB, MPEG, AVI file formats. TWAIN - architecture - setting up new WAVE type. Pen Input, Video image display systems, Print output, Image Scanners, Digital Video and Audio, Video images and animation, Full-Motion video. **(9)**

TOTAL : 45

REFERENCE BOOKS

1. *Donald D. Hearn, M. Pauline Baker, Warren, "Computer Graphics with Open GL" , 4th Edition, Prentice Hall, 2010.*
2. *Prabhat K. Andleigh, Kiran Thakrar " Multimedia Systems Design", Prentice - Hall of India Pvt. Ltd. 2007.*
3. *James D. Foley, Andries Van Dam, Steven K. Feiner, F. Hughes John, "Computer Graphics Principles and Practices", Second Edition in C, Pearsons publications, 2007.*
4. *Ralf Steinmetz and Klara Nahrstedt, "Multimedia: Computing, Communications and Applications", Pearson Educations, 2009.*

15MCAE31 - PRINCIPLES OF COMPILER DESIGN

L	T	P	C
3	0	0	3

PRE-REQUISITES

15MCA11, 15MCA13

ASSESSMENT : THEORY

COURSE OBJECTIVE

- *To make the students to understand the principles involved in compiler design.*
- *To understand the design and implementation of a simple compiler.*

COURSE OUTCOME

CO1 : *Able to describe the design of a compiler and the phases of program translation from source code to executable code and the files produced by these phases.*

CO2 : *Able to explain lexical analysis phase and its underlying formal models such as finite automata and their connection to language definition through regular expressions and grammars and also explain syntax analysis phase and identify the similarities and differences among various parsing techniques*

CO3 : *Able to use formal attributed grammars for specifying the syntax and semantics of programming languages and able to identify the effectiveness of optimization.*

INTRODUCTION TO COMPILERS

Compilers - Analysis - Synthesis model of compilation - Analysis of the source program - The phases of a compiler - Cousins of the compiler - Compiler construction tools - Error handling. **(7)**

LEXICAL ANALYZER

Lexical analysis - Role of lexical analyzer - Tokens, Patterns and lexemes - Input buffering - Specification of tokens - Regular expressions - Recognition of tokens - Transition diagrams - Implementing a transition diagram - Finite Automata - Regular expression to NFA - Conversion of NFA to DFA - Applications of finite automata for recognizing tokens. **(10)**

SYNTAX ANALYZER

Syntax analysis - Role of parser - Context-free grammars - Derivations - Writing a grammar - Top Down parsing - Recursive descent parsing - Predictive parsers - Non-recursive predictive parsers - Construction of predictive parsing tables - Bottom up parsing - Handles - Shift reduce parser - Operator-precedence parsing. LR parsers - Canonical collection of LR (0) items - Constructing SLR parsing tables. **(10)**

INTERMEDIATE CODE GENERATION

Syntax directed translation - Syntax directed definitions - Synthesized attributes - Inherited attributes - Intermediate code generation - Intermediate language - Construction of syntax trees - DAG - Bottom-Up evaluation of S attributed definitions - Implementations - Assignment statements - Boolean expressions - Back patching. **(10)**

CODE OPTIMIZATION

Principle sources of optimization - Optimization of basic blocks - Loops in flow graphs - Introduction to global data flow analysis.

CODE GENERATION

Issues in design of code generator - Target machine - Time storage management - Basic blocks and flow graphs - Code generation algorithm - DAG representation - Peephole optimization. **(8)**

TOTAL : 45

REFERENCE BOOKS

1. *Alfred V. Aho, Ravi Sethi and Jeffrey D Ullman, "Compilers, Principles, Techniques and Tools", Addison Wesley Longman (Singapore Pvt. Ltd.), 2011.*
2. *Alfred V. Aho, Jeffrey D Ullman, "Principles of Compiler Design", Addison Wesley, 1988.*
3. *Jean Paul Tremblay, Paul G Sorenson, "The Theory & Practice of Compiler Writing", International student edition, 1985.*
4. *David Gries, "Compiler Construction for Digital Computers", Wiley International Edition, 1971.*
5. *William A Barrett, Rodney M Bates, David A Gustafson, John D Couch, "Compiler Construction, Theory & Practice", Galgotia publications Pvt. Ltd., New Delhi, 2nd edition, 1986.*
6. *David Galles, "Modern Compiler Design", Pearson Education, 2008*
7. *Steven S. Muchnick, "Advanced Compiler Design & Implementation", Morgan Kaufmann Publishers, 2000.*
8. *Charles N. Fischer, Richard. J. LeBlanc, "Crafting a Compiler with C", Pearson Education, 2008*

15MCAE32 - MICROPROCESSORS

L	T	P	C
3	0	0	3

PRE-REQUISITES

15MCA14, 15MCA24

ASSESSMENT : THEORY

COURSE OBJECTIVE

- *To create the comprehension of microprocessor structure: CPU, memory and input/output peripherals*
- *To expose to the students to the instruction set of a 16-bit processor*
- *To provide the knowledge on how 8086 helps in solving the issues in building a multitasking operating system*

COURSE OUTCOME

Students are expected to have the

CO1 *: Ability to design, debug and test a small scale microprocessor based system*

CO2 *: Knowledge on operating system interaction.*

CO3 *: Ability to write system programs*

8086 ARCHITECTURE AND BUS STRUCTURE

Introduction - Overview of Microcomputer Systems - Addresses - Microprocessors in Digital System Design - 8086 CPU Architecture - Machine Language Instructions - Addressing Modes - Instruction Execution Timing - System Bus Structure - Basic 8086 Configurations - System Bus Timing - Bus Standards. **(10)**

ASSEMBLY LANGUAGE PROGRAMMING

Instruction Format - Data Transfer Instructions - Arithmetic Instructions - Branch Instructions - Loop Instructions - Logical Instructions - Other Instructions - Directives and Operators - Assembly Process - Translation of Assembler Instructions. **(10)**

MODULAR PROGRAMMING

Linking and Relocation - Stack - Procedures - Interrupt and Routines - Macros - Program Design and Example - Byte and String Manipulation **(8)**

I/O PROGRAMMING AND MULTIPROGRAMMING

Fundamental I/O Considerations - Programmed I/O - Interrupt I/O - Block Transfer and DMA - Design Example - Process Management and iRMX86 - Semaphore Operations - Common Procedure sharing - Memory management - Virtual Memory and 80286 - Interrupt Priority Management **(8)**

I/O INTERFACES

Serial Communication Interface - Parallel Communication - Programmable Timers and Event Counters - Keyboard and Display - DMA Controllers - Maximum mode and 16 bit Bus Interface Designs **(9)**

TOTAL : 45

REFERENCE BOOKS

1. *Yn-cheng Liu,Glenn A.Gibson, "Microcomputer Systems: The 8086 / 8088 Family Architecture Programming and Design", Second Edition, Prentice Hall of India , 2003.*
2. *Sunil Mathur, "Microprocessor 8086: Architecture, Programming and Interfacing", Prentice Hall of India, 2011.*
3. *Triebel Walter A, Singh Avtar, "8088 and 8086 Microprocessors", Prentice Hall of India , 2001.*
4. *Douglas V Hall, SSSP Rao, "Microprocessors and its Interfacing", Third Edition, TMH, 2012.*
5. *Barry B. Brey, "The Intel Microprocessors 8086/8088, 80186/80188, 80286, 80386, 80486, Pentium, and Pentium Pro Processor Architecture, Programming, and Interfacing", Seventh Edition, Prentice Hall of India, 2006.*

15MCAE33 - DATA MINING AND WAREHOUSING

L	T	P	C
3	0	0	3

PRE-REQUISITES

15MCA25

ASSESSMENT : THEORY

COURSE OBJECTIVE

This course introduces data mining concepts with emphasis on analysis of various types of data and principles that relate different mining functionalities. It also provides basic concepts, techniques and integration of data warehousing. It highlights the need for big data and its analytical methods.

COURSE OUTCOME

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

CO1 *: Describe the concepts of data preprocessing.*

CO2 *: Define the data models, architecture and operations of data warehousing.*

CO3 *: Identify and apply data mining techniques in complex data objects.*

INTRODUCTION

Definition and need of data mining, Kinds of data and patterns, Applications and issues. Types of data : Data objects and attribute types, Measuring data similarity and dissimilarity. Data Preprocessing: Overview, data cleaning, data integration, data reduction, data transformation and data discretization. **(12)**

DATA WAREHOUSE AND OLAP TECHNOLOGY

Data warehouse-basic concepts, data warehouse modeling, data warehouse implementation. **(7)**

DATA MINING TECHNIQUES

Mining Frequent Patterns and Associations : Basic concepts, Frequent itemset mining methods.

Classification : Basic concepts, Decision tree induction, Bayes classification methods.

Cluster Analysis : Basic concepts and methods, partitioning methods, hierarchical methods: Agglomerative and divisive hierarchical clustering and BIRCH.

Outlier Detection : Outliers and Outlier Analysis, Outlier Detection Methods. **(14)**

DATA MINING TRENDS

Mining Sequence Data, Mining Other Kinds of Data, Visual and Audio Data Mining. **(5)**

BASICS OF BIG DATA ANALYTICS

Definition of Big data - need - Introduction to big data analytics - Analyzing big data in a context - predictive analysis and big data. **(7)**

TOTAL : 45

REFERENCE BOOKS

1) *Jiawei Han, Micheline Kamber and Jian Pei, "Data Mining - Concepts and Techniques", Third Edition, Elsevier Publications, 2012.*
2) *Paul C. zikopoulos, Chris Eaton, Dirk deRoos and George Lapis, "Understanding Big Data", Mc-Graw Hill, 2012.*
3) *Arun K Pujari, "Data Mining Techniques", Universities Press.*

15FY22F - BASIC FRENCH

L	T	P	C
3	0	0	3

PRE-REQUISITES

Consent of the Instructor

ASSESSMENT : THEORY

COURSE OBJECTIVE

The students will be to comprehend the fundamentals and Grammatical Patterns of French Language and acquire the basic Writing and Speaking Skill and develop an understanding of French practices and perspectives in Social contexts.

COURSE OUTCOME

At the end of the semester the students will be able to :

CO1 *: Understand the basics of the Language*

CO2 *: Write simple narration and description and speak to communicate ideas.*

CO3 *: Demonstrate confidence in Social Interactions.*

INTRODUCTION **(2)**

UNITÉ-1 : Faire connaissance - inviter et répondre à une invitation - décrire les personnes- articles définis et indéfinis - genre etnombre des noms et des adjectifs- interrogation et négation - conjugaison du présent. Paris monuments et lieux publics - la vie de quatre parisiens de professions différentes. **(11)**

UNITÉ-2 : Exprimer l' ordre et l'obligation demander et commander - evaluer et apprécier- féliciter et remercier - articles partitifs -adjectifs démonstratifs et possessifs prépositions et adverbes de quantité et de l'imperatif verbes pronominaux - une région deFrance la Bourgogne - vie quotidienne à la compagne. **(11)**

UNITÉ-3 : Raconter et rapporter - donner son avis - se plaindre et réprimander - expliquer et justifier - pronoms compléments -futur proche - passé composé et imparfait. Plusieurs régions de France - différents univers sociaux. **(11)**

UNITÉ-4 : Demander l'autorisation - interdire - formuler des projects - discuter et débattre. Pronoms < en > et < y > - pronoms relatifs et superlatifs - conjugaison du futur - présent continu et passé récent.La vie administrative et régionale - problems economiques et écologiques - traditions et modernité. **(10)**

TOTAL : 45

REFERENCES BOOKS

1. *Le Nouveau Sans Frontières - Philippe Dominique , Jacky Girardet, Michèle Verdelhan.*
2. *Dondo Modern French Course - Mathurin Dondo*
3. *Modern French Grammar - Margaret Lang and Isabelle Perez.*

15FY22G - BASIC GERMAN

L	T	P	C
3	0	0	3

PRE-REQUISITES

Consent of the Instructor

ASSESSMENT : THEORY

COURSE OBJECTIVE

The students will be to comprehend the fundamentals and Grammatical Patterns of German Language and acquire the basic Writing and Speaking Skills and apply the new language actively and creatively in different social contexts.

COURSE OUTCOME

At the end of the semester the students will:

CO1 *: Understand the fundamental concepts of the Language*

CO2 *: Write simple narration and description and speak to communicate ideas.*

CO3 *: Demonstrate confidence in Social Interactions.*

DEUTSCH-EIN GRUNDKURS GERMAN-A BASIC COURSE

1. EINFüHRUNG

Begrüßung - Name - Vorname - Familienname - Anrede

2. THEMA

Hallo! Wie geht's?

Begegnungen

Guten Tag, ich suche…,

Im Supermarkt

Arbeit und Freizeit

Familie and Haushalt

3. GRAMMATIK

Position des Verbs : Aussage, W- Frage und

Ja/ Nein - Frage; Artikel die der das.

W- Frage; Konjugation in Pr sens;

Nominativ : bestimmter, unbestimmter and negative Artikel

Akkusativ : Akkusativ-Erg nzung

Artikel als Pronomen

Dative - Erg nzung :Personalpronomen und Ortsangaben;

Imperativ

Modalverben; Ortsangaben; Richtungsangaben;

Zeitangaben; Ordinalzahlen

Possessiv- Artikel; trennbare und nicht trennbareVerben;

Wechselprapositionen

Unterricht 50 + Teste 10 = 60 Stunden

Lehrbuch

- Studio d A1: Kurs - und übungsbuch

  (Deutsch alsFremdsprache)

  CornelsenVerlag.
- Tangarmaktuell1 :Kursbuch + Arbeitsbuch

  (Deutsch alsFremdsprache)

  Max HueberVerlag

15MCAEL01 - BUSINESS INTELLIGENCE LAB

L	T	P	C
0	0	4	2

PRE-REQUISITES

Consent of the Instructor

ASSESSMENT : PRACTICAL

COURSE OBJECTIVE

This course helps the students to develop business intelligence projects and to suggest timely and better managerial decisions.

COURSE OUTCOME

CO1 *: Students will be able to use ETL tools on Data warehouses and apply Business Intelligence methods and techniques.*

CO2 *: Students will be able to handle report generation tools to make better decisions.*

TOPICS TO BE COVERED :

1. Configuring and Testing ETL tools.
2. Configuring and Testing Business Intelligence tools and Report Generation tools.

15MCAEL02 - GRAPHICS AND MULTIMEDIA LAB

L	T	P	C
0	0	4	2

PRE-REQUISITES

Consent of the Instructor

ASSESSMENT : PRACTICAL

COURSE OBJECTIVE

- *To train on the basic requirements of Graphic 2D and 3D Design and to work with various primitive algorithms.*
- *To help them to understand the concept of multimedia, animations and to work on technologies relating to them.*

COURSE OUTCOME

The students will be able to implement

CO1 *: The primitive graphics 2D and 3D algorithms and object transformations on any programming languages.*

CO2 *: Simple 2D animation projects using latest animation tools.*

I COMPUTER GRAPHICS

1. Primitive Algorithms

   Line - Bresenham, DDA, Midpoint.

   Circle - Midpoint, Trigonometric

   Ellipse - Midpoint, Trigonometric

2. Polygon, Polygon Filling.
3. Transformations - 2D Translations, Scaling, Rotation

II MULTIMEDIA AND ANIMATIONS

Flash Programming (OR) Maya

1. Creating Layers, Symbol objects, effects for objects
2. Creating scene by combining objects and layers
3. Creating Animations using various technologies
4. Creating Interactive Animation.
5. Adding audio to animations.
6. Creating small animation projects.

15MCAEL03 - ASSEMBLY LANGUAGE PROGRAMMING LAB

L	T	P	C
0	0	4	2

PRE-REQUISITES

Consent of the Instructor

ASSESSMENT : PRACTICAL

COURSE OBJECTIVE

To make the students

- *Familiarize with Instruction Set Architecture*
- *Understand the usage of assembler directives*
- *Understand the use of software interrupts.*

COURSE OUTCOME

The students will be able to

CO1 *: Write system programs*

CO2 *: Analyze assembly language programs*

CO3 *: Design microprocessor based systems*

PROGRAMMING CONCEPTS TO BE COVERED:

1. Programming using various Addressing modes and Assembler Directives
2. Programs using 8086 instructions
3. Writing procedures
4. Writing macros and interrupt service routines

15MCAEL04 - INTERNET OF THINGS LAB

L	T	P	C
0	0	4	2

PRE-REQUISITES

Consent of the Instructor

ASSESSMENT : PRACTICAL

COURSE OBJECTIVE

To make the students understand the features and operation of

1. *Cooja Simulator*
2. *Contiki*
3. *Intel Galileo board*

COURSE OUTCOME

CO1 : *The students will have applied experience of the key concepts (electricity, components, circuitry) underlying physical computing*

CO2 : *The students will be able to use standard hardware and software tools for physical computing*

CO3 : *The students will be able to design and make interactive objects that integrate sensing, actuation and software*

The students must be trained for

1. Programs for exploring the features of Contiki such as protothreds, timers, networking primitives by using Cooja simulator
2. Developing applications using Galileo board, exploiting all features of the board.

15MCAEL05 - MOBILE APPLICATION DEVELOPMENT LAB

L	T	P	C
0	0	4	2

PRE-REQUISITES

15MCA34, 15MCA36

ASSESSMENT : PRACTICAL

COURSE OBJECTIVE

This course focuses on understanding the characteristics of mobile applications and build fully functional store-worthy Android applications

COURSE OUTCOME

Students will able to

CO1 *: Design and implement the user interfaces of mobile applications.*

CO2 *: Develop advanced mobile applications using database and the web*

CO3 *: Develop games, animations and multimedia applications for mobile devices.*

CONCEPTS TO BE COVERED

1. **Android Development Environment**
   - Download and Install SDK and ADT
   - Working of Eclipse and Android Emulator
2. **Genric UI development**
   - Views and View groups
   - Event Handling and Listeners
   - Layouts and spinner
3. **Storing and Retriving Data**
   - Android storing and retrieving data using SQL file
   - Working with content provider
4. **Notification and Alarms**
   - Action Bars,Menus,Dialogs
   - Notifications and Toast
5. **Camera and Media player**
   - Camera Application
   - Media player and media recorder

6. **Location Based Services**
    - Finding locations and Tracking Movement
    - Map based activity and Proximity alerts
7. **Communication via Network and Web**
    - SMS and MMS
    - Bluetooth and WI-FI
8. **Graphics and Animation**
    - Different shapes of different colours
    - Moving from one direction to another
    - Tweened animation
9. **Game**
    - Shooting bubble,Shooting arrows,Simple snake game,etc.

15MCAEL06 - CLOUD COMPUTING LAB

L	T	P	C
0	0	4	2

PRE-REQUISITES

15MCA23,15MCA24,15MCA34

ASSESSMENT : PRACTICAL

COURSE OBJECTIVE

To provide the ability to work with cloud computing technology by exploring public cloud environments and the service offerings

COURSE OUTCOME

Students shall be able to:

CO1 *: Understand the working principles of virtualization*

CO2 *: Create services and host them on the cloud*

Topics to be covered

- Virtualization Software Installation
- Creating single/multiple virtual machines
- Communication between host machine and virtual machine
- Communication between two virtual machines on the same host
- Communication between two virtual machines on different hosts
- Virtual machine migration
- Deploying and accessing simple applications in a virtual machines
- Setting up Cloud environment
- Hosting services in the Cloud

Amazon EC2

- Create and manage Amazon EC2 instances
- Run Web application/service on EC2 instance and access them from desktop client

Amazon S3

- Create and manage Amazon S3 instances
- Upload files to S3, set properties and access control rights
- Run a static website on S3
- Develop programs to access S3 instance using APIs provided by Amazon
- Upload/Download files from S3 in a secured manner

Google App Engine

- Develop an application, launch it on Google App Engine, and access it with proper authentication mechanisms

Hadoop

- Setup Hadoop cluster and store suitable large data set
- Perform analysis on the data using map-reduce algorithm

15MCAOE01 - ACCOUNTING AND FINANCIAL MANAGEMENT

L	T	P	C
3	0	0	3

PRE-REQUISITES

Consent of the Instructor

ASSESSMENT : THEORY

COURSE OBJECTIVE

Help the students to gain knowledge on various types of accounting their uses merits and demerits and to educate them on the need for financial accounting and its basic concepts, conventions and accounting procedures to ascertain the profit. Also assist them to work on the various methods and techniques for preparation and analysis of costs and cost statements and provide knowledge on various strategic financial management techniques and methods of capital budgeting.

COURSE OUTCOME

CO1 : *The student will be aware of various types of accounting and can prepare statements of financial accounting to ascertain the profit for any trading or manufacturing organization and develop computer models for them.*

CO2 : *The student can identify various costs and prepare cost sheet and apply the Cost Volume Profit analysis to prepare statements of profit under marginal costing technique.*

CO3 : *The student can prepare statements to assist for strategic decision, using various techniques like ratio analysis, budgeting, working capital management and capital budgeting and generate software for the above techniques.*

ACCOUNTING

Introduction: Accounting concepts, principles and conventions - basic accounting procedures - journal and ledger, trial balance. **(6)**

FINAL ACCOUNTS

Manufacturing and Trading Account, Profit and Loss Account, Balance Sheet. Final accounts with adjustments - Working with excel worksheets for automating Final Accounts. **(12)**

COST ACCOUNTING

Methods and techniques of Cost Accounting - classification of cost - material cost, labour cost, overheads, fixed and variable costs, cost-volume-profit analysis - marginal costing. **(12)**

FINANCIAL MANAGEMENT

Objectives and scope of financial management - Analysis and Interpretation of Financial Management - Ratio Analysis - capital investment decision through pay-back period method, average rate of return - internal rate of return - cost of capital - discounted cash flow analysis by using spread sheet. **(8)**

BUDGETING AND BUDGETARY CONTROL

Types of budgets - preparation of various functional budgets - preparation of cash budgets - flexible budgets - advantages of budgeting and budgetary control **(7)**

TOTAL : 45

REFERENCE BOOKS

1. *Grewal T S, "Double entry book keeping - Finanacial Accounting", Sultan Chand & Sons, 2012.*
2. *Sharad K. Maheswari, Maheswari S.N , "Principles of Management Accounting Vol. I & II", Sultan Chand & Sons, 2007.*
3. *Vinayakam N., Mani P.L., Nagarajan K.L. - Principles of Accountancy - S.Chand & Co., Ltd., 2008.*
4. *Jain S.P. & Narang K.L. "Advanced Accountancy Vol 1" Kalyani Publishers, 2012.*
5. *Sashi K. Gupta & Sharma R.K., "Management Accounting", Kalyani Publishers, 2011.*
6. *Khan M.Y. and Jain P.K., "Financial Management", Tata McGraw hill, 2007.*

15MCAOE02 - BASICS OF JAVA PROGRAMMING

L	T	P	C
3	0	0	3

PRE-REQUISITES

15MCA15

ASSESSMENT : THEORY

COURSE OBJECTIVE

The students can apply object-oriented programming paradigm in Java like objects, classes, inheritance, interfaces, packages and Exception handling. They can understand the String Class along with merits and demerits.It will finally include a short introduction to the Java Collection Framework and the Java API.

COURSE OUTCOME

CO1 : *Understand the concept of OOP as well as the purpose and usage of inheritance, polymorphism, encapsulation and method overloading.*

CO2 : *Identify classes, objects, members of a class and the relationships among them needed for a specific problem.*

CO3 : *Create Java application programs using sound OOP practices (e.g., interfaces and APIs) and proper program structuring (e.g., by using access control identifies, automatic documentation through comments, error exception handling)*

CO4 : *Develop programs using the Java Collection API as well as the Java standard class library.*

INTRODUCTION

Overview of Object Oriented Programming - Overview of Java- Data Types, Variables and Arrays -Operators - Control Statements - Classes and Objects - Overloading Methods and Constructors - Passing and Returning Objects as Parameters - Access control - Variable length Arguments - overloading vararg - Wrapper Classes - String Handling - String Arrays - Methods - String Buffer class. **(9)**

INHERITANCE

Basics - usage of super keyword - Multilevel Hierarchy - Method overriding - Dynamic Method Dispatch - Using Abstract Classes - Using Final with Inheritance - The Object Class **(7)**

PACKAGES AND INTERFACES

Defining , Finding and Importing Packages - Access Protection. Interfaces: Define, Implement and Apply Interfaces - Nested Interfaces - Variables in Interfaces. **(7)**

EXCEPTION HANDLING

Fundamentals - Exception Types - Using Try and Catch - Multiple catch - Nested try - throw - throws and finally.

THREADS

Java Thread Model - Lifecycle of a Thread - Priorities - Synchronization - Creating a Thread - Extending a Thread - Creating Multiple Threads -Using Thread Methods - Thread Exceptions. **(9)**

COLLECTIONS

Overview - wrapper classes - AutoBoxing Facilities the use of Primitive Types - For-Each Style for Loop - Collection Interface - Collection Class - Accessing a Collection via an Iterator - Working with Maps - Comparators - String Tokenizer **(9)**

Applets - Applet Fundamentals - JDBC **(4)**

TOTAL : 45

REFERENCE BOOKS

1. *Herbert Schildt, "JavaThe Complete Refernce", Tata McGraw-Hill Publishing Company Limited, 8th Edition, 2011.*
2. *E. Balagurusamy, "Programming With Java : A Primer", Tata Mcgraw Hill Publishing Company Limited, 5th Edition, 2015.*
3. *Cay S. Horstmann, Gray Cornell, "Core Java Volume I - Fundamentals", Pearson Education, 9th Edition, 2013.*
4. *Herbert Schildt, "Java : A Beginners Guide", Tata McGraw-Hill Publishing Company Limited, 6th Edition, 2014.*

15MCAOE03 - DOT NET PROGRAMMING

L	T	P	C
3	0	0	3

PRE-REQUISITES

Consent of the Instructor

ASSESSMENT : THEORY

COURSE OBJECTIVE

To introduce the concepts of .NET framework and the features of ASP.NET, ADO.NET, Web services, VB.NET and XML in .NET

COURSE OUTCOME

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

CO1 *: Develop dynamic applications using DOT NET framework*

CO2 *: Develop web applications using ASP.NET and VB.NET*

CO3 *: Develop web services and effective database applications*

BASICS OF .NET FRAMEWORK

Introduction to .NET-.NET framework architecture-Common Language Runtime-Common Type System-Common Language Specification-Framework Class Library-Overview of .NET Assemblies- Single file and Multi file Assemblies- Shared Assemblies- Working with .NET Framework and SDK. **(7)**

VB.NET LANGUAGE FUNDAMENTALS

Variables and constants - data types - declaration. Operators - types - precedence. Expressions. Program flow - Decision statements - Value data types - Structures, Enumerations. Reference data types- Single-dimensional - Multi-dimensional arrays - jagged arrays - dynamic arrays -Creating windows Forms - windows controls - Button, Check box, Combo box, Label, List box, Radio Button, Text box. Events - Click, close, Deactivate, Load, Mouse Move, Mouse Down, MouseUp - Creating menus - menu items - context menu - Using dialog boxes - Show Dialog() method **(10)**

ACCESSING DATA WITH ADO.NET

ADO.NET - ADO.NET Programming Objects and Architecture- Displaying Database Data - Working with the Dataset and Data Table Objects. **(8)**

ASP.NET

The Features of ASP.NET- The Anatomy of ASP.NET Pages- Introducing Web Forms- Separating Content and Code- The Code Behind feature- Application Configuration-ASP.NET Namespaces-ASP Server Controls: Introduction -Major Features of ASP.NET Server Controls-Server Side Processing in ASP.NET, Using HTML Server Controls, Web Controls, Validation Controls-Creating Custom ASP Server User Controls. **(10)**

WEB SERVICES AND XML

Web Services : Introduction- Understanding Web Services- Using XML in Web Services- Overview of Web Services Namespace-Type Marshalling- Using Datasets. XML: Reading XML Data- Writing XML data- Using XPath to search XML - XML Serialization in DOT NET **(10)**

TOTAL : 45

REFERENCE BOOKS

1. *Stephen C. Perry, "Core C# and .NET", Pearson Education, Prentice Hall Publications, 2006.*
2. *"Introduction to Visual Basic .NET", NIIT Prentice Hall of India,2005*
3. *Jeffrey Richter, Francesco Balena, ".NET Framework Programming in Microsoft VB.NET", TataMcGraw Hill Publications, 2003*
4. *Mesbah Ahmed, Chris Garret, "ASP.NET Web Developer's Guide", Syngress Publications, 2002.*
5. *Matt J.Crouch,"ASP.NET and VB.NET Web Programming", Pearson Education, 2002.*

15MCAOE04 - C# and DOT NET PROGRAMMING

L	T	P	C
3	0	0	3

PRE-REQUISITES

Consent of the Instructor

ASSESSMENT : THEORY

COURSE OBJECTIVE

To introduce the concepts of .NET framework and the features of C#. NET and ADO.NET, and thereby enable application development in C# using DOT NET Framework.

COURSE OUTCOME

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

CO1 *: Design dynamic applications using DOT NET framework*

CO2 *: Develop Windows applications using C#.NET*

CO3 *: Develop effective database applications using ADO.NET*

BASICS OF .NET FRAMEWORK

Introduction to .NET-.NET framework architecture-Common Language Runtime-Common Type System-Common Language Specification-Framework Class Library-Overview of .NET Assemblies- Single file and Multi file Assemblies- Shared Assemblies- Working with .NET Framework and SDK. **(7)**

Basic Elements of C# - Program Structure and simple Input and Output Operations - Operators and Expressions - Statements - Arrays and Structures. Inheritance - Namespace - Polymorphism - Interface and Overloading - Multiple Inheritance - Property - Indexes - Delegates - Publish/Subscribe Design Patterns-Operator Overloading-Method Overloading. **(11)**

C# Concepts for creating Data Structures - File Operation - File Management systems -Stream Oriented Operations- Multitasking - Multithreading - Thread Operation -Synchronization. **(9)**

Working with XML - Techniques for Reading and Writing XML Data - Using XPath and Search XML - ADO.NET Architecture - ADO.NET Connected and Disconnected Models - XML and ADO.NET - Simple and Complex Data Binding- Data Grid View Class. **(9)**

Application Domains - Remoting - Leasing and Sponsorship - .NET Coding Design Guidelines -Assemblies - Security - Application Development - Web Services - Building an XML Web Service - Web Service Client - WSDL and SOAP - Web Service with Complex Data Types - Web Service Performance. **(9)**

TOTAL : 45

REFERENCE BOOKS

1. *Stephen C. Perry " Core C# and .NET", Pearson Education,2006.*
2. *S. Thamarai Selvi and R. Murugesan "A Textbook on C# ", Pearson Education,2003.:*
3. *Jesse Liberty, "Programming C#", Second Edition, O'Reilly Press, 2002.*
4. *Robinson et al, "Professional C#", Fifth Edition, Wrox Press, 2002.*
5. *Herbert Schildt, "The Complete Reference: C#", Tata McGraw Hill, 2004.*
6. *Andrew Troelsen, "C# and the .NET Platform", A! Press, 2003.*
7. *Thuan Thai and Hoang Q. Lam, "DOT NET Framework Essentials", Second Edition, O'Reilly, 2002.*

15MCAOE05 - PARALLEL PROCESSING

L	T	P	C
3	0	0	3

PRE-REQUISITES

Consent of the Instructor

ASSESSMENT : THEORY

COURSE OBJECTIVE

- *To learn modern computer hardware architecture facility for parallel processing*
- *To understand scheduling of parallel execution and apply the parallel processing concepts to applications*

COURSE OUTCOME

CO1 *: At the end of the course, the students will be able to understand the basics of parallel processing concepts for solving problems in real-world scenarios*

CO2 *: They would be able to exploit modern multi-core architecture to solve large scale compute and memory intensive applications*

PRAM ALGORITHMS

Introduction to Flynn's Taxonomy-PRAM model of parallel computation - EREW-CREW-CRCW- Mapping theorem -Parallel reduction - prefix sums - list ranking - preorder tree traversal - merging two sorted lists - graph coloring - reducing processors -Brent's theorem **(5)**

PROCESSOR NETWORKS

Mesh networks - binary tree - hyper tree - pyramid - butterfly - hypercube - cube connected cycles and Shuffle exchange networks - De Brujin networks. **(5)**

MAPPING AND SCHEDULING

Mapping data to processors : Embedding - Dilation - Ring to 2D mesh -2D mesh to 2Dmesh - Binary tree to 2D mesh - Binomial tree to 2Dmesh -Embedding graphs to hypercubes- binary tree to hypercubes - Binomial tree to hypercubes - rings and mesh to hypercubes. Static scheduling on UMA models. Grahams list scheduling algorithm. Coffman Grahams scheduling algorithm. **(10)**

SUMMATION ALGORITHMS

Hypercube SIMD model - shuffle exchange SIMD summation algorithm - 2D Mesh SIMD summation algorithm - UMA summation model - Broadcast - Binomial tree communication pattern **(5)**

MATRIX MULTIPLICATION ALGORITHMS

Matrix multiplication on 2D Mesh SIMD model - Related theorems -Hypercube SIMD model - shuffle exchange SIMD model - UMA Multiprocessor - Block matrix multiplication - Algorithms for multicomputer - Row-column and block oriented algorithms. **(5)**

SORTING

Enumeration sort - Lower bounds on Parallel sorting - Odd Even Transposition sort - Bitonic merge - sequence - Bitonic merge on shuffle exchange network - two dimensional mesh network - Hypercube network - Parallel quicksort - Recurrence equation and analysis - Hyperquick sort **(5)**

SEARCHING AND GRAPH ALGORITHMS

Parallel search - Ellis's algorithm - Manber and Ladner's algorithms.

P- Depth Search - Breadth Depth Search - Connected components -All pairs shortest path - single source shortest path - Minimum cost spanning tree - Sollin's algorithm - Kruskal's algorithm. **(5)**

PARALLEL PROGRAMMING

Shared Memory Programming- Message Passing Programming- Programming Accelerators and Coprocessors **(5)**

TOTAL : 45

REFERENCES

1. *Michael J. Quinn, "Parallel Computing Theory and Practice", McGraw Hill, Second Edition, 2012 (reprint).*
2. *AnanthGrama, Anshul Gupta, George Karypis, Vipin Kumar, "Introduction to Parallel Computing", Addison Wesley, Second Edition, 2003.*

15MCAOE06 - BUSINESS INTELLIGENCE

L	T	P	C
3	0	0	3

PRE-REQUISITES

Consent of the Instructor

ASSESSMENT : THEORY

COURSE OBJECTIVE

This course Introduces the concepts and techniques of business intelligence to facilitate the students to develop business intelligence projects and to make timely and better decisions.

COURSE OUTCOME

CO1 *: Students will be able to apply Business Intelligence methods and techniques in addressing strategic business problems in organizations.*

CO2 *: Students will be able to make better decisions by conducting in-depth analysis to both technical and business problems.*

BASICS OF BUSINESS INTELLIGENCE

Business intelligence: Definition - Effective and timely decisions - data, information and knowledge - role of mathematical models - BI architectures. Decision Support Systems: Definition - Representation of the decision-making process - Evolution of information systems - - development of DSS. Mathematical models for decision making: Structure - development of a model - classes of model **(10)**

BUSINESS INTELLIGENCE STAGES AND STEPS

BI definition - BI decision support initiatives - development approaches - engineering stages and the development steps - parallel development tracks - BI project team structure.

Business Case Assessment : justification-drivers-Business Analysis issues - Risk assessment -activities -Deliverables - roles. **(9)**

BI PROJECT PLANNING AND REQUIREMENTS DEFINITION

BI project : managing - defining - planning - activities - deliverables - roles. Project Requirements Definition: General and specific requirements - activities - deliverables - roles. **(8)**

DATA ANALYSIS AND APPLICATION PROTOTYPING

Data Analysis: Business focused data analysis - top-down logical data modeling - bottom up source data analysis - data cleansing - activities - deliverables-roles.

Prototyping: Purpose - best practices - types - building successful prototypes - application prototyping activities - deliverables - roles. **(9)**

DATABASE DESIGN AND ETL DESIGN

Differences in database design - logical and physical database design - activities - deliverables - roles. ETL Design: Implementation strategies - Preparing for ETL process - Designing the extract programs, transformation programs, load programs, ETL process flow - Evaluating ETL tools - activities - deliverables - roles. **(9)**

TOTAL : 45

REFERENCE BOOKS

1. *Carlo Vercellis, "Business Intelligence: Data mining and Optimization for Decision Making", John Wiley and Sons, 2009. (Unit 1)*
2. *Larissa T.Moss and Shaku Atre, "Business Intelligence Roadmap: The Complete project lifecycle for decision support applicatons", Addison Wesley, 2003. (Units II, III, IV & V).*
3. *Efraim Turban, Ramesh Sharda, Dursun Delen and Janine E. Aronson, "Business Intelligence - A Managerial Approach", Second Edition, Pearson Prentice Hall, 2010.*

15MCAOC01 - DOCUMENT WRITING

L	T	P	C
0	2	0	1

PRE-REQUISITES

Consent of the Instructor

ASSESSMENT : THEORY

COURSE OBJECTIVE

To study the method of documenting a project and the presentation

COURSE OUTCOME

CO1 *: Explain the task orientation process and how to break the project into small task.*

CO2 *: Produce software documentation for references from user analysis through editing and fine tuning.*

INTRODUCTION

Need for software documentation - Understanding task orientation - Analyzing users - Writing scenarios - User informational needs - Document goals -User work motivations - Task analysis.

DOCUMENTATION GUIDELINES

Writing guide - Procedures - Guidelines - Writing to support - Writing steps as actions - Categorization. Documentation Planning : Planning and writing documents - Task list and schedule - Guidelines - Documentation procedure - Documentation plan - Review plan - Review schedule - Editing and Fine tuning - Designing orientation.

DOCUMENTATION LAYOUTS

Laying out pages - Laying out screens - Page showing elements of document design - Screen showing elements for online design - Getting the Language right - Using graphics effectively - Designing Indexes.

TOTAL : 20

REFERENCE BOOKS

1. *THOMAS.T.BARKER. "Writing software documentation:-a task oriented approach" Allyn & bac series of technical communication, Second Edition, Longman Publishers, 2004.*
2. *Dan jones, "Technical writing style" Sam dragga, Texas University.*

15MCAOC02 - PYTHON

L	T	P	C
0	2	0	1

PRE-REQUISITES

Consent of the Instructor

ASSESSMENT : THEORY

COURSE OBJECTIVE

To make the students to be able to create and run scripts using Python for a given application

COURSE OUTCOME

CO1 *: Be fluent in the use of procedural statements arrays and be able to design, code, and test small Python programs that meet requirements*

CO2 *: Understand the concepts of object-oriented programming basic searching and sorting algorithms, vector computation*

PYTHON CONCEPTS

Expressions - values - types - variables - Operators and Expressions - programs & algorithms - Control flow,exception - File I/O - the Python execution model

DATA STRUCTURES

List - set, dictionary (mapping) - tuple - graph (from a third-party library) - List slicing (sublist) - list comprehension (shorthand for a loop) - Mutable and immutable data structures.

FUNCTIONS

Procedural abstraction, functions as values, recursion, function design methodology

Data abstraction (introduction only, no in-depth coverage) : Modules, objects,Visualization (graphing/ plotting results), Program decomposition.

WORKING WITH PYTHON

Tools and Environment, The Python Library : String and Text Handling, Data Structures and Algorithm, Threating, Networking, Web Programming, Graphical Programming, Database Access

TOTAL : 20

REFERENCE BOOKS

1. *Python Cookbook, 3rd Edition: Recipes for Mastering Python 3, by David Beazley and Brian K. Jones, on O'Reilly Atlas, 2006.*
2. *Learn Python The Hard Way, 2nd Edition by Zed Shaw is free to read online.*

15MCAOC03 - MATLAB

L	T	P	C
0	0	2	1

PRE-REQUISITES

Consent of the Instructor

ASSESSMENT : PRACTICAL

COURSE OBJECTIVE

- *Students will understand MATLAB programming concepts*
- *Students will learn how to use MATLAB as an effective tool in Science and Engineering*

COURSE OUTCOME

CO1 *: Able to use MATLAB for interactive computations*

CO2 *: Able to generate plots and export this for use in reports and presentations*

CO3 *: Able to program scripts and functions using the MATLAB development environment*

CONCEPTS TO BE COVERED

1. Introduction to MATLAB, creating variables, MATLAB functions, Data Types.
2. Script Files, Plotting-Graphing functions
3. Input and Output Statements, Conditional Statements-Logical operators, if, else and elseif, switch statements
4. Loops-for loop, while loop, Nested loops- Break statement
5. Working with Matrices, Arrays and Array Functions

TOTAL : 20

REFERENCE BOOKS

1. *MATLAB: A Practical Introduction to programming and Problem Solving, 3rd Edition, Stormy Attaway, Elsevier, 2013.*

15MCAOC04 - CLUSTER COMPUTING LAB

L	T	P	C
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PRE-REQUISITES

Basic Java Programming

ASSESSMENT : PRACTICAL

COURSE OBJECTIVE

To gain expertise in parallel programming and distributed computing using MapReduce and Hadoop framework.

COURSE OUTCOME

CO1 *: Students will be able to write parallel programs using MapReduce.*

CO2 *: Students will be able to understand and use the hadoop framework with multiple nodes for big data.*

CO3 *: Be able to develop Hadoop applications.*

CONCEPTS TO BE COVERED

1. INTRODUCTION TO MAP REDUCE PROGRAMMING AND HADOOP

- Setting up Hadoop with one and multiple nodes (IDE, VM, Cygwin etc)
- Introduction to HDFS commands
- Word count program
- Word count program with input file size of 1 TB or more (Big data)
- Counting number of characters in each string and the total characters.
- Convert existing serial programs into map-reduce programs and execute them in hadoop.
- Other simple problems

2. HADOOP APPLICATIONS

- Collect big datasets from internet and execute the map-reduce version of data mining algorithms on these datasets.

3. USE HIVE DATABASE IN HADOOP AND DO SIMPLE DATA PROCESSING PROGRAMS

4. MINI-PROJECT