CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY (AUTONOMOUS)

With effect from 2020-21

MCA (Master of Computer Applications)

SEMESTER – I

S.No	Course Code	Title of the Course	Scheme of Instruction		Scheme of Examination			Credits
			Hours per week		Duration of SEE in Hours	Maximum Marks		
			L/T	P/S		CIE	SEE	
THEORY								
1	20MCC101	Computer Programming using 'C'	3/1	-	3	40	60	4
2	20MCC102	Computer Organization and Architecture	3/1	-	3	40	60	4
3	20MCC103	Software Engineering	3/1	-	3	40	60	4
4	20MCC104	Mathematical Foundations for Computer Applications	3/1	-	3	40	60	4
5	20MTC27	Probability& Statistics	3/1	-	3	40	60	4
PRACTICALS								
6	20MCC105	Computer Programming Lab using 'C'	-	3	3	50	50	2
7	20MCC106	Python Programming Lab	-	3	3	50	50	2
8	20EG101	Professional Communication in English Lab	-	3	3	50	50	2
		TOTAL	**20**	**9**	**-**	**350**	**450**	**26**

L: Lecture T: Tutorial P: Practical S: Seminar

CIE: Continuous Internal Evaluation SEE: Semester End Examination

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SEMESTER-II

S.No	Course Code	Title of the Course	Scheme of Instruction		Scheme of Examination			Credits
			Hours per week		Duration of SEE in Hours	Maximum Marks		
			L/T	P/S		CIE	SEE	
THEORY								
1	20MCC107	Data Structures and Algorithms	3/1	-	3	40	60	4
2	20MCC108	Artificial Intelligence	3/1	-	3	40	60	4
3	20MCC109	Object Oriented Programming using Java	3/1		3	40	60	4
4	20MCC110	Database Management Systems	3/1	-	3	40	60	4
5	20MCE101/ 20MCE102/ 20MCE103/ 20MCE104	Elective – I	3	-	3	40	60	3
PRACTICALS								
6	20MCC111	Data Structures Lab using C++	-	3	3	50	50	2
7	20MCC112	Object Oriented Programming Lab using Java	-	3	3	50	50	2
8	20MCC113	Database Management Systems Lab	-	3	3	50	50	2
		TOTAL	**19**	**9**	**-**	**350**	**450**	**25**

L: Lecture T: Tutorial P: Practical S: Seminar

CIE: Continuous Internal Evaluation SEE: Semester End Examination

Summer Internship is compulsory after II Semester with 2 credits

Elective- I	
20MCE101	Organizational Behavior.
20MCE102	Entrepreneurship.
20MCE103	Business Intelligence & Analytics.
20MCE104	Software Project Management.

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SEMESTER - III

S. No.	Course Code	Title of the Course	Scheme of Instruction		Scheme of Examination			Credits
			Hours per week		Duration of SEE in Hours	Maximum Marks		
			L/T	P/S		CIE	SEE	
THEORY								
1	20MCC114	Data Communications and Computer Networks	3/1	-	3	40	60	4
2	20MCC115	Data Science and Machine Learning	3/1	-	3	40	60	4
3	20MCC116	Operating Systems	3/1	-	3	40	60	4
4	20MCC117	Web Technologies	3/1	-	3	40	60	4
5	20MCE105/ 20MCE106/ 20MCE107/ 20MCE108	Elective-II	3	-	3	40	60	3
6	20MCA101	Intellectual Property rights and Professional Ethics.	2	-				0
PRACTICALS								
7	20MCC118	Object Oriented System Development Lab	-	3	3	50	50	2
8	20MCC119	Machine Learning Lab using Python	-	3	3	50	50	2
9	20MCC120	Web Technologies Lab	-	3	3	50	50	2
		TOTAL	**21**	**9**	**-**	**350**	**450**	**25**

L: Lecture T: Tutorial P: Practical S: Seminar
CIE: Continuous Internal Evaluation SEE: Semester End Examination

Elective – II	
20MCE105	Cloud Computing
20MCE106	Design and Analysis of Algorithms
20MCE107	Big Data Analytics
20MCE108	Advanced Java Programming

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MCA (Master of Computer Applications)

SEMESTER - IV

S.No	Course Code	Title of the Course	Scheme of Instruction		Scheme of Examination			Credits
			Hours per week		Duration of SEE in Hours	Maximum Marks		
			L/T	P/S		CIE	SEE	
THEORY								
1	20MCE109/ 20MCE110/ 20MCE111/ 20MCE112	Elective-III	3	-	3	40	60	3
2	20MCE113/ 20MCE114/ 20MCE115/ 20MCE116	Elective-IV	3	-	3	40	60	3
3	20MCC121	Major Project Work	-	6	-	100	100	12
		TOTAL	**6**	**6**	**-**	**180**	**220**	**18**

L: Lecture T: Tutorial P: Practical S: Seminar

CIE: Continuous Internal Evaluation SEE: Semester End Examination

Elective – III	
20MCE109	Cyber Security
20MCE110	Social Network Analysis
20MCE111	Block Chain Technology
20MCE112	Deep Learning

Elective – IV	
20MCE113	Cyber Forensics
20MCE114	Computer Vision
20MCE115	Internet of Things
20MCE116	Natural Language Processing

S. No.	Syllabus Component	No. of courses	No. of Credits	Credit s Percentage (%)
1.	Core Theory	12	48	50
2.	Core Practical's	10	30	31.2
3.	Core Electives	16	12	12.5
4.	Mathematics	01	04	4.1
5.	English	01	02	2.0
6.	Audit Course	01	0	0
Total		41	96	100 %

Total No. of Courses: 41 **Total No. of Credits: 96**

Academic Adjustable Courses: Elective-III, Elective-IV can be completed in any semester from II-Semester to IV-Semester through MOOC's, provided the pre requisites courses should be completed.

COMPUTER PROGRAMMING USING 'C'

20MCC101

Instruction	3L+1T Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	60 Marks
Continuous Internal Evaluation	40 Marks
Credits	4

Course Outcomes:

After completion of the course, the students will be able to

1. Design algorithms and draw flowcharts for various problems.
2. Choose various data types which are suitable for the problems and distinguish the concepts of control structures.
3. Develop programs using functions and preprocessor directives.
4. Apply array and pointer concepts in solving various problems.
5. Utilize the concepts of strings and structures in various problems.
6. Build programs by using dynamic memory allocation and file management concepts.

UNIT – I

Algorithm, flowchart, structured programming, program development steps, creating and running programs, structure of a C program, character set, keywords, identifiers, constants, basic data types and sizes, variables, operators, operator precedence and associativity, expressions, evaluating expressions, type conversions, basic formatted Input/output statements, decision control structures: if and switch statements, loop control structures: while, do-while and for, continue, break.

UNIT – II

Functions: Basic concepts, user defined functions, parameter passing, local variables, global variables, recursive functions, comparison of iteration and recursion, standard library functions, header files, storage classes, preprocessor.

UNIT – III

Arrays: Basic concepts, one-dimensional array, passing of arrays to functions, searching and sorting: linear search, binary search and bubble sort, two-dimensional array, multi-dimensional array.
Pointers: Basic concepts, pointers as function arguments, pointer arithmetic, pointers to pointers, pointers and one-dimensional arrays, pointers and two-dimensional arrays, array of pointers.

UNIT – IV

Strings: Basic concepts, string I/O operations, pointers and strings, string manipulation functions. Structures: Declaration, definition and initialization of structures, accessing structures, nested structures, array of structures, structures and functions, pointers to structures, self-referential structures, unions, enumerated types, typedef.

UNIT – V

Dynamic memory management functions, command line arguments, Files: Basic concepts, text files, binary files, basic file I/O operations, sequential-access files, random-access files.

Text Books:

1. Pradip D and Manas G, "Programming in C", 2nd Edition, Oxford University Press, 2007.
2. B.A. Forouzan and R.F.Gilberg,"Computer science, A structured programming approach using C", 3rd Edition, Cengage Learning, 2007.

Suggested Reading:

1. BW Kernighan DM Ritchie, "The C programming Language", 2nd Edition, Prentice Hall India, 1998.
2. P.J Deitel and H.M Deitel , "C How to program" , 6th Edition, PHI, 2010.
3. Yashwant Kanetkar, "Let us C", 13th Edition, BPB Publications, 2013.
4. E Balaguru Swamy, "Programming in ANSI C", 5th Edition, Tata McGraw-Hill, 2007.
5. K R Venugopal and S R Prasad, "Mastering C", McGraw-Hill, 2007.

COMPUTER ORGANIZATION AND ARCHITECTURE

20MCC102

Instruction	3L+1T Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	60 Marks
Continuous Internal Evaluation	40 Marks
Credits	4

Course Outcomes:

After completion of the course, the students will be able to:

1. Acquaint with the operations and utilities of Boolean algebra and K Maps
2. Evaluate the work implementation of digital components, sequential and combinational circuits.
3. Learn the basic computer organization and its design.
4. Understand the components of CPU and their functionality.
5. Appreciate the input–output and memory organization.
6. Analyze Parallel processing concepts and its applicability.

UNIT -I

Digital Logic Circuits and Components: Data types and Number systems, Logic Gates, Boolean algebra, 3 and 4 Variable K Maps, Half Adder and Full Adder, SR flip flop and D flip flop, Integrated Circuits, Decoder, Multiplexers, Registers, Shift Registers

UNIT -II

Register Transfer and Micro Operations: Register Transfer language, Register transfer, Bus and Memory Transfer, Arithmetic Micro operations, Logic Micro operations, Shift Micro operations and Arithmetic logic shift unit.

Basic Computer Organization and Design: Instruction codes, CPU Registers, Computer Instructions, Timing and Control, Instruction Cycles, Memory Reference Instructions, Input, Output and Interrupts

UNIT -III

Central Processing Unit: Micro programmed Control, Control Memory, Address Sequencing, Design of Control Unit. General Register Organization, Stack Organization, Instruction Formats, Nine Addressing Modes, Data Transfer and Manipulation, Program Control.

UNIT -IV

Input–Output and Memory Organization: Peripheral Devices, I/O output interface, Asynchronous data transfer, Modes of transfer, Priority Interrupts, DMA controller and DMA process, Input output Processor, Serial Communication. Usefulness of Cache Memory, 3 types of Cache Memory mapping procedures

UNIT -V

Parallel Processing: Introduction to Parallel Processing, Shared Memory Multiprocessing, Abstract model of Parallel Computer, Parallel Processing Mechanism, Multi Programming and Time Sharing, Pipeline Computers, Serial V/s Parallel Processing, Parallelism V/s Pipelining.

Text Books:

1. M. Morris Mano, "Computer System Architecture", Pearson Asia/Prentice Hall, 3rdedn.2007.
2. M.Sasi Kumar, Dinesh Shikhare, P. Ravi Prakash,"Introduction to Parallel Processing", Published by PHI- 2nd Edition 2014.

Suggested Reading:

1. William Stallings, "Computer Organization & Architecture", Pearson Education, Sixth Edition, 2003.
2. Kai Hwang and Faye A.Briggs, "Computer Architecture and Parallel Processing" International Edition, 1984.

SOFTWARE ENGINEERING

20MCC103

Instruction	3L+1T Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	60 Marks
Continuous Internal Evaluation	40 Marks
Credits	4

Course Outcomes:

After completion of the course, the students will be able to:

1. Understand the basics of software engineering principles and importance of software requirement's specification.
2. Acquire the knowledge and requirement of software development models.
3. Identify the importance of software design and architecture principles and models.
4. Acquaint with the software testing approaches and levels of testing
5. Learn the concepts of risk management, software reengineering, reverse engineering and software maintenance activities.

UNIT-I

Introduction to Software Engineering: Software Engineering Challenges, Software Engineering approach, Software Process, Waterfall, Iterative, Prototype, Incremental, Spiral Model, V model.

UNIT- II

Requirements specification, SRS Structure, Problem analysis, IEEE format of SRS, Function Oriented Design: Design Principles, Module-level concepts, Design notations and specifications, coupling and cohesion concepts

UNIT-III

Structured design methodology, Software Architecture: Role of Software Architecture, Architecture views, Component and Connector view. Risk Engineering - Risk Analysis and Management. RMMI Techniques.

UNIT-IV

Effort Estimations, Schedule Estimation, Software cost Estimation, COCOMO, Function Point Analysis. White box and black box testing approaches, unit testing, integration testing, system testing, acceptance testing.

UNIT-V

Software Maintenance, Maintenance activities, Software Reengineering, Reverse Engineering, Forward Engineering, Software configuration management.

Text Books:

1. Pankaj Jalote,"An Integrated Approach to Software Engineering", 3rd Edition, Narosa PublishingHouse, 2010.
2. Roger S, Pressman's,"Software Engineering: A Practitioner's Approach", 6th Edition, Tata Mc GrHill, 2010.

MATHEMATICAL FOUNDATIONS FOR COMPUTER APPICATIONS

20MCC104

Instruction	3L+1T Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	60 Marks
Continuous Internal Evaluation	40 Marks
Credits	4

Course Outcomes:

After completion of the course the students will be able to:

1. Understand the required propositional logic to test the logic of a program.
2. Examine various properties of Relations and Functions.
3. Identify the basics of Linear Algebra in the form of Matrices and Vectors.
4. Synthesize the importance of minimization and Least Squares in data analysis and fitting.
5. Expose the principle of Inclusion and Exclusion as a basis for various Permutations and Combinations.
6. Evaluate the procedural knowledge on Graphs and Trees to derive applications in Computer Science.

UNIT – I

Fundamentals of Logic: Basic Connectives and Truth Tables, Logical Equivalence, Logical Implication, Use of Quantifiers, Definitions and the Proof of Theorems. **Boolean algebra**: Switching Functions, Logic gates, Don't Care Condition **Set Theory**: Sets and Subsets, Set operations and the Laws of Set theory Counting and Venn Diagrams.

UNIT – II

Functions: Cartesian product, Functions, Onto Functions, Special Functions, Pigeonhole Principle, Composition and Inverse Functions, Computational Complexity. **Relations**: Partial Order Relations, Lattices, Equivalence Relations and Partitions.

UNIT – III

Linear Algebra: Linear Algebraic Systems- Matrices and Vectors, Matrix Inverses, Transposes and Symmetric Matrices, Practical Linear Algebra – Tridiagonal Matrices and Pivoting strategies, Vector Spaces- Real Vector Spaces and Sub spaces, Norms. **Minimization and Least Squares:** Minimization Problems, Minimization of Quadratic Functions, The Closest Point and Least Squares, Data Fitting and Interpolation, Eigen values and Eigen Vectors, Introduction to Gradient Descendent Algorithm.

UNIT – IV

Principles of Inclusion and Exclusion: Introduction, Generalization of principle, Derangements, Rooks Polynomial, Arrangements with Forbidden Positions.

UNIT – V

Graph Theory: Definitions and examples, Sub graphs, Complements and graph isomorphism, Vertex degree, Planar graphs: Hamiltonian paths and Cycles, Graph coloring. **Trees**: Definitions, Properties and examples, Rooted Trees, Spanning Trees and Minimum Spanning Trees.

Text Books:

1. Ralph P. Grimaldi, "Discrete and Combinatorial Mathematics", Pearson Education, 4th Edition,2003.
2. Peter J. Olver, ChehrzadShakiban, "Applied Linear Algebra", Springer International Publishing, 2nd Edition, 2018.

Suggested Reading:

1. Kenneth H Rosen, "Discrete Mathematics and its Applications" Tata McGraw Hill, 6th Edition, 2007.
2. J.P Tremblay & R. Manohar, "Discrete Mathematical Structures with Applications to computer science" McGraw Hill. 1987.
3. Joe L. Mott, A.kandal& T.P. Baker, "Discrete Mathematics for Compute Scientists & Mathematicians", Prentice Hall N.J., 1986
4. Kevin Ferland, "Discrete Mathematics", Houghton Mifflin Company, 2009.

PROBABILITY AND STATISTICS

20MTC27

Instruction	3L+1T Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	60 Marks
Continuous Internal Evaluation	40 Marks
Credits	4

Course Outcomes:

On successful completion of this course the students shall be able to

1. Calculate the measures of skewness.
2. Apply probability on continuous and discrete random variables.
3. Use the basic probability for fitting the Random phenomenon.
4. Apply various tests for testing the significance of sample data.
5. Use the principle of Least Squares approximation for estimation of the data.

UNIT-I

Basic statistics: Measures of Central Tendency: Mean, Median, Mode. Measures of Dispersion: Quartile deviation, Standard deviation, Coefficient of dispersion, Coefficient of variation. Skewness: Karl Pearson's Coefficient of skewness, Bowley's Coefficient of Skewness and Kurtosis. Moments about a point and Moments about the Mean.

UNIT-II

Probability and Mathematical Expectation: Probability, Addition Theorem of probability, Conditional Probability, Multiplication theorem of probability, Bayes Theorem, Random variable, discrete random variable, continuous random variable, Properties of probability mass function and probability density function. Mathematical expectation, properties of expectation, properties of variance and covariance.

UNIT-III:

Probability Distributions: Discrete probability distribution: Poisson distribution, Mean, Variance, MGF, CGF, fitting of Poisson distribution. Continuous probability distributions: Normal distribution, Standard Normal random variable Expectation, Variance, MGF (with out proof), CGF, Properties of Normal Curve and Areas under Normal curve. Exponential distribution, Expectation, Variance, MGF, CGF.

UNIT-IV:

Testing of Hypotheses: Test of significance, null and alternative hypotheses, Errors in sampling, level of significance. Large sample test: Test of significance for single proportion, difference of proportions, single mean and difference of means. t-Test for single mean, differences of Means. F- test for equality of two population variances. Chi-Square test of Goodness of fit.

UNIT-V:

Regression and Curve Fitting: Correlation: karl pearson's coefficient of correlation. Linear Regression: Lines of regression, properties of regression coefficients. Curvilinear regression: Fitting of Parabola, fitting of a power curve $y = ax^b$, Fitting of Exponential curve $y = ae^{bs} and y = ab^s$.

Text books:

1. S.C .Gupta, V.K. Kappoor, "Fundamentals of Mathematical Statistics", Sultan Chand and Sons, 2014.
2. Sheldon Ross, "A First Course in Probability", 9th Edition, Pearson publications, 2014.

Suggested Reading:

1. Walpole, H. Myers, L. Myers, Ye, "Probability and statistics for engineers & Scintists" 9th Edition, Pearson Publications, 2016.
2. S.C. Gupta, "Fundamentals of Statistics", Himalaya publishing, 7th Edition ,2014.

COMPUTER PROGRAMMING LAB USING 'C'

20MCC105

Instruction	3 Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	50 Marks
Continuous Internal Evaluation	50 Marks
Credits	2

Course Outcomes:

After completion of the course, the students will be able to:

1. Use various data types, operators and control structures in the programs.
2. Apply the built-in functions and customized functions for solving the programs.
3. Develop the programs using one-dimensional and two-dimensional array concepts.
4. Build the programs using pointer concepts.
5. Construct the Programs using strings and structures concepts.
6. Solve the problems using dynamic memory allocation and file management concepts.

List of Programs

1. Calculate the area of a circle, rectangle, square and triangle.
2. Find the biggest of three different numbers by using nested if -else statement.
3. Find the Roots of a Quadratic Equation $ax^2+bx+c=0$, where $a>0$.
4. Find the grade of student using marks of the subjects using if-else if statement.
5. Takes two numeric values and one operator form the user, performs the operation and then prints the result. (Consider the operators +,-,*, /, % and use Switch Statement).
6. Find the max, min and sum of given set of numbers.(Note: Don't use array concept)
7. Find the sum of individual digits of a positive integer.
8. Find the factorial of a given positive number.
9. A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 1 and 1, Subsequent terms are found by adding the preceding two terms in the sequence. Generate the first n terms of the Fibonacci sequence. Where n value given by the user.
10. Generate all the prime numbers between n and m, where n and m values are given by the user.
11. Find the reverse of the given positive integer and check whether the reverse number is palindrome or not.
12. Find the value of sin(x) using series expansion. (Note: $\sin(x) = x - x^3/3! + x^5/5! -$ where x is in radians)
13. Find the value of cos(x) using series expansion. (Note: $\cos(x) = 1 - x^2/2! + x^4/4! -$ ….where x is in radians.)
14. Find the factorial of a given positive integer using non-recursive and recursive functions.
15. Find the GCD (greatest common divisor) of two given positive integers using non-recursive and recursive functions.
16. Display array elements from last index to first index and find out sum of the even elements and sum of the odd elements of the array.
17. Search whether the given element is present in the list or not using linear search technique.
18. Search whether the given element is present in the list or not using binary search technique.
19. Arrange the given set of elements in ascending order using bubble sort technique.
20. Add two matrices and store the result in another matrix.
21. Multiply two matrices and store the result in another matrix.
22. Transpose the given Matrix.
23. Display the array elements from last index to first index and find out the even elements sum and odd elements sum of the array.
24. Implement call by reference mechanism by swapping of two integers using pointers.
25. Find the number of characters, words and sentences in the given string.
26. Copy the contents of one string into another string using pointers.
27. Concatenate two strings without using strcat built-in function.
28. Develop functions to perform the following operations on structure complex.
    i) Read a complex number.
    ii) Display a complex number.
    iii) Add two complex numbers.
29. Develop functions to perform the following operations on structure complex.
    i) Read a complex number.

ii) Display a complex number.
iii) Multiply two complex numbers.

30. Allocate memory at runtime to store five student records and also display those students' records.
31. Find out number of characters, words and sentences in the given text file.
32. Copy the contents of one text file into another text file.
33. Read records sequentially from the file.
34. Read records randomly from the file based on user choice.

Suggested Reading:

1. E Balaguruswamy, "Programming in ANSI C", 5th Edition, Tata McGraw-Hill, 2007.
2. K R Venugopal & S R Prasad, "Mastering C", McGrawHill, 2007.
3. Yashwant Kanetkar, "Let us C", 13th Edition, BPB Publications, 2013.

PYTHON PROGRAMMING LAB

20MCC106

Instruction	3 Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	50 Marks
Continuous Internal Evaluation	50 Marks
Credits	2

Course Outcomes:

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

1. Understand basic types of Python Programming.
2. Demonstrate the conditional and loop statements in Python Programming.
3. Experiment with functions and recursive functions.
4. Elaborate various operations on Strings, Lists, Tuples, Dictionaries.
5. Understand and experiment with libraries like Numpy, Pandas, matplotlib.
6. Demonstrating the Data Pre-Processing techniques.

List of Programs:

1. Demonstrate Python Datatypes, Variables.
2. Demonstrate the use of if and if-else statements.
3. Demonstrate the use of for and while loop statements.
4. Print the prime numbers up to 'n'.
5. Find sum of n natural numbers using recursion function.
6. Demonstrate Strings in Python.
7. Perform operations on Lists.
8. Perform operations on Tuples.
9. Perform operations on Dictionaries.
10. Find the factorial of a given number using functions.
11. Find the GCDof giventwo numbers using functions.
12. Find the factorial of giventwo numbers using recursive functions.
13. Find the GCDof given two numbers using recursive functions.
14. Display Fibonacci series using recursion and non-recursion functions with modules.
15. Create, access, rename and delete files.
16. Demonstrate Packages, Libraries of Python (Numpy, Pandas, Statistics, matplotlib etc)
17. Demonstrate application on feature scaling using MinMaxScaler with pandas.
18. Demonstrate application on feature scaling using StandardScaler with pandas.
19. Demonstrate application on feature scaling using Binarizer with pandas.
20. Demonstrate application on feature scaling using Normalizer with pandas.

Suggested Reading:

1. ReemaThareja,"Python Programming", Oxford Press, 2017.
2. Jake VanderPlas, "Python Data Science Handbook", O'Really Publications, 2017.
3. Dr. Charles R. Severance, "Python for Everybody-Exploring Data in Python 3".

PROFESSIONAL COMMUNICATION LAB

20EG101

Instruction	3 Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	50 Marks
Continuous Internal Evaluation	50 Marks
Credits	2

Course Outcomes:

After successful completion of the course the students will be able to:

1. Define the speech sounds in English and understand the nuances of pronunciation in English
2. Apply stress correctly and speak with the proper tone, intonation and rhythm.
3. Differentiate various soft skills and illustrate proper email and mobile etiquette.
4. Determine the context, work in teams, discuss and participate in Group discussions and demonstrate effective presentation skills.
5. Design a resume and prepare and face interviews with confidence.

Exercises:

1. Introduction to English Phonetics: Introduction to auditory, acoustic and articulatory phonetics, organs of speech: the respiratory, articulatory and phonatory systems.
2. Sound system of English: Phonetic sounds and phonemic sounds, introduction to international phonetic alphabet, classification and description of English phonemic sounds, minimal pairs. The syllable: types of syllables, consonant clusters
3. Word stress: Primary stress, secondary stress, functional stress, rules of word stress.
4. Listening skills – practice with IELTS and TOEFL material
5. Soft Skills: Introduction, Hard Skills vs Soft Skills; Public Speaking, Leadership skills and Team Building; Business Etiquette - Email & Mobile Etiquette.
6. Group Discussions – dynamics of group, intervention, summarizing, modulation of voice and body language.
7. Presentation Skills –Elements of effective presentation – Structure of presentation – Presentation tools
   – Body language. Creating an effective PPT
8. Interview Skills – Resume Writing, Elements of an Effective Resume. Concept and process, pre-interview planning, opening strategies, answering strategies, mock interviews.

Suggested Reading:

1. E.Suresh kumar et al.,"English for Success(with CD)", Cambridge University Press India Pvt Ltd. 2010.
2. T Balasubramanian,. "A Textbook of English Phonetics for Indian Students", Macmillan, 2008.
3. Edgar Thorpe,"Winning at Interviews", Pearson Education, 2006.
4. Priyadarshi Patnaik,"Group Discussions and Interviews", Cambridge University Press Pvt Ltd 2011.

DATA STRUCTURES AND ALGORITHMS

20MCC107

Instruction	3L+1T Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	60 Marks
Continuous Internal Evaluation	40 Marks
Credits	4

Course Outcomes:

After completion of the course, students would be able to:

1. Understand the basic concepts of C++.
2. Build classes with functions, constructors and apply OOPS concepts wherever required.
3. Make use of various linear data structures and their implementation according to situations.
4. Apply and Distinguish different sorting techniques and their implementation in real world environment.
5. Implement different collision resolution techniques on hashing.
6. Make use of various non-linear data structures and their implementation according to situations

UNIT- I

C++ Introduction: Overview, Program Structure, namespace, identifiers, variables, constants, data types, enum, operators, Overloading of functions, default arguments, inline functions, dynamic memory allocation and De allocation (new and delete).**C++ Class Overview:** Class Definition, Objects, Class Members, Access Control, Class Scope, Constructors and destructors.

UNIT- II

OOPS Concepts: Inheritance basics, base and derived classes, Inheritance types, base class access control, Friend Functions, Templates, Function and class templates , Polymorphism, Runtime Polymorphism using virtual functions, Operator overloading. **Analysis Of Algorithms** :Algorithm Specification, Time and Space Complexities, Performance Analysis, Asymptotic notations, Algorithm design techniques: Brief Introduction to Divide and Conquer method, Back Tracking method.

UNIT- III

Sparse Matrix: Representation and its efficiency in storage. **Stacks**: Definition and Operations and Applications, Array and Linked Representation of Stacks. **Queues:** Definition and Operations. Array and Linked Representation of Queues and their Applications. **Linked Lists**: Definition and Operations, Double linked list representation, Circular linked lists.

UNIT- IV

Sorting: Bubble sort, Merge Sort, Selection Sort, heap sort, Quick sort, Insertion sort , Posterior Analysis, Sequential Search, binary search. **Hashing:** Hash table, its implementation, Hash table representation, types of hashing, collision resolution techniques.

UNIT- V

Trees: Definitions and Properties, Representation of Binary Trees, Operations. Binary Tree Traversal, Binary search trees, operations- insertion, deletion and searching, heap trees. AVL Tress and Operations on AVL Trees.B-Trees and its operations. **Graphs**: Definition and representation of graphs, data structures for representing graphs- edge list structures, adjacency list structures, adjacency matrix, Graph traversals – BFS and DFS. Spanning trees, minimum spanning trees, prim's and kruskal's algorithms.

Text Books:

1. E. Balaguruswamy "Object Oriented Programming with C++", Tata McGraw Hill,4th Edition, 2008.
2. S.Sahani, "Data Structures, Algorithms and Applications in C++",Universities Press. 2ndEdition, 2006.
3. Ellis Horowitz, Sartaj Shani, SanguthevarRajasekaran, "Fundamentals of Computer Algorithms", 2nd Edition, University Press, 2007.

Suggested Reading:

1. Langsam, Augenstein and Tanenbaum, "Data structures using C and C++", PHI, 2nd Edition, 2002.
2. Michael T.Goodrich, R.Tamassia and D.Mount, "Data structures and Algorithms in C++", Wiley Student Edition, Seventh Edition, John Wiley and Sons, 2011.
3. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C++", 3rdEdition, Pearson Education. Ltd., 2007.

ARTIFICIAL INTELLIGENCE

20MCC108

Instruction	3L+1T Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	60 Marks
Continuous Internal Evaluation	40 Marks
Credits	4

Course Outcomes:

1. After completion of the course, students will be able to:
2. Differentiate between elementary Problem and AI problem.
3. Determine and evaluate the various search strategies.
4. Compare and contrast the various knowledge representation schemes in AI.
5. Understand and analyze the various reasoning techniques involved in solving AI problems.
6. Understand the different learning techniques.

UNIT I

Intelligent Agents: Intelligent agents, structure of agents Introduction & Problem Solving: AI problems, AI Technique, Defining problem as a State-Space Search, Production Systems, Problem Characteristics. Heuristic Search Techniques: Generate–and–test, Hill Climbing, Best–First Search, Problem Reduction, Constraint Satisfaction.

UNIT II

Game Playing: Overview, Min-Max search Procedure, Adding Alpha-beta Cutoffs, Additional Refinements, Iterative Deepening. Using Predicate Logic: Representing simple facts in logic, Representing Instance and ISA Relationships, Computable Functions, propositional calculus and predicates, Resolution.

UNIT III

Uncertainty and Reasoning Techniques: Non monotonic reasoning, Logics for Non monotonic reasoning, Implementation issues. Statistical reasoning: Probability and Bayes theorem, Certainty factors and Rule based systems, Bayesian Networks, Dempster-Shafer Theory.

UNIT IV

Learning: Introduction, Rote learning, Learning by taking advice, learning in problem solving, learning from examples: Induction. Expert System: Representing and Using Domain Knowledge, Expert systems shells, Explanation, Knowledge Acquisition.

UNIT V

Natural Language Processing: Introduction, Syntactic Processing, Semantic Analysis, Statistical NLP, Spell Checking. PROLOG-The Natural Language of AI: Prolog facts and rules, variables, control structures, arithmetic operators, matching in Prolog, backtracking.

Text Books:

1. Elaine Rich, Kevin Night, Shivashankar B Nair, "Artificial Intelligence",3rd Edition.,2008
2. Russell Norvig, "Artificial Intelligence-Modern Approach", 3rdEdition, 2009.

Suggested Reading:

1. Saroj Kaushik, "Artificial Intelligence", Cengage Learning India, 2012.
2. Nelson M. Mattos, "An Approach to Knowledge Base Management", Springer Berlin Heidelberg, 1991.

OBJECT ORIENTED PROGRAMMING USING JAVA

20MCC109

Instruction	3L+1T Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	60 Marks
Continuous Internal Evaluation	40 Marks
Credits	4

Course Outcomes:

After completion of the course, the students will be able to:

1. Gain the conceptual and practical knowledge on basic Object-Oriented Programming concepts.
2. Implement complex Object-Oriented Programs using distinct OOP principles.
3. Acquire the knowledge on Scheduling of real-time application clients using Thread models as well as Exception Handling mechanisms.
4. Evaluate the usage of Mutable and Immutable Strings in different systems development. Also inculcate basic Stream Programming
5. Identify the importance of Collections framework to develop complex applications with advanced Data Structures.
6. Design and practice the GUI Components and to habituate the Event driven programming.

UNIT -I

Object Oriented Programming: History of java, and evolution of java, java Buzzwords, Object Oriented Programming, Data types, Variables and Arrays, Operators, Control Statements.

UNIT -II

Introduction to Classes: Classes, Methods, Constructors, This keyword, finalize method, Garbage Collection, Overloading, Recursion, nested classes. **Inheritance**: Inheritance and its types, super, Overriding, Abstract Classes, Using final. **Packages and Interfaces**: packages, Access protection, importing packages, Implementing Interfaces.

UNIT -III

Exceptional Handling: Exception–handling fundamentals, Exception types, Using try and Catch, throw, throws and finally clauses. **Multithreaded Programming:** Java Thread Model, Creating Threads, Interrupting threads, Thread Priorities, Synchronizing Threads, Inter-thread Communication.

UNIT – IV

String Handling: String class, String buffer class, String length, Special String operations, string comparison, Enumerations, Primitive type wrappers and Autoboxing, Overview of Annotations. **Java I/0:**Classes and Interfaces, File class, Stream and Byte Classes, Reading and Writing Files.

UNIT –V

The Collections Framework: Introduction and overview of Collections framework, The Collection interfaces, Collection classes – Array List, Hash Set and Tree Set, Working with M Using an Iterator, Comparators. **Applets and Event Driven Programming:** Introduction to Applets, Applet Life cycle methods, Passing Parameters to Applets, Event Handling, Delegation Event model, Event classes, Event Listener Interfaces. **AWT Controls, Layout Managers and Menus:** AWT classes, AWT control fundamentals, Window fundamentals**,** Understanding of Layout managers.

Text Books:

1. Herbert Scheldt, "Java, The Complete Reference" McGraw Hill Education, JavaTM 9th Edition, 2014.
2. Richard A. Johnson, "Java Programming and Object-Oriented Application Development" Cengage Learning, India Edition, 2009.

Suggested Readings:

1. John Dean and Raymond "Introduction Programming with Java A problem solving approach", McGr. Hill, 2008.
2. Joe Wigglesworth and Paula McMillan, "Java Programming: Advanced Topics" Cengage Learning. 3rd Edition, 2009.

DATABASE MANAGEMENT SYSTEM

20MCC110

Instruction	3L+1T Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	60 Marks
Continuous Internal Evaluation	40 Marks
Credits	4

Course Outcomes:

After the completion of the course, students will be able to:

1. Acquire the knowledge of basic concepts of the database.
2. Exposure to different Data Models.
3. Map the ER Models into relations and normalize the relations.
4. Acquire the knowledge of query evaluation.
5. Gain the knowledge of concurrent execution and transaction management.
6. Understand the issues in system crash and recovery measures.

UNIT-I

Introduction to DBMS and DB Models: File system Vs. DBMS, Advantages of DBMS, Data Abstraction, Database Design, and ER diagrams, Entities, Attributes and Entity Sets, Relationship Sets, Additional features of ER model, Conceptual Design with the ER model. The Relational Model: Introduction to the Relational Model, Integrity Constraints over relations, Logical Database design(ER to Relational), creating tables, views, Destroying / Altering Tables and Views.

UNIT-II

Schema Refinement and Normal Forms: Introduction to Schema Refinement, Functional Dependencies, Normal Forms, Decompositions, Normalizations. **Structured Query Language**: Overviews, Basic Structure of SQL, Queries, Set Operations, Null Values, Additional Basic Operations, Aggregate Functions, Nested Sub queries, Join Expression .**Advanced SQL**: SQL Data Types, Integrity Constraints, Authorization, Functions and Procedural Constructs, Cursors, Triggers.

UNIT-III

Indexing and Hashing: Basic Concepts, File Organization Indexing, Index Data Structures, Tree-Structured indexing: Indexed sequential Access Method (ISAM) B+ Trees: A dynamic index structure, format of a node, search, Insert, Delete, Duplicates Trees in Practice. **Hash-Based Indexing**: Static Hashing, Extendable Hashing, Linear Hashing, Extendable Hashing versus Linear Hashing. Comparison of Ordered Indexing and Hashing.

UNIT-IV

Transaction Management: ACID Properties, Transactions and Schedules, Concurrent Execution of Transactions, Lock-Based Concurrency Control. **Concurrency Control**: 2PL, Serializability, Recoverability, Introduction to Lock Management, Dealing with Deadlock, Specialized Locking Techniques, Concurrency Control without Locking.

UNIT-V

Crash Recovery: Introduction to ARIES, The Log, Other Recovery Related Structures, The WAL, Check pointing, recovering from a system Crash, Media recovery. Security and Authorization: Introduction to database security, Access Control Discretionary Access control, Mandatory access control. Additional Issues related to Security.

Text Books:

1. Silberschataz, Korth, Sudarshan "Database System Concepts", 5th Edition, McGraw Hill, 2011.

Suggested Reading:

1. Raghu Ramakrishna, Johannes, Gehrke, "Database Management Systems", 3rd Edition, McGraw Hill, 2003.
2. RamezElmasri, Shamkant B. Navathe, Somayajulu, Gupta "Fundamentals of Database systems", Pearson Education 2006.

ORGANIZATIONAL BEHAVIOUR
(ELECTIVE-I)

20MCE101

Instruction	3 Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	60 Marks
Continuous Internal Evaluation	40 Marks
Credits	3

Course Outcomes:

After completion of this course students would be able to:

1. Analyze the behavior, perception and personality of individuals and groups in organizations in terms of the key factors that influence organizational behavior.
2. Analyze the various characteristics of the perceiver, target and situation
3. Assess the potential effects of organizational-level factors on organizational behavior.
4. Critically evaluate the potential effects of motivating and leading the individuals in the Organization.
5. Analyze organizational behavioral issues in the context of groups, power and politics issues.
6. Understanding various conflict resolution strategies.

UNIT – I

Organizational behavior – Nature and levels of organizational behavior – Individuals in organization – Individual differences – Personality and Ability – The Big five Model of personality – Organizationally relevant personality traits. The nature of perception – characteristics of the perceiver, target and situation – perceptual problems.

UNIT – II

Organizational Designs and Structures – Traditional and Contemporary organizational designs. Organizational culture and ethical behavior – factors shaping organizational culture– creating an ethical culture.

UNIT – III

Motivation–early and contemporary theories of motivation. Leadership – early and contemporary approaches to leadership.

UNIT – IV

Groups and group development – turning groups into effective teams. Managing change – process, types and challenges. Communicating effectively in organizations – communication process–barriers to communication– overcoming barriers to communication–persuasive communication–communication in crisis situations.

UNIT – V

Power, Politics, Conflict and Negotiations–Sources of individual, functional and divisional Power. Organizational politics. Conflict – causes and consequences – Pondy's model of organizational conflict– conflict resolution strategies.

Text Books:

1. Jennifer George and Gareth Jones "Understanding and Managing Organizational Behavior", Pearson Education Inc., 2012.
2. Jon L Pierce and Donald G. Gardner, "Management and Organizational behavior", Cengage Learning India (P) Ltd., 2001.
3. Richard Pettinger "Organizational Behaviour", Routledge, 2010.

Suggested Reading:

1. Stephen P. Robbins, Jennifer George and Gareth Jones "Management and Organizational Behavior", Pearson Education. Inc., 2009.
2. K. Aswathappa "Organizational Behavior", Himalaya Publishing House, 2013.
3. John Schermerhorn, Jr. James G. Hunt and Richard N. Osborn "Organizational Behavior", 10th Edition, Wiley India, Edition. 2009.

ENTREPRENUERSHIP
(ELECTIVE-I)

20MCE102

Instruction	3 Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	60 Marks
Continuous Internal Evaluation	40 Marks
Credits	3

Course Outcomes:

After completion of the course, students will be able to:

1. Apply the entrepreneurial process.
2. Analyze the feasibility of a new business venture and preparation of Business plan.
3. Ability to evaluate entrepreneurial tendency and attitude.
4. Brainstorm ideas for new and innovative products or services.
5. Use a variety of feasibility studies, assess and select prospective new venture concepts.
6. Describe how to investigate financing alternatives for specific new venture concepts.

UNIT I:

Entrepreneur: Introduction, The Entrepreneur: Definition and Concept. Entrepreneurial Traits, Characteristics and Skills, Classification of Entrepreneurs, Entrepreneur vs Professional Managers, Women Entrepreneurs, Growth of Entrepreneurs, Nature and Importance of Entrepreneurs, The Entrepreneurial Culture.

UNIT II:

Entrepreneurship: The Concept of Entrepreneurship, Theories of Entrepreneurship, Entrepreneurship Environment, Entrepreneurship Development, Entrepreneurship Training, Institutions in Aid of Entrepreneurship Development, Project: Concept and Classification Search for a Business Idea, Project Identification, Project Formulation, Project Design and Network Analysis, Project Report, Project Appraisal, Factory Design and Layout.

UNIT III:

Financial Analysis: Financial Analysis-An Input in Financial Appraisal, Ratio Analysis, Investment Process, Break-even Analysis, Profitability Analysis, Social Cost-Benefit Analysis, budget and planning **:** Budgetary Control, Planning Process, Applicability of Factories Acts.

UNIT IV:

Sources Of Finance: Sources of Development Finance, Project Financing, Institutional Finance to Entrepreneurs, Financial Institutions, Role of Consultancy Organizations, Quality standards: Standardization, Quality Control, marketing : Methods of Marketing, Marketing Channels, Marketing Institutions and Assistance, E-Commerce, Exploring Export Possibilities.

UNIT V:

Setting Up A Small Enterprise: Location of an Enterprise, Steps for Starting a Small Enterprise , Selection of Types of Ownership Organization , Incentives and Subsidies, Problems of Entrepreneurship , Sickness in Small-Scale Industries, Reasons and Remedies . Project work: Project Work and Successful Entrepreneurs.

Textbooks:

1. Vasanth Desai "Dynamics of Entrepreneurial Development and Management", Himalaya Publishing House.
2. Prasanna Chandra "Project-Planning, Analysis, Selection, Implementation and Review", Tata Mc Graw-Hill Publishing Company Ltd., 1995.

Suggested Reading:

1. Stephen R. Covey and A. Roger Merrill "First Things First", Simon and Schuster Publication, 1994.
2. G.S. Sudha "Organizational Behaviuor", 1996.
3. Robert D. Hisrich, Michael P. Peters, "Entrepreneurship", Tata Me Gr Hill Publishing Company Ltd., 5th Edition, 2005
4. Robert D. Hisrich, Michael P. Peters, "Entrepreneurship", Tata Me Gr Hill Publishing Company Ltd., 5th Edition, 2005

BUSINESS INTELLIGENCE AND ANALYTICS
(ELECTIVE-I)

20MCE103

Instruction	3L Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	60 Marks
Continuous Internal Evaluation	40 Marks
Credits	3

Course Outcomes:

After completion of the course, the students will be able to:

1. Get clear idea about the basic concepts on Business Analytics in an organization.
2. Demonstrate detailed knowledge about the role of Business Analysts in decision making.
3. Distinguish between Descriptive, Predictive and Prescriptive Analytics.
4. Gain knowledge on Data Warehousing and Data Mining concepts.
5. Understand the usefulness of Business analytics in various functional areas of an organization.
6. Identify the key features of Big data and its implications.

UNIT- I:

Introduction: Introduction to Analytics, Data Science, Big data. Business analytics-challenges from outside and within, BASP (Business analytics success pillars) framework, Applications of Analytics to different domains, Data, Information, and Knowledge, Analyst's Role in the BA Model – Three Requirements the Analyst Must Meet , Required Competencies for the Analyst , Hypothesis-Driven Methods, Data Mining with Target Variables , Explorative Methods.

UNIT- II:

Descriptive Analytics: Descriptive analytics-Data warehousing-concepts, characteristics, Data marts, Meta data and process of data warehousing, Business Reporting, Visual Analytics and Business performance measurement, Why a Data Warehouse, Architecture and Processes in a Data Warehouse, Tips and Techniques in Data Warehousing.

UNIT- III:

Predictive Analytics: Introduction, Data mining concepts and Applications, Data mining process, methods, classification techniques. Text mining-introduction, text analytics and sentiment analytics. Web mining- introduction, Web analytics and social analytics.

UNIT- IV:

Prescriptive Analytics: Introduction- categories of models- optimization, simulation, heuristics, predictive models, other models. Automated decision systems and Expert systems, Knowledge Management and collaborative systems.

UNIT-V:

Big Data: Introduction, Defining Big Data, Big Data Landscape, Business Implications of Big Data, Technology Implications of Big Data, Big Data Technologies, Management of Big Data.

Text Books:

1. Ramesh Sharada, DursunDelen, Efraim Turban,"Business intelligence and analytics" Pearson.
2. Jean paulisson,jesse s.harriot,"Win with advanced Business analytics" Wiley and SAS.

Suggested Readings:

1. Gert H.N. Laursen, JesperThorlund "Business Analytics for Managers" JohnWiley& Sons, Inc., 2010.
2. The GIS Book: George B. Karte.

SOFTWARE PROJECT MANAGEMENT
(ELECTIVE-I)

20MCE104

Instruction	3L Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	60 Marks
Continuous Internal Evaluation	40 Marks
Credits	3

Course Outcomes:

After completion of the course, the students will be able to:

1. Gain basic knowledge of software project management principles.
2. Choose an appropriate project development model.
3. Implement design patterns in the software architecture.
4. Identify project risks, monitor and track project deadlines.
5. Work in a team environment and be aware of different models of communications.
6. List various process models and describe issues related with quality assurance.

UNIT-I

Software Project Management: Introduction, Importance, Software Projects Vs Other types of Projects, Contract Management, Technical Project Management, Activities covered by SPM, Plans, Methods and Methodologies. Setting Objectives, Project Success and Failures, Management and Control. **Project Evaluation and Programme Management:** Project port polio management, Evaluation of Individual projects, Cost Benefit Evaluation Techniques, Risk Evaluation, Program Management, Managing the Resource with in the Program, Strategic Program Management, Aids to Program Management, Overview of Project Planning**.**

UNIT-II

Selection of an Appropriate Project Approach: Choosing the methodologies and technologies, Software process and process models. S**oftware Effort Estimation**: Problems with Over and Underestimates, Software Effort Estimation Techniques. Function Point Analysis. A Parametric Productive Model – COCOMO-2

Activity Planning: Objectives of Activity Planning, Schedules, Activities, Sequencing, Network Planning Models.

UNIT-III

Risk Management: Categories of Risk, A Frame work with Dealing with Risk, Evaluating Risk with the Schedule.

Resource Allocation: Nature of Resource, Identify Resource Requirements, Scheduling, Creating Critical path, Cost Schedules, Scheduling Sequence. **Monitoring & Control**: Creating Framework, Collecting Data, Project Termination Review, Visualizing Progress, Cost Monitoring, Prioritizing Monitoring, Change Control,Software Configuration Management.

UNIT-IV

Managing Contracts: Types of Contracts, Stages in Contract Placement, Typical Terms of Contracts, Contract Management Acceptance. **Managing People in Software Environments**: Organizational behavior, selecting the Right person for the Job, Instruction in the best methods, Motivations, the Oldham-hackman Job characteristics model, Stress, Health and Safety, Some Ethical and Professional concerns. **Working in Teams**: Becoming a Team, Decision making, Organization and Team Structures, Coordination of dependencies, Communication genres, Communication plans, Leadership.

UNIT –V

Software Quality: The Place of Software Quality in Project planning, Quality Management Systems, Process Capability models, Software Reliability Quality plans, **ISO**: ISO – 9126, Product and Process Metrics, An Overview of PRINCE 2: Components of Prince 2.

Text Book:

1. Bob Hughes and Mike Cotterell, "Software Project Management", 5th Edition, Tata McGraw Hill, 2010.

Suggested Reading:

1. Walker Rayce, “Software Project Management: A Unified Framework”, Addison Wesley, 1998.
2. Watts S. Humphrey, “Managing Software Process”, Addison – Wesley Pearson Education, 1998.

DATA STRUCTURES LAB USING C++

20MCC111

Instruction	3 Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	50 Marks
Continuous Internal Evaluation	50 Marks
Credits	2

Course Outcomes:

After completion of the course, students will be able to:

1. Build classes with member functions, constructors and destructors.
2. Analyze the different kinds of inheritance types and its functionalities.
3. Make use of various linear data structures concepts in real world environment.
4. Apply and distinguish different sorting techniques and their requirement according to the situations.
5. Implement different collision resolution techniques on hashing.
6. Distinguish the DFS and BFS of graph traversals and their implementations.

List of C++Programs:

1. Overloading of Functions, Default Arguments.
2. Dynamic Memory allocation and De allocation.
3. Illustrate the concept of Class with member functions, Constructors and destructors
4. Illustrate the concept of Inheritance.
5. Implement Stack using Arrays and Linked Lists
6. Write a C++ programs for implementing Queues using Arrays and Linked Lists
7. Implement Linked Lists using Single, double and Ciruclar Linked Lists
8. Implement Binary Search Trees.
9. Implement Hashing.
10. Implement Quick Sort.
11. Implement Insertion Sort.
12. 12 Implement Selection Sort.
13. Implement Merge Sort.
14. Implement Graph Traversals DFS and BFS.

Suggested Reading:

1. Herbert Schildt, “Complete reference to C++”, 4th Edition, 2003.
2. E. Balaguruswamy, “Object Oriented Programming with C++”, Tata McGraw Hill, 4th Edition, 2008.
3. V.V.Muniswamy, “Advanced Data structures & Algorithms in C++”,Jaico Publishing House.
4. A.M. Berman, “Data structures via C++”, Oxford University Press.

OBJECT ORIENTED PROGRAMMING LAB UISNG JAVA

20MCC112

Instruction	3 Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	50 Marks
Continuous Internal Evaluation	50 Marks
Credits	2

Course Outcomes:

After completion of the course, students will be able to:

1. Understand and model various mathematical computation programs using OOP concepts.
2. Conclude the restrictions on class members using package level access protection.
3. Implement the forecasting of multiple clients task execution using Multithreading and exception handling concepts.
4. Analyze the input as well as output data for String and Stream programming.
5. Determine the usage of Collections framework with the help of its interfaces and classes.
6. Apply Event handling using distinct Layout managers.

List of Java Programs

1. Demonstrate the usage of Operators, Control Structures, Arrays etc.
2. Create classes, objects
3. Demonstrate the usage of constructors
4. Implement Method overloading
5. Implement Method overriding, dynamic method dispatch
6. Demonstrate the concept of Inheritance
7. Implement Interfaces
8. Create and import Packages
9. Implement Exception handling
10. Create Multiple threads
11. Demonstrate String and String Buffer classes
12. Demonstrate Wrapper classes
13. Create I/O streams and files
14. Demonstrate Collections
15. Implement Applets
16. Implement AWT
17. Create Layout managers

Suggested Reading:

1. Herbert Schildt, "Java, The Complete Reference" McGraw Hill Education, JavaTM 9th Edition, 2014.
2. Richard A.Johnson, "Java Programming and Object-Oriented Application Development" Cengage Learning, India edition 2009.

DATABASE MANAGEMENT SYSTEMS LAB

20MCC113

Instruction	3 Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	50 Marks
Continuous Internal Evaluation	50 Marks
Credits	2

Course Outcomes:

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

1. Implement SQL commands.
2. Declare and enforce integrity constraints on a database.
3. Implement the views with multiple options.
4. Develop PL/SQL programs using stored procedures, functions, cursorsand packages.
5. Create user access and authorization controls.
6. Design and build a Forms and Reports.

List of Programs

I. SQL

1. Creating tables using commands in DDL
2. Manipulating the data using DML
3. Using Aggregate functions Set operators
4. Simple condition query creation using SQL Plus
5. Complex condition query creation using SQL Plus
6. Exercising all types of Joins, views
7. Exercising Data Control Language and Transaction Control Language

II. PL/SQL

8. Demonstration of Blocks, Cursors,
9. Procedures, Functions and Packages.
10. Creation of Triggers

III. FORMS

11. Designing forms for various databases. (Creating, Inserting, Updating, Deleting)

IV. REPORTS

12. Generation using SQL Reports
13. Creation of Reports based on different queries.

Note:-The creation of sample database for the purpose of the experiments is expected to be pre-decided by the instructor.

Suggested Reading:

1. Nilesh Shah “Database Systems Using Oracle”, PHI, 2007.
2. Rick F Van der Lans “Introduction to SQL”, 4th Edition, Pearson Education, 2007.
3. Benjamin Rosenzweig, Elena Silvestrova “Oracle PL/SQL by Example”, 3rd Edition, Pearson Education, 2004.
4. Albert Lulushi, “Oracle Forms Developer’s Handbook”, Pearson Education, 2006.

DATA COMMUNICATIONS AND COMPUTER NETWORKS

20MCC114

Instruction	3L+1T Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	60 Marks
Continuous Internal Evaluation	40 Marks
Credits	4

Course Outcomes:

After completion of the course, the students will be able to:

1. Interpret the various features of Data Communications.
2. Demonstrate proper placement of different layers of ISO model and illuminate its function.
3. Analyze the various protocols and Access methods of Data Link layer an MAC sub Layers.
4. Experiment With various Routing Algorithms of Network layer.
5. Apply Transport layer Services and protocols such as TCP, UDP.
6. Identify internals of main protocols such as HTTP, FTP, SMTP and DNS service of Application layer and security issues in computer networking.

UNIT - I

Data Communications: Components, Data Representation, Data Flow, Networks: Network Criteria, Physical Structure, Network Types, Internet History, Standards and Administration, **Network models**: ISO/OSI model, TCP/IP Protocol Suite, **Physical layer:** Data and Signals, Transmission Impairment, Performance, **Digital Transmission:** Digital-to-Digital Conversion, Transmission Modes, **Transmission Media:** Guided media, unguided media.

UNIT-II

Data link Layer: Error detection and Correction: Block coding, CRC, **Data Link Control (DLC):** DLC Services, Data-Link Layer Protocols, HDLC, Point-to-Point Protocol (PPP), **Media Access Control (MAC):** Random Access, Controlled Access, Channelization, **Wired LANs:** Ethernet IEE 802.3, IEEE 802.4,IEEE 802.5.

UNIT-III

Network Layer: Network-Layer Services, Packet Switching, Network Layer Performance, IPV4 Addressing **Network Layer Protocols:** Internet Protocol (IP), **Unicast Routing:** Routing Algorithms, Unicast Routing Protocols, IPV6 Addressing and Protocol, Transition from IPV4 to IPV6.

UNIT-IV

Transport Layer: Transport Layer Services, Connection oriented and Connectionless Protocols, **Transport Layer Protocols**, User Datagram Protocol (UDP), **Transmission Control Protocol (TCP).**

UNIT-V

Application Layer: World Wide Web (WWW) and HTTP, FTP, TELNET, SSH, Domain Name Space (DNS), SMTP, BITTORRENT, **Network Security:** Security Goals, Attacks, Symmetric and Asymmetric cryptography Basis, Firewalls.

Text Books:

1. Behroz A Forouzan, "Data Communications and Networking", 5th Edition, Tata McGraw – Hill, 2013.

Suggested Reading:

1. Andrew S. Tanenbaum, "Computer Networks", 5th Edition, Pearson Education, 2011.
2. LL Peterson, BS Davie, "Computer Networks: A Systems Approach", 5thEdition, Morgan-Kauffman, 2011.
3. JF Kurose, KW Ross, "Computer Networking: A Top-Down Approach", 5thEdition, Addison-Wesley, 2009.
4. W Stallings, "Cryptography and Network Security,Principles and Practice", 5thEdition, Prentice-Hall, 2010.

DATA SCIENCE AND MACHINE LEARNING

20MCC115

Instruction	3L+1T Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	60 Marks
Continuous Internal Evaluation	40 Marks
Credits	4

Course Outcomes:

After completion of the course, the students will be able to:

1. Identify Suitable Machine Learning algorithms for different problems.
2. Preprocess the data sets.
3. Apply Prediction Techniques.
4. Recognize patterns using Machine Learning models.
5. Apply dimensionality reduction techniques on different datasets.
6. Create ensemble methods for optimization.

UNIT-I

Introduction to data Analysis: NumPy Basics: Arrays and Vectorized Computation, The NumPy ndarray: A Multidimensional Array Object, Creatingnd arrays, Data Types for ndarrays, Data Processing Using Arrays, File Input and Output with Arrays, Pandas: Introduction to pandas Data Structures, Series, DataFrame, Index Objects, Summarizing and Computing Descriptive Statistics, Handling Missing Data, Data Loading, Storage, and File Formats.

UNIT-II

Introduction: Learning, Types of Machine Learning. **Concept learning:** Introduction, Version Spaces and the Candidate Elimination Algorithm. **Learning with Trees:** Constructing Decision Trees, CART, Classification Example. **Linear Discriminants:** The Perceptron, Linear Separability.**Linear Regression Multilayer Perceptron (MLP):** Going Forwards, Backwards, MLP in practices, Derivingback.**Propagation SUPPORT Vector Machines:** Optimal Separation, Kernels.

UNIT-III

Some Basic Statistics: Averages, Variance and Covariance, The Gaussian. **The Bias-Variance Tradeoff Bayesian learning:** Introduction, Bayes theorem, Bayes Optimal Classifier, Naive Bayes Classifier. **Graphical Models:** Bayesian networks, Approximate Inference, Making Bayesian Networks, Hidden Markov Models, The Forward Algorithm.

UNIT-IV

Evolutionary Learning: Genetic Algorithms, Genetic Operators. **Genetic Programming Ensemble learning:** Boosting, Bagging. **Dimensionality Reduction:** Linear Discriminant Analysis, Principal Component Analysis.

UNIT-V

Clustering: Introduction, Similarity and Distance Measures, Outliers, Hierarchical Methods, Partitional Algorithms, Clustering Large Databases, Clustering with Categorical Attributes, Comparison.

Text Books:

1. Tom M. Mitchell, “Machine Learning”, McGraw Hill, 1997
2. Stephen Marsland, “Machine Learning - An Algorithmic Perspective”, CRC Press, 2009.
3. Wes McKinney, “Python for data Analytics”, O’Really Publications, 2013.

Suggested Reading:

1. J F Khamber, “Data Mining Concepts”, Elsevier, 2007.
2. Margaret H Dunham, “Data Mining”, Pearson Edition, 2003.
3. GalitShmueli, Nitin R Patel, Peter C Bruce, “Data Mining for Business Intelligence”, Wiley India Edition, 2007.
4. RajjallShinghal, “Pattern Recognition”, Oxford University Press, 2006.

OPERATING SYSTEMS

20MCC116

Instruction	3L+1T Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	60 Marks
Continuous Internal Evaluation	40 Marks
Credits	4

Course Outcomes:

After completion of the course, the students will be able to:

1. Define the fundamental components of a computer operating system and the interactions among them.
2. Illustrate CPU scheduling algorithms, memory management techniques and deadlock handling methods.
3. Build applications using semaphores and monitors to synchronize their operations.
4. Analyze the performance of CPU scheduling and page replacement algorithms.
   Identify how the process management, scheduling, memory management happen in Linux Environment.

UNIT-I

Operating System Introduction: Operating Systems Objectives and functions, Computer System Architecture, OS Structure, OS Operations, Evolution of Operating Systems - Simple Batch, Multi programmed, time shared, Personal Computer, Parallel, Distributed Systems, Real-Time Systems, Special - Purpose Systems**.**

System structures: Operating System Services, System Calls, Types of System Calls, System Programs, Operating System Design and Implementation, Operating System Structure, Virtual Machines, Operating System debugging. **Process Concept**: Process Concept, Process Scheduling, Operations on process, Inter process Communication. **Multithreaded Programming**: Multithreading Models, Thread Libraries, Threading Issues.

UNIT–II

Process Scheduling: Scheduling Criteria, Scheduling Algorithms, Thread Scheduling, Multiple Processor Scheduling.**Process Synchronization**: Critical Section Problem, Peterson's Solution, Semaphores, Classic Problems of Synchronization, Monitors. **Deadlocks**: System Model, Deadlock Characterization, Methods in Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock.

UNIT- III

Memory Management Strategies: Swapping, Contiguous Memory Allocation, Paging, Structure of the Page Table, Segmentation. **Virtual Memory Management**: Demand Paging, Copy on Write, Page Replacement Algorithms, Allocation of Frames, Thrashing. **System Protection**: Goals of Protection, Principles of Protection, Domain of Protection, Access Matrix.

UNIT- IV

File System: File Concept, Access Methods, Directory and Disk Structure, File System Mounting, File Sharing, Protection.**Implementing File System**: File System Structure, File System Implementation, Directory Implementation, Allocation Methods, Free Space Management, Efficiency and Performance, Recovery.**Secondary Storage Structure**: Overview of Mass Storage Structure, Disk Structure, Disk Attachment, Disk Scheduling, Disk Management, Swap Space Management, RAID Structure.

UNIT- V

I/O Systems: I/O Hardware, Application I/O Interface, Kernel I/O Subsystem, Transforming I/O Request to Hardware Operations, STREAMS. **Case Study**: **The Linux System**: Linux History, Design Principles, Kernel Modules, Process Management, Scheduling, Memory Management, File Systems, Input and Output, Inter process Communication.

Text Books:

1. Abraham Silberschatz, Peter B. Galvin, Greg Gagne, "Operating System Concepts", 9th Edition, John Wiley and Sons, 2011.

Suggested Reading:

1. Gary Nutt, "Operating Systems", 3rd Edition, Pearson Education, 2004.
2. Harvey M. Deital, "Operating Systems", 3rd Edition, Pearson Education, 2004.

WEB TECHNOLOGIES

20MCC117

Instruction	3L+1T Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	60 Marks
Continuous Internal Evaluation	40 Marks
Credits	4

Course Outcomes:

After completion of the course, the students will be able to:

1. Develop the web pages using XHTML/HTML.
2. Apply CSS concepts to present the document.
3. Perform client side validations using Javascript
4. Create interactive web pages using JavaScript and jQuery.
5. Develop the web applications using PHP and MYSQL.
6. Store and transport the data using XML.

UNIT – I

Introduction to XHTML: origins and evolution of HTML and XHTML, basic syntax, standard XHTML document structure, basic text markup tags, images, hypertext links, lists, tables, forms, frames, syntactic differences between HTML and XHTML, introduction to HTML 5.

Cascading Style Sheets (CSS): Introduction, levels of style sheets, style specification formats, selector forms, property value forms, font properties, list properties, color, alignment of text, box model, background images, positioning.

UNIT – II

Basics of JavaScript: overview of JavaScript, object orientation and JavaScript, general syntactic characteristics, primitives, operations, expressions, screen output and keyboard input, control statements, object creation and modification, arrays, functions, constructors, pattern matching using regular expressions, errors in scripts.

UNIT-III

JavaScript and XHTML Documents: Document object model, element access in JavaScript, events and event handling, handling events from body elements, handling events from button elements, Handling events from text box and password elements, moving elements, element visibility, dynamic content, stacking elements, locating the mouse cursor, slow movement of elements.

Introduction to jQuery: Overview and basics.

UNIT –IV

Introduction to PHP: origins and uses of PHP, overview of PHP, general syntactic characteristics, primitives, operations, expressions, output, control statements, arrays, functions, pattern matching, form handling, cookies, session tracking.

Database Access through the web: MYSQL database system, database access with PHP and MYSQL.

UNIT-V

Introduction to XML: Introduction, syntax of XML, XML document structure, document type definitions, namespaces, XML schemas, displaying raw XML documents, displaying XML documents with CSS, XSLT style sheets, XML processors.

Text Books:

1. Robert W.Sebesta, "Programming the World Wide Web", 4th Edition, Pearson Education, 2008.

Suggested Reading:

1. Thomas Powell "HTML & XHTML: The Complete Reference", 4th Edition, Tata McGraw-Hill, 2003.
2. Thomas A Powell, Fritz Schneider "JavaScript: The Complete Reference", 3rd Edition, Tata McGraw Hill, 2013.
3. Steven Holzner "PHP: The Complete Reference", McGraw Hill Education, 2008.

CLOUD COMPUTING
(ELECTIVE-II)

20MCE105

Instruction	3L Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	60 Marks
Continuous Internal Evaluation	40 Marks
Credits	3

Course Outcomes:

After completion of the course, the students will be able to:

1. Identify the basic components of cloud computing for service perspective and their roles.
2. Understand the requirement of various technologies offered in cloud environment to support the client's requirements.
3. Appreciate various cloud infrastructure mechanisms, virtual server's role and utility to the need of the hour.
4. Evaluate the role, design and implementation of various cloud architectures to provide the best services.
5. Will be able to analyze the role and functionalities of IaaS, PaaS, SaaS service infrastructure mechanisms
6. Apply large data processing methods in Clouds.

UNIT-I

Fundamental Cloud Computing-Understanding Cloud Computing, Origins influences, Basic Concepts andTerminology, Goals, Benefits, risks, Challenges, Rolls and boundaries, Cloud characteristics, Cloud Delivery
models, Cloud deployment models.

UNIT-II

Cloud Enabling Technology-Broadband Networks and Internet architecture, Data center technology, Visualization Technology, Cloud Security-basic terms and concepts, Threat agents, Cloud security threats.

UNIT-III

Cloud Infrastructure Mechanisms-Logical network perimeter, Virtual server, Cloud Storage device, cloud usage monitor, Resource replication, special cloud mechanisms, cloud management mechanisms, cloud security mechanisms,

UNIT-IV

Cloud Computing Architecture-Fundamental Architecture, Work load distribution architecture, Dynamic scalability architecture, service load balancing architecture, Hyper clustering architecture, load balanced virtual server instances architecture, zero down time architecture, cloud balancing architecture, Resource reservation architecture, rapid provision architecture.

UNIT-V

Working with clouds- (Cloud Provider Perspective) Building IaaS Environments, Equipping PaaS Environment, optimizing SaaS Environments. (Cloud consumer perspective)- Working with IaaS Environments, working with PaaS Environment, working with SaaS Environments.

Text Books:

1. Thomas Erl, Ricardo Puttini "Cloud Computing: Concepts, Technology & Architecture", Prentice Hall, 1st Edition, 2015

Suggested Reading:

1. Rajkumar Buyya, James Broberge and Anddrzej, M Gosciniski "Cloud Computing Principles and Paradims". Wiley Publishing, 2011.
2. John W Rittinghouse, JamesF.Ransome. "Cloud Computing Implementation, Management and Security" CRC Press, 2009.
3. Kai Hwang, Geoffrey C.Fox,Jack J. Dongarra, "Distributed and Cloud Computing from parallel Processing to the Internet of things".

DESIGN AND ANALYSIS OF ALGORITMS
(ELECTIVE-II)

20MCE106

Instruction	3L Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	60 Marks
Continuous Internal Evaluation	40 Marks
Credits	3

Course Outcomes:

After completion of the course, the students will be able to:

1. Analyze the time and space complexities of algorithms.
2. Understand different algorithmic design techniques.
3. Apply important algorithmic design paradigms.
4. Analyze complex problems to find out optimal solutions.
5. Design and Analyze non deterministic algorithms to solve polynomial and non-polynomial problems.

UNIT-I

Introduction: Algorithm Definition, Algorithm Specification, Performance Analysis. **Review of Elementary Data Structures**: Stacks, Queues, Trees, Dictionaries, Priority Queues, Sets and Disjoint Set Union.

UNIT-II

Divide and Conquer: General Method, Finding the Maximum and Minimum, Merge Sort, Quick Sort, Stassen's Matrix Multiplication.**Greedy Method:** General method**,** Knapsack problem, Job Sequencing with Deadlines, Minimum Cost Spanning Trees, Optimal Storage on Tapes, Optimal Merge Patterns.

UNIT-III

Dynamic Programming: General Method, Multistage Graphs, All-Pairs Shortest Paths, Optimal Binary Search Trees, 0/1 Knapsack, Reliability Design, Traveling Salesmen Problem.**Basic Traversal and Search Techniques**: Breadth First Search (DFS) and Traversal, Depth First Search (DFS) and Traversal, Connected Components and Spanning Trees, Bi-connected Components and DFS.

UNIT-IV

Backtracking: General Method, 8-Queen's Problem, Sum of Subsets, Graph Coloring, Hamiltonian Cycles, Knapsack Problem.**Branch and Bound**: The Method, 0/1 Knapsack Problem, Traveling Salesperson Problem.

UNIT -V

NP-Hard and NP-Complete Problems: Basic Concepts, Cook's Theorem, NP-Hard Graph Problems and NP- Hard Scheduling Problems.

Text Book:

1. Ellis Horowitz, Sartaj Shani, SanguthevarRajasekaran, "Fundamentals of Computer Algorithms", 2nd Edition, University Press, 2007.

Suggested Reading:

1. R. Pannerselvam "Design and Analysis of Algorithms", PHI, 2007.
2. Hari Mohan Pandey, "Design and Analysis of Algorithms", University Science Press, 2009.
3. Aho, Hopcroft, Ullman "The Design and Analysis of Computer Algorithms", Pearson Education, 2000.
4. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein "Introduction to Algorithms", 2ndEdition, Prentice Hall of India Private Limited, 2006.
5. Anany Levitin "Introduction to the Design & Analysis of Algorithms", Pearson Education, 2003.
6. Parag H.Dave, Himanshu B. Dave "Design and Analysis of Algorithms", Pearson Education, 2nd Edition, 2014.

BIG DATA ANALYTICS
(ELECTIVE-II)

20MCE107

Instruction	3 Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	60 Marks
Continuous Internal Evaluation	40 Marks
Credits	3

Course Outcomes:
After completion of the course, students will be able to:

1. Explain the foundations, definitions, and challenges of Big Data and various Analytical tools.
2. Understand the HADOOP architecture.
3. Design program using HADOOP and Map reduce.
4. Understand importance of Big Data in Social Media and Mining.
5. Understand Data Analytics with R.
6. Compare supervised and unsupervised learning.

UNIT - I
Introduction To Big Data: Big Data and its Importance – Four V's of Big Data – Drivers for Big Data – Introduction to Big Data Analytics – Big Data Analytics applications.

UNIT - II
Big Data Technologies : Hadoop's Parallel World – Data discovery – Open source technology for Big Data Analytics – cloud and Big Data –Predictive Analytics – Mobile Business Intelligence and Big Data

UNIT - III
Introduction Hadoop: Big Data – Apache Hadoop & Hadoop EcoSystem – Moving Data in and out of Hadoop – Understanding inputs and outputs of Map Reduce - Data Serialization.

UNIT - IV
Hadoop Architecture: Hadoop: RDBMS Vs Hadoop, Hadoop Overview, Hadoop distributors, HDFS, HDFS Daemons, Anatomy of File Write and Read., NameNode, Secondary NameNode, and DataNode, HDFS Architecture,Hadoop Configuration, Map Reduce Framework,Role of HBase in Big Data processing, HIVE, PIG.

UNIT - V
Data Analytics with R Machine Learning: Introduction, Supervised Learning, Unsupervised Learning, Collaborative Filtering, Social Media Analytics, Mobile Analytics, Big Data Analytics with BigR.

Textbooks:

1. Seema Acharya, Subhasini Chellappan, "Big Data Analytics", Wiley, 2015.
2. Michael Minelli, Michehe Chambers, "Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Business", 1st Edition, AmbigaDhiraj, Wiely CIO Series, 2013.
3. Tom White, "Hadoop: The Definitive Guide", 3rd Edition, O'Reilly Media, 2012.

Suggested Reading:

1. Arvind Sathi,"Big Data Analytics: Disruptive Technologies for Changing the Game", 1st Edition, IBM Corporation, 2012.
2. Jay Liebowitz, "Big Data and Business AnalyticsAuerbach Publications", CRC press, 2013.
3. Tom Plunkett, Mark Hornick, "Using R to Unlock the Value of Big Data: Big Data Analytics with Oracle R Enterprise and Oracle R Connector for Hadoop", McGraw-Hill/Osborne Media (2013), Oracle press.
4. Boris Lublinsky, Kevin T. Smith, Alexey Yakubovich,"Professional Hadoop Solutions", Wiley, ISBN: 9788126551071, 2015.
5. Chris Eaton, Dirk derooset al, "Understanding Big data", McGraw Hill, 2012.
6. Michael Berthold, David J. Hand "Intelligent Data Analysis", Springer, 2007.
7. Bill Franks, "Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics", 1st Edition, Wiley and SAS Business Series, 2012.

ADVANCED JAVA PROGRAMMING
(ELECTIVE-II)

20MCE108

Instruction	3L Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	60 Marks
Continuous Internal Evaluation	40 Marks
Credits	3

Course Outcomes:
After completion of the course, the students will be able to:

1. Understand the architecture of JAVA EE.
2. Examine the JDBC driver connection to Oracle, MySQL databases.
3. Design and build a web application using servlets.
4. Develop web application using JSPs.
5. Compares Model 1 and MVC architecture using servlets and JSPs.
6. Apply and Build Struts based application using MVC Architecture.

UNIT - I
JAVA EE Platform Overview: Enterprise Architecture Styles, Features of the Java EE Platform, Architecture of Java EE, Container Server, Developing Java EE Applications, Web and Application Servers
Web Applications and Java EE: Exploring the HTTP Protocol, Introducing Web Applications, Exploring Web Architecture Models, Exploring the MVC Architecture

UNIT - II
Working with JDBC 4.0: Introduction to JDBC, JDBC Drivers, Features of JDBC, JDBC APIs: The java.sql Package, Thejavax.sql Package, Exploring Major Classes and Interfaces, Exploring JDBC Processes with the java.sql Package, Exploring JDBC Processes with the javax.sql Package, Working with Transactions

UNIT - III
Working with Servlets 3.1: Exploring the Features of Java Servlet, New Features in Servlet 3.1, Exploring the Servlet API, Explaining the Servlet Life Cycle, Creating a Sample Servlet, Working with ServletConfig and Servlet Context Objects, Working with the HttpServletRequest and HttpServletResponse Interfaces, Handling Sessions in Servlets 3.1

UNIT - IV
Java Server Pages 2.3: Introducing JSP Technology, Listing Advantages of JSP over Java Servlet , Exploring the Architecture of a JSP Page, Life Cycle of a JSP, JSP Basic Tags and Implicit Objects, Action Tags in JSP, Accessing a Database through JSP and JDBC

UNIT – V
Working with Struts 2:
Introducing Struts 2, MVC 2 Design Pattern for Struts 2, The Need for Struts 2, Processing Request in Struts 2, Struts 2 Architecture, Struts 2 Configuration Files, Struts 2 Annotations, Understanding Actions in Struts 2, Performing Validation in Struts 2

Text Books:

1. Kogent Learning Solutions, Java Server Programming Java EE 6 (J2EE 1.6), Black Book, Wiley DreamtechIndia Pvt., Ltd.
2. H. Schildt, “Java 2 Complete Reference”, 5th Edition, Tata McGraw Hill, New Delhi, 2002.

Suggested Reading:

1. K. Moss “Java Servlets”, 2nd Edition, Tata McGraw Hill, New Delhi, 1999.
2. J. McGovern,R.Adatia,Y. Fain, “J2EE 1.4 Bible”, WileyDreamtech India Pvt., Ltd, New Delhi,2003.
3. Marty Hall, Larry Brown, Yaakov Chaikin, “Core Servlets and JavaServer Pages Volume-2:Advanced Technologies”, 2nd Edition, Sun Enterprises.

INTELLECTUAL PROPERTY RIGHTS AND PROFESIONAL ETHICS

(AUDIT COURSE)

20MCA101

Instruction	2L Hours per week
Duration of Semester End Examination	--
Semester End Examination	--
Continuous Internal Evaluation	--
Credits	0

Course Outcomes:

After completion of the course, students will be able to:

1. Understand about the importance of Ownership, patent rights and its licensing.
2. Summarize about Patent Infringement and patent laws.
3. Identify the new developments and government laws in patenting.
4. Understand the importance of Values and Ethics in their personal lives and professional careers.
5. Learn the rights and responsibilities as an employee, team member and as a global citizen.
6. Understand about the engineering experimentation and challanges.

UNIT – I

Law of Patents, Patent Searches, Ownership, Transfer: Introduction to Intellectual Property Rights - Patentability – Design Patents – Double Patenting – Patent Searching – Patent Application Process – Prosecuting the Application, Post-issuance Actions, Term and Maintenance of Patents. Ownership Rights – Sole and Joint Inventors – Inventions Made by Employees and Independent Contractors – Assignment of Patent Rights – Licensing of Patent Rights – Invention Developers and Promoters.

UNIT – II

Patent Infringement, New Developments and International Patent Law :

Direct Infringement – Inducement to Infringe – Contributory Infringement – First Sale Doctrine – Claims Interpretation – Defenses to Infringement – Remedies for Infringement – Resolving an Infringement Dispute – Patent Infringement Litigation - New Developments in Patent Law.

UNIT – III

Morals, values and Ethics:

Integrity – Work ethic – Service learning – Civic virtue – Respect for others – Living peacefully – Caring – Sharing – Honesty – Courage – Valuing time – Cooperation – Commitment – Empathy – Self confidence – Character – Spirituality – Introduction to Yoga and meditation for professional excellence and stress management.

UNIT – IV

Senses of 'Engineering Ethics':

Variety of moral issues – Types of inquiry – Moral dilemmas – Moral Autonomy – Kohlberg's theory – Gilligan's theory – Consensus and Controversy – Models of professional roles – Theories about right action – Self-interest – Customs and Religion – Uses of Ethical Theories

UNIT – V

Engineering as experimentation:

Engineers as responsible experimenters - codes of ethics - a balanced outlook on law - the challenger case study. Safety and risk - assessment of safety and risk - risk benefit analysis and reducing risk. Multinational corporations - Environmental ethics - computer ethics - weapons development - engineers as managers- consulting engineers-engineers as expert witnesses and advisors -moral leadership.

Textbooks:

1. Richard Stim,"Intellectual Property – Copyrights, Trademarks, and Patents", Cengage Learning
2. Mike Martin and Roland Schinzinger, "Ethics in Engineering", McGraw-Hill, New York 1996.

Suggested Reading:

1. Deborah E. Bouchoux,"Intellectual Property Rights", Cengage Learning.

2. Vinod V.Sople, “Managing Intellectual Property The Strategic Imperative”, 2nd Edition, PHI Learning Private Limited.
3. Govindarajan M, Natarajan S, Senthil Kumar V. S, “Engineering Ethics”, Prentice Hall of India, New Delhi, 2004.

OBJECT ORIENTED SYSTEM DEVELOPMENT LAB

20MCC118

Instruction	3 Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	50 Marks
Continuous Internal Evaluation	50 Marks
Credits	2

Course Outcomes:

After completion of the course the students will be able to:

1. Understood the browsing and 4 views of Rational Rose case tool.
2. Gained the knowledge of selecting a case study and modelling it using nine UML diagrams
3. Acquainted with the knowledge of implementing and modelling use case diagram and class diagram with all 6 relations and the elements of use cases, actors, boundary, control and entity classes and object message modelling.
4. Implement the structural modeling of through collaboration diagram and Dynamic modelling through sequence diagram.
5. Develop and model state diagram to establish of a given object's life cycle and also construct activity diagram modelling to appreciate the parallel object flows in the system's implementation.
6. Establish the system's architecture through the modelling of component diagram. Able to understand the overall system's hardware and software implementation through the modelling of deployment diagram.

List of Diagrams:

1. Use case Diagram
2. Class Diagram
3. Object Diagram
4. Sequence Diagram
5. Collaboration Diagram
6. State chart Diagram
7. Activity Diagram
8. Component Diagram
9. Deployment Diagram

The students should finally submit a technical report on their case study.

**Suggested Reading: **

1. Ivor Jacbson, Grady Booch, James Rumbaugh, "The Unified Software Development Process", PearsonEducation, India, 2008.

MACHINE LEARNING LAB USING PYTHON

20MCC119

Instruction	3 Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	50 Marks
Continuous Internal Evaluation	50 Marks
Credits	2

Course Outcomes:

After completion of course, the students will be able to:

1. Understand complexity of Machine Learning algorithms and their limitations;
2. Understand modern notions in data analysis oriented computing;
3. Be capable of confidently applying common Machine Learning algorithms in practice and implementing their own
4. Be capable of performing experiments in Machine Learning using real-world data.

List of Programs:

1. Python Datatypes, Variables, Recursive Functions.
2. Strings, Lists, User defined functions, Tuples, Dictionaries.
3. Packages, Libraries of Python.
4. Demonstrating the Data preprocessing techniques.
5. Demonstration on How to get different datasets
6. Write a simple program on Simple Linear Regression
7. Multiple Linear Regression Backward Elimination – Preparation & Automatic Backward Elimination. Use Decision Tree functions on real time data for

8. C4.5,
9. CART,
10. CHAID
11. Logistic Regression
12. K-Nearest Neighbors
13. Support Vector Machine with different kernals
14. Random Forest Classification

Use clustering functions on real time data for

15. K-Means,
16. Hierarchical Clustering

Use Association mining functions for

17. Apriori

Apply Data compression techniques for real time data

18. Linear Discriminant Analysis (LDA),
19. Principal Component Analysis (PCA)

**Suggested Reading: **

Open source Software Python

WEB TECHNOLOGIES LAB

20MCC120

Instruction	3 Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	50 Marks
Continuous Internal Evaluation	50 Marks
Credits	2

Course Outcomes:

After completion of the course, the students will be able to:

1. Develop static web pages.
2. Present the documents in professional way.
3. Construct interactive web pages.
4. Perform client side validations.
5. Build web applications.
6. Store and Transport data using XML.

List of Programs:

XHTML/HTML

1. Text Markup Tags.
2. Images.
3. Hyperlinks.
4. Ordered and Unordered Lists.
5. Tables and Nested Tables.
6. Forms.
7. Frames.

CSS

8. Inline Stylesheet, Internal Stylesheet. External Stylesheet and Pseudo Classes.
9. Font properties. Border properties, Margin properties, Padding and Background properties.

JAVASCRIPT

10. Selection statements, switch statements and loop statements.
11. Pre-defined objects (Date, String, Math etc.,).
12. Functions.
13. Array object.
14. User-defined objects.
15. Pattern matching using regular expressions.
16. Handle various events occurred in the HTML document.
17. Positioning elements, moving elements, elements visibility, stacking elements and slow movement of elements.

PHP

18. Selection statements and loop statements.
19. Functions.
20. Arrays
21. Pattern matching.
22. Handling forms.
23. Access MYSQL database through PHP.

XML

24. Store the information in the XML Documents.
25. CSS style sheets for the XML documents.
26. XSLT style sheet for the XML documents.

Suggested Reading:

1. Robert W.Sebesta, "Programming the World Wide Web", 4th Edition, Pearson Education, 2008.
2. Thomas Powell, "HTML & XHTML: The Complete Reference", 4th Edition, Tata McGraw-Hill, 2003.
3. Thomas A Powell, Fritz Schneider, "JavaScript: The Complete Reference", 3rd Edition, Tata McGraw Hill, 2013.
4. Steven Holzner, "PHP: The Complete Reference", McGraw Hill Education, 2008.

CYBER SECURITY
(ELECTIVE-III)

20MCE109

Instruction	3L Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	60 Marks
Continuous Internal Evaluation	40 Marks
Credits	3

Course Outcomes:

After completion of the course, the students will be able to:

1. Identify different types of cybercrimes and analyze legal frameworks to deal with these cybercrimes.
2. Apply Tools used in cybercrimes and laws governing cyberspace.
3. Infer the features of Cryptography and Network Security.
4. Interpret the Cyber Laws and use them accordingly.
5. Identify the importance of digital evidence in prosecution.
6. Analyze and resolve cyber security issues.

UNIT - I

Introduction to Cyber Crime: Cyber Crime: Definition and Origins of the Word, Cyber crime and Information Security, Classification of Cyber Crimes, Cyber Crime: The Legal Perspective, Cyber Crime: An Indian Perspective, A Global Perspective of Cyber Crime.

UNIT-II

Cyber Offenses: Introduction, How Criminals plan the Attacks, Social Engineering, Cyber stalking, Cyber cafe and Cybercrimes, Botnets: The Fuel for Cybercrime, Attack Vector; **Tools and Methods Used in Cybercrime:** Introduction, Proxy Servers and Anonymizers, Phishing, Password Cracking, Keyloggers and Spywares, Virus and Worms, Trojan Horse and Backdoors, Steganography, DoS and DDoS attacks, SQL Injection, Buffer Overflow.

UNIT-III

Cryptography and Network Security: Introduction to Cryptography, Symmetric key Cryptography, Asymmetric key Cryptography, Message Authentication, Digital Signatures, Applications of Cryptography. Overview of Firewalls- Types of Firewalls, User Management, VPN Security Security Protocols: - security at the Application Layer- PGP and S/MIME, Security at Transport Layer- SSL and TLS, Security at Network Layer-IPSec.

UNIT-IV

Cyberspace and the Law: The Legal Perspectives**:** Cyber Crime and the Legal Landscape around the World, Need of Cyber laws: the Indian Context, The Indian IT Act, Challenges to Indian Law and Cyber Crime Scenario in India, Digital Signatures and the Indian IT Act, Cyber Crime and Punishment, Cyber Law, Technology and Students: The Indian Scenario.

UNIT-V

Cyber Forensics: Introduction ,Digital Forensics Science, Need for Computer Forensics, Cyber Forensics and Digital Evidence, Forensics Analysis of Email, Digital Forensics Life Cycle, Chain of Custody Concept, Network Forensics, Approaching a Cyber Forensics Investigation, Challenges in Computer Forensics.

Text Books:

1. Sunit Belpre and Nina Godbole, "Cyber Security: Understanding Cyber Crimes, Computer Forensics And Legal Perspectives", Wiley India Pvt., Ltd, 2011.
2. William Stallings, "Cryptography and Network Security Principals an Practice" 6th Edition, Pearson 2014

Suggested Reading:

1. Kevin Mandia, Chris Prosise, "Incident Response and computer forensics", Tata McGraw Hill, 2006.
2. Alfred Basta, Nadine Basta, Mary Brown, Ravinder Kumar, "Cyber Security and Cyber Laws", Paperback – 2018.
3. Mark F Grady, FransescoParisi, "The Law and Economics of Cyber Security", Cambridge university press, 2006.

SOCIAL NETWORK ANALYSIS
(ELECTIVE-III)

20MCE110

Instruction	3L Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	60 Marks
Continuous Internal Evaluation	40 Marks
Credits	3

Course Outcomes:

1. Understand the basic concepts of social networks
2. Understand the various Ranking Algorithms
3. Understand the fundamental concepts in analyzing the large-scale data that are derived from social networks
4. Implement mining algorithms for social networks
5. Perform mining on large social networks and illustrate the results.
6. Analysis of various opinions on social networks

UNIT I

Introduction to Social Network Mining: Graph Models and Node Metrics. Introduction to social network mining. Illustration of various social network mining tasks with real-world examples. Data characteristics unique to these settings and potential biases due to them. Social Networks as Graphs. Random graph models/ graph generators (Erd¨os-R´enyi, power law, preferential attachment, small world, stochastic block models, kronecker graphs), degree distributions. Models of evolving networks. Node based metrics, ranking algorithms (Pagerank). Gephi graph visualization and exploration software – practice.

UNIT II

Social-Network Graph Analysis: Social network exploration/ processing: graph kernels, graph classification, clustering of social-network graphs, centrality measures, community detection and mining, degeneracy (outlier detection and centrality), partitioning of graphs. SNAP system for large networks analysis and manipulation.

UNIT III

Social-Network Graph Analysis and Properties: Social network exploration/ processing and properties: Finding overlapping communities, similarity between graph nodes, counting triangles in graphs, neighborhood properties of graphs. Pregel paradigm and Apache Giraph graph processing system.

UNIT IV

Information Diffusion in Social Networks: Strategic network formation: game theoretic models for network creation/ user behavior in social networks. Information diffusion in graphs: Cascading behavior, spreading, epidemics, heterogeneous social network mining, influence maximization, outbreak detection. Opinion analysis on social networks: Contagion, opinion formation, coordination and cooperation.

UNIT V

Dynamic Social Networks: Applications and Research Trends. Dynamic social networks, Link prediction, Social learning on networks. Special issues in Information and Biological networks. Important applications of social network mining related to the above topics. Research trends.

Text books:

1. David Easley and Jon Kleinberg, Networks, crowds, and markets, Cambridge University Press, 2010.
2. Jure Leskovec, Anand Rajaraman and Jeffrey David Ullman, Mining of massive datasets, Cambridge University Press, 2014.
3. John Schermerhorn, Jr. James G. Hunt and Richard N. Osborn “Organizational Behavior”, 10th Edition, Wiley India, Edition. 2009.

BLOCKCHAIN TECHNOLOGY
(ELECTIVE-III)

20MCE111

Instruction	3L Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	60 Marks
Continuous Internal Evaluation	40 Marks
Credits	3

Course Outcomes:
After completion of the course, students will be able to:

1. Design principles of Bitcoin and Ethereum.
2. Explain the Simplified Payment Verification protocol.
3. List and describe differences between proof-of-work and proof-of-stake consensus.
4. Experiment with a blockchain system by sending and reading transactions.
5. Design, build, and deploy a distributed application.
6. Evaluate security, privacy, and efficiency of a given blockchain system.

UNIT I
Basics: Distributed Database, Two General Problem, Byzantine General problem and Fault Tolerance, Hadoop Distributed File System, Distributed Hash Table, ASIC resistance, Turing Complete. • Cryptography: Hash function, Digital Signature - ECDSA, Memory Hard Algorithm, Zero Knowledge Proof.

UNIT II
Blockchain: Introduction, Advantage over conventional distributed database, Blockchain Network, Mining Mechanism, Distributed Consensus, Merkle Patricia Tree, Gas Limit, Transactions and Fee, Anonymity, Reward, Chain Policy, Life of Blockchain application, Soft & Hard Fork, Private and Public blockchain.

UNIT III:
Distributed Consensus: Nakamoto consensus, Proof of Work, Proof of Stake, Proof of Burn, Difficulty Level, Sybil Attack, Energy utilization and alternate.

UNIT IV:
Cryptocurrency: History, Distributed Ledger, Bitcoin protocols - Mining strategy and rewards, Ethereum - Construction, DAO, Smart Contract, GHOST, Vulnerability, Attacks, Sidechain, Namecoin

UNIT V:
Cryptocurrency Regulation: Stakeholders, Roots of Bit coin, Legal Aspects-Crypto currency Exchange, Black Market and Global Economy. Applications: Internet of Things, Medical Record Management System, Domain Name Service and future of Blockchain.

Text Books:

1. Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller and Steven Goldfeder, Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction, Princeton University Press (July 19, 2016).

Suggested Readings:

1. Antonopoulos, “Mastering Bitcoin: Unlocking Digital Cryptocurrencies”.
2. Satoshi Nakamoto, “Bitcoin: A Peer-to-Peer Electronic Cash System”.
3. DR. Gavin Wood, “ETHEREUM: A Secure Decentralized Transaction Ledger”,Yellow Paper, 2014.
4. Nicola Atzei, Massimo Bartoletti, and TizianaCimoli, A survey of attacks on Ethereum smart contracts

DEEP LEARNING
(ELECTIVE-III)

20MCE112

Instruction	3L Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	60 Marks
Continuous Internal Evaluation	40 Marks
Credits	3

Course Outcomes:

After completion of the course the students will be able to:

1. Identify Suitable Neural Networks.
2. Train Neural Networks.
3. Find Local Minima for Optimization of Models.
4. Compare different Neural Networks.
5. Apply Convolutional Neural Networks.

UNIT-I

The Neural Network: Building Intelligent Machines, The Limits of Traditional Computer Programs, The Mechanics of Machine Learning , The Neuron, Expressing Linear Perceptrons as Neurons , Feed-Forward Neural Networks, Linear Neurons and Their Limitations, Sigmoid, Tanh, and ReLU Neurons, Softmax Output Layers.

UNIT-II

Training Feed-Forward Neural Networks: The Fast-Food Problem, Gradient Descent ,The Delta Rule and Learning Rates, Gradient Descent with Sigmoidal Neurons, The Backpropagation Algorithm, Stochastic and Minibatch Gradient Descent, Test Sets, Validation Sets, and Overfitting, Preventing Overfitting in Deep Neural Networks

UNIT-III

Implementing Neural Networks in TensorFlow: What Is TensorFlow? How Does TensorFlow Compare to Alternatives?, Installing TensorFlow, Creating and Manipulating TensorFlow Variables, TensorFlow Operations, Placeholder Tensors, Sessions in TensorFlow, Navigating Variable Scopes and Sharing Variables, Managing Models over the CPU and GPU, Specifying the Logistic Regression Model in TensorFlow, Logging and Training the Logistic Regression Model

UNIT- IV

Beyond Gradient Descent.: The Challenges with Gradient Descent, Local Minima in the Error Surfaces of Deep Networks, Model Identifiability, Local Minima in Deep Networks?, Flat Regions in the Error Surface, When the Gradient Points in the Wrong Direction, Momentum-Based Optimization, A Brief View of Second- Order Methods, Learning Rate Adaptation, AdaGrad—Accumulating Historical Gradients , RMSProp— Exponentially Weighted Moving Average of Gradients, Adam—Combining Momentum and RMSProp

UNIT – V

Convolutional Neural Networks: Neurons in Human Vision, The Shortcomings of Feature Selection, Filters and Feature Maps, Full Description of the Convolutional Layer, Max Pooling, Full Architectural Description of Convolution Networks, Closing the Loop on MNIST with Convolutional Networks, Image Preprocessing Pipelines Enable More Robust Models, Accelerating Training with Batch Normalization, Building a Convolutional Network for CIFAR-10, Visualizing Learning in Convolutional Networks.

Text Books:

1. Nikhil Buduma, “Fundamentals of Deep Learning”, O’reilly Publications, 2017.

Suggested Reading:

1. Ian Goodfellow, YoshuaBengio, “Aaron Courville, Deep Learning”, MIT Press, 2017.
2. Valentino Zocca, GianmarioSpacagna, Daniel Slater, Peter Roelants, Python Deep Learning, PACKT, 2017.

CYBER FORENSICS
(ELECTIVE-IV)

20MCE113

Instruction	3L Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	60 Marks
Continuous Internal Evaluation	40 Marks
Credits	3

Course Outcomes:

After completion of the course, students will be able to:

1. Understand the need and principles of digital forensics.
2. Summarize various digital investigation process models.
3. Illustration about digital forensic tools.
4. Obtain and analyze digital information for possible use as evidence in digital forensics process.
5. Understand about network basics for digital investigation.
6. Applying forensic science to computers and networks.

UNIT – I

Foundations of Digital Forensics: Digital Evidence, Principles of Digital Forensics, Challenging aspects of Digital Evidence - The Role of computers in crime, Cyber Crime Law.

UNIT – II

Digital Investigations: Digital Investigation process models, Applying Scientific method in Digital Investigations, Handling A digital Crime scene: Fundamental Principles, Surveying and Preserving Digital Investigation.

UNIT - III

The role of Computers in violent crime : Processing Digital crime scene, Investigative Reconstruction, Digital Evidence as Alibi.

UNIT - IV

Cyber stalking : Computer basics for Digital Forensics , Applying Forensics science to computers, Digital Evidence on windows systems, Digital Evidence on unix systems.

UNIT - V

Network Forensics: Networks basics for Digital Investigators, Applying Forensics science to networks, Digital Evidence on physical and data link layers, Digital Evidence on Network and Transport layers.

Text Books:

1. Eoghan Casey,"Digital Evidence and computer Crime", Academic Press 3rd Edition.
2. E. P. Dorothy,"Real Digital Forensics for Handheld Devices", Auerback Publications, 2013.

Suggested Reading:

1. J. Sammons, "The Basics of Digital Forensics: The Primer for Getting Started in Digital ForensicsSyngress", Publishing, 2012.
2. E. Casey, "Handbook of Digital Forensics and Investigation", Academic Press, 2010.

COMPUTER VISION
(ELECTIVE-IV)

20MCE114

Instruction	3L Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	60 Marks
Continuous Internal Evaluation	40 Marks
Credits	3

Course Outcomes:

After completion of the course the students will be able to:

1. Implement fundamental image processing techniques required for computer vision.
2. Apply Fourier transforms, Geometric Transformations.
3. Apply the feature extraction techniques for image description and recognition.
4. Identify computer vision techniques in various real-time interdisciplinary projects.
5. Understand various Image based rendering Techniques.

UNIT -I

Introduction: What is computer vision, A brief history, Image processing: Point operators. Linear filtering, More neighborhood operators, Fourier transforms, Pyramids and wavelets, Geometric transformations, Global optimization.

UNIT -II

Feature detection and matching: Points and patches, Edges, Lines, Feature-based alignment: 2D and 3D feature- based alignment, Pose estimation, Geometric intrinsic calibration.

UNIT -III

Image stitching: Motion models, Global alignment, Compositing, Dense motion estimation: Translational alignment, Parametric motion, Spline-based motion, Optical flow, Layered motion.

UNIT -IV

Structure from motion: Triangulation. Two-frame structure from motion, Factorization, Bundle adjustment, Constrained structure and motion, Recognition: Object detection, Face recognition, Instance recognition, Category recognition, Context and scene understanding.

UNIT -V

Stereo correspondence: Epipolar geometry, Sparse correspondence, Dense correspondence, Local methods, Global optimization, Multi-view stereo, Image-based rendering: View interpolation, View interpolation, Light fields and Lumigraphs, Environment mattes, Video-based rendering.

Text Books:

1. Richard Szeliski," Computer vision: Algorithm and Applications", Springer- Verlag, London, 2010.

Suggested Reading:

1. Sridhar, Digital Image processing, Oxford University Press, 2011.
2. David A. Forsyth and Jean Ponce, "Computer Vision: A Modern Approach", Prentice Hall, Pearson Education, 2nd Edition, 2012.

INTERNET OF THINGS
(ELECTIVE-IV)

20MCE115

Instruction	3L Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	60 Marks
Continuous Internal Evaluation	40 Marks
Credits	3

Course Outcomes:
After completion of the course the students will be able to:

1. Gain vision of IoT from a global context.
2. Determine the Market perspective of IoT and Domain Specific Applications
3. Understand the Architectural Overview of IoT
4. Determine the usage of Devices, Gateways and Data Management in IoT.
5. Examining state of the art architecture in IoT and Design Constraints

UNIT-I
M2M to IoT-The Vision-Introduction, From M2M to IoT, M2M towards IoT-the global context, A use case example, Differing Characteristics.**M2M to IoT – A Market Perspective**– Introduction, Some Definitions, M2M Value Chains, IoT Value Chains, An emerging industrial structure for IoT, The international driven global value chain and global information monopolies.

Unit-II
Domain Specific IOTs: Introduction, Home Automation, Cities, Environment, Energy, Retail, Logistics, Agriculture, Industry, Health and Lifestyle

UNIT-III
M2M to IoT-An Architectural Overview: Building an architecture, Main design principles and needed capabilities, An IoT architecture outline, standards considerations. **M2M and IoT Technology Fundamentals**- Devices and gateways, Local and wide area networking, Data Management.

UNIT-IV
M2M and IoT Technology Fundamentals: Business processes in IoT, Everything as a Service (XaaS), M2M and IoT Analytics, Knowledge Management. **IoT Architecture-State of the Art** – Introduction, State of the art, **Architecture Reference Model**-Introduction, Reference Model and Architecture, IoT Reference Model.

UNIT-V
IoT Reference Architecture: Introduction, Functional View, Information View, Deployment and operational View, Other Relevant architectural views. **Real-World Design Constraints-**Introduction, Technical Design constraints-hardware is popular again, Data representation and visualization, Interaction and remote control.

Text Books:

1. Jan Holler, VlasiosTsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle, "From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence", 1st Edition, Academic Press, 2014.
2. Vijay Madisetti and Arshdeep Bahga, "Internet of Things (A Hands-on-Approach)", 1stEdition, VPT, 2014.

Suggested Reading:

1. Francis daCosta, "Rethinking the Internet of Things: A Scalable Approach to Connecting Everything", 1st Edition, Apress Publications, 2013.
2. Hakim aChachi "Internet of Things (Connecting Objects)", Wiley – 2010.

NATURAL LANGUAGE PROCESSING
(ELECTIVE-IV)

20MCE116

Instruction	3L Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	60 Marks
Continuous Internal Evaluation	40 Marks
Credits	3

Course Outcomes:

After completion of the course the students will be able to:

1. Recognize the importance of Natural Language Processing in the current competitive world.
2. Examine distinct architectures of NLP systems.
3. Identify the basics of Parsing using Word level analysis.
4. Differentiate between syntactic and semantic analysis.
5. Outline the Machine Translation using different approaches.
6. Summarize basic operations in Natural Language Processing using Python.

UNIT – I

Introduction: What is NLP, Origin and Challenges of NLP, NLP applications, Language and Knowledge, Language and Grammar, Processing Indian Languages, Some successful early NLP systems. **Language Modeling:** Various Grammar-based Language Models, Statistical Language Model.

UNIT – II

Natural Language Generation: Introduction, Architectures of NLG Systems, Generation tasks and Representations. **Word Level Analysis:** Introduction, Regular Expressions, Morphological Parsing, Spelling Error detection and Correction, Words and Word Classes, Parts-of-Speech tagging.

UNIT – III

Syntactic Analysis: Introduction, Context Free Grammar, Parsing, Probabilistic parsing, Indian Languages.
Semantic Analysis: Meaning representation, Lexical Semantics, Ambiguity and Word Sense Disambiguation.

UNIT – IV

Machine Translation: Problems in Machine Translation, Characteristics of Indian Languages, Machine Translation Approaches – Direct, Rule-based, Corpus-based and Semantic (Knowledge) based Systems, Translations involving Indian Languages.

UNIT – V

NLP with Python: Overview of built-in Data Structures in Python – List, Tuple, Dictionary and Set, Introduction to Python nltk module, Word Tokenization, TF-IDF Vectors – Bag of Words, Vectorizing, Topic Modeling, From word counts to Topic scores.

Text Books:

1. Tanveer Siddiqui, U S Tiwary, "Natural language processing and information retrieval", Oxford University, New Delhi, Press, 2008.
2. Hobson Lane, Cole Howard, Hannes Max Hapke, "Natural Language Processing in Action Understanding, Analyzing, and Generating Text with Python", Manning Publications Co., 2019.

Suggested Reading:

1. Daniel Jurafsky& James H. Martin, "Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics, and Speech Recognition", Prentice Hall, PTR, 2007.
2. Steven Bird, Ewan Klein & Edward Loper, "Natural Language Processing with Python", O'Reilly Media Inc., 1st Edition, 2009.

MAJOR PROJECT WORK

20MCC121

Instruction	6 Hours per week
Semester End Examination	Viva Voce
Continuous Internal Evaluation	100 Marks
Semester End Examination	100 Marks
Credits	12

Course Outcomes:

After completion of the course the students would be able to:

1. Understand to capture project requirements from the client.
2. Analyze and implement software life cycle for the given requirements.
3. Design a real time solution for the given software requirement specifications.
4. Develop the solution for the chosen problem using the concepts and techniques in the curriculum.
5. Writes test cases and applies test case scenarios.
6. Record the entire development process of a particular problem.

Major Project Work has to be carried out by each student individually in a period of 15 weeks of duration. Students should submit a synopsis at the end of 2nd week in consultation with the Project Guide. The synopsis should consist of definition of the problem, scope of the problem and plan of action. After completion of 8 weeks students are required to present a Project Seminar on the topic covering the aspects of analysis, design and implementation of the project work to the committee consisting of two faculty members of MCA department in the college along with guide will evaluate the project and award internal marks. At the end of the semester the students are required to present their project work before the External Committee for Vive-Voce examination, in which each student will be awarded with marks.