SUB	SUB CODE	MAX. MARKS	MIN. MARKS
Engineering Mathematics II	**IT-301**	**S-40, T-60**	**S-20,T-20**

Course Objective:

The objective of this course is to familiarize the prospective engineers with techniques in multivariate integration, ordinary and partial differential equations and complex variables. It aims to equip the students to deal with advanced level of mathematics and applications that would be essential for their disciplines.

Course Contents:

Unit1: Multivariable Calculus (Integration):

Multiple Integration: Double integrals (Cartesian), change of order of integration in double integrals, Change of variables (Cartesian to polar), Applications: areas and volumes, Center of mass and Gravity (constant and variable densities); Triple integrals (Cartesian), orthogonal curvilinear coordinates, Simple applications involving cubes, sphere and rectangular parallelepipeds; Scalar line integrals, vector line integrals, scalar surface integrals, vector surface integrals, Theorems of Green, Gauss and Stokes.

Unit 2: First order ordinary differential equations:

Exact, linear and Bernoulli's equations, Euler's equations, Equations not of first degree equations solvable for p, equations solvable for y, equations solvable for x and Clairaut's type.

Unit 3: Ordinary differential equations of higher orders:

Second order linear differential equations with variable coefficients, method of variation of parameters, Cauchy-Euler equation; Power series solutions; Legendre polynomials, Bessel functions of the first kind and their properties.

Unit 4: Complex Variable – Differentiation:

Differentiation, Cauchy-Riemann equations, analytic functions, harmonic functions, finding harmonic conjugate; elementary analytic functions (exponential, trigonometric, logarithm) and their properties; Conformal mappings, Mobius transformations and their properties.

Unit 5: Complex Variable – Integration:

Contour integrals, Cauchy-Goursat theorem (without proof), Cauchy Integral formula (without proof), Liouville's theorem and Maximum-Modulus theorem (without proof); Taylor's series, zeros of analytic functions, singularities, Laurent's series; Residues, Cauchy Residue theorem (without proof), Evaluation of definite integral involving sine and cosine, Evaluation of certain improper integrals using the Bromwich contour.

Course Outcomes:

After Completion of the course, the students will learn

1. The mathematical tools needed in evaluating multiple integrals and their usage.
2. The effective mathematical tools for the solutions of differential equations that model physical processes.
3. The tools of differentiation and integration of functions of a complex variable that are used in various techniques dealing engineering problems.

Suggested Text/Reference Books

(i) G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.

(ii) Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.

(iii) W. E. Boyce and R. C. DiPrima, Elementary Differential Equations and Boundary Value Problems, 9th Edn., Wiley India, 2009.

(iv) S. L. Ross, Differential Equations, 3rd Ed., Wiley India, 1984.

(v) E. A. Coddington, An Introduction to Ordinary Differential Equations, Prentice Hall India, 1995.

(vi) E. L. Ince, Ordinary Differential Equations, Dover Publications, 1958.

(vii) J. W. Brown and R. V. Churchill, Complex Variables and Applications, 7th Ed., Mc-Graw Hill, 2004.

(viii) N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.

(ix) B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.

SUB	SUB CODE	MAX. MARKS	MIN. MARKS
Industrial Economics & Business Organization (IEBO)	**IT-302**	**S-40, T-60**	**S-20,T-20**

Course Objective:

Its aim is to familiarize students with a broad range of the methods and models applied by economists in the analysis of firms and industries. A broader goal is that students who take the course will, by working extensively with theoretical models, acquire analytical and managerial skills that are transferable to other kinds of intellectual problems faced day to day at the shop floor under the impact of dynamic global scenario.

Course Contents:

Unit-I INTRODUCTION TO ECONOMICS

Introduction to economics, its importance, approaches and uses of study, engineering and economics, Economic problems, Economic good and Wealth, Demand and supply. Competition, Monopoly, Theory of firm, Money and its function, theory of money and choice, bank and its functions, employment and income, gross national product, net national product-consumption, savings and investment.

Unit-II FEATURES OF INDIAN ECONOMY

Broad features of Indian economy, Natural resources and economic development, infrastructure in the Indian economy, Agricultural development, Green revolution, Population, Population theories, Unemployment, Poverty, and balanced regional development, Economic growth and economic development, Indian Industries, Industrial policy, Industrialization in India, Role, Plan and pattern of industrialization, Public Vs private Sectors, Economic reforms in India, India's five year plans.

Unit-III INDIAN ECONOMY & GLOBAL TRANSACTIONS

The indigenous and modern banking system in India, Reserve Bank of India, Monetary and Fiscal policies, Financial Institutions and SEBI, Free Trade and protection, India's Foreign Trade and WTO, balance of payments, Indian currency system and foreign exchange, Foreign Capital Investment, Foreign aid and FEMA.

Unit-IV INTRODUCTION TO BUSINESS ORGANIZATION

Concept nature and scope of business, business and its environment, economic, legal social and political environment of business, business ethics. Forms of business organization- Types and their functions, roles and responsibilities, HUF, Partnership, Joint Stock Companies, Private and Public Limited companies

Cooperatives, Joint stock and public sector, Entrepreneurship, promoters and financial Institutions, concept of business growth, profit maximization V s social responsibility, role and problems of small business, Joint Ventures, multinationals.

Unit-V INTRODUCTION TO MANAGEMENT

Evolution, development and modern philosophy, management in India, Scientific management, Rationalization and quality circles. Principles of management- Nature and function of management, Management By Objectives (MBO) and management by Exception (MBE)- Importance, characteristics, applications, Management theory Jungle, Schools of Management thought, Management Information Systems(MIS).

Course outcome:

Upon completion of the course students should:

1. Understand basic models of the behaviour of firms and industrial organization and how they can be applied to policy issues.
2. Be able to manipulate these models and be able to solve analytically problems relating to industrial economics. Be able to apply the models to important policy areas while being aware of the limitations of the theory.
3. Be familiar with the history of competition policy and some important business regulations.
4. Be familiar with the functioning of different experimental market institutions and the key results of these experiments

BOOKS:

1. Indian economy: Rudder dutt & KPM Sundaram.
2. Indian economy: A.N. Agrawal
3. Managerial Economics: Joel Dean.
4. Organization & Management: Koontz, O'Donnel.
5. Essentials of Management: Koontz, O'Donnel
6. Principles & practice of Management: Chhabra & singh

SUB	SUB CODE	MAX. MARKS	MIN. MARKS
Digital Electronics	**IT-303**	**S-40, T-60**	**S-20,T-20**

Course Objective:

1. Concept understanding: Number System, Logic Gates,
2. Concept & Implementation of combinational & Sequential Circuits
3. Introduction to Logic families

Course Contents:

Unit. I.

Number system & Boolean algebra, number systems: Binary, Arithmetic, octal, Hexadecimal & radix conversion. Binary codes: BCD, excess three, gray, display ASCII, EBDCIC, Parity check codes, code conversion, Boolean algebra: theorems, Introduction to logic gates, NANPNOR realization, Boolean laws & theorems.

Unit. II.

Simplification of Boolean expression, sum of product & product of sum forms, concept of min terms & max terms, minimization techniques, karnaugh's MAP method, Tabulation method.

Unit III.

Combinational circuits & flip flops half adder, full adder, subs tractor, BCD adder, multiplexer & de-multiplexer, encoder & decoder circuits. FLIP-FLOPS: RS, clocked RS, T, D, JK, master slave JK.

Unit. IV.

Sequential circuits, elements of sequential switching circuits, synchronous & asynchronous systems, binary ripple, counter, BCD counter, UP-down counter, Shift requesters, series parallel shift registers shift left & shift right operation, Johnson & ring counter.

Unit V.

Design of sequential circuits, State diagram, State table, State assignment, characterizing equation & definition of synchronous sequential machines, mealy & moore model machines, state table & transition diagram, Introduction to logic families, RTL, DTL, all types of TIL, ECL, NMOS, NCMOS, logic etc.

Course outcome:

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

- Learn about number system used to represent numbers in computer
- Study of digital logic gates and their implementation
- Learn the implementation of various combinational circuit e.g. multiplexer, decoder, parallel adder and subtracted.
- Study and implementation of sequential circuit.

Books:

1) Digital logic and computer design by Moris Mano

2) Digital principles & application A.Paul Malvino & Donald. P. Leach

SUB	SUB CODE	MAX. MARKS	MIN. MARKS
OOPS Methodology, Analysis and Design	**IT-304**	**S-40, T-60**	**S-20,T-20**

Course Objective:

1. Concept of Object Oriented Programming
2. Object Oriented Programming approach in C++

Course Contents:

Unit I

Objects, Objects as software modules, Objects interaction , Classes, method lookup, hierarchies of classes , inheritance , polymorphism, abstract classes .

Unit II

Identifying objects and Classes , representation of objects , association with objects, aggregate components of objects.

Unit III

Object oriented programming languages class declarations object declaration, mandatory profiles message sending association recursive association , many to many association .argument passing .

Unit IV

Inherited methods, redefined methods , the protected interface, abstract base classes. Public and protected properties, private operations disinheritance, multiple inheritance.

Unit V

Overview of C++ as object oriented programming language, loops, decision, structures and functions, arrays and pointers, virtual function, files and stream.

Course outcome:

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

- Understand the difference between the top-down and bottom-up approach
- Describe the object-oriented programming approach in connection with C++
- Apply the concepts of object-oriented programming
- Apply virtual and pure virtual function & complex programming situations

Books:

1. Object oriented programming in C++ by Robert Lafore.

2. Object oriented programming with C++ by David parsons.

3. Object oriented design with C++ by Ken Barclay

SUB	SUB CODE	MAX. MARKS	MIN. MARKS
Data Structure	**IT-305**	**S-40, T-60**	**S-20,T-20**

Course Objectives:

1. To provide the knowledge of basic data structures and their implementations.
2. To understand importance of data structures in context of writing efficient programs.
3. To develop skills to apply appropriate data structures in problem solving.

Course Contents:

UNIT-I Arrays and List: Array: Definition, Representation, Address Calculation; Searching: Linear search, Binary search; Sorting: Bubble sort, Insertion sort, Selection sort, Radix sort, Shell sort; List: Introduction, Implementation as Linked list, Circular linked List, Doubly linked list, Applications of linked list.

Unit-II Stacks: Definition, Representations : static and dynamic, Implementation of stack, Applications of stack: Polish notation representation and conversion, Tower of Honoi problem, Implementation of recursion, Quick sort and Merge sort.

Unit-III Queues and Hashing: Definition, Representations, Static and dynamic, Circular Queue, Double ended Queue, Priority Queue, applications of queues. Hash Structures: Representation, Search and Implementation and other issues.

Unit-IV Trees: Definition, Basic terminology, Binary tree, Complete Binary Tree, representations: Static and dynamic, Traversal techniques in binary tree, Heap tree & its applications, Binary Search tree, AVL tree, M-way search trees, B-tree & its variations.

Unit-V Graphs: Definition, Basic terminology, Graph Types, Representations: static, dynamic; Implementations, Searching in graphs – BFS, DFS, Shortest path in graphs, Applications.

Course Outcomes:

1. Learn the basic types for data structure, implementation and application.
2. Know the strength and weakness of different data structures.
3. Use the appropriate data structure in context of solution of given problem..
4. Develop programming skills which require to solve given problem.

Books :

[1] E. Horowitz & Sahni,Fundamental Data Structure, Galgotia Book Source, 1983.
[2] A. Tannenbaum, Data Structure Using C, Pearson Education, 2003.
[3] Kruz, Data Structure and Programming Design, 1987.
[4] N. Wirth, Algorithms +Data Structure = Program, Prentice Hall of India, 1979.
[5] Goodrich & Tamassia, Data Structures and Algorithms in C++, 2nd Edition, John Wiley & Sons, 2011.

SUB	SUB CODE	MAX. MARKS	MIN. MARKS
Digital Electronics Lab	**IT-306**	**S-40, P-60**	**S-20,P-20**

Course Objective :

Realization/Verification of digital concepts learnt in the theory subjects.

Course Contents:

1. Realization of basic and universal logic gates using ICS 7400, 7432, 7402, 7408, 7486, 7404.
2. Realization of NOT, OR, AND, NOR, XOR, XNOR using NAND.
3. Realization of NOT, OR, AND, NAND, XOR, XNOR using NOR.
4. Realization of half adder and full adder.
5. Verification of Demorgan's theorem.
6. Simplify the Boolean expression using Boolean algebra and verify.
7. Verification of TT of 4:1 mux & 1:4 demux using IC's

Course Outcome:

Students will learn and understand the Basics of digital electronics and able to design basic logic circuits, combinational and sequential circuits.

SUB	SUB CODE	MAX. MARKS	MIN. MARKS
OOPS Lab	**IT-307**	**S-40, P-60**	**S-20,P-20**

Course Objectives:

- To make the student learn a object oriented way of solving problems.
- To teach the student to write programs in Java to solve the problems

Course Contents:

1. Simple C++ programs to implement various control structures.
a. if statement
b. switch case statement and do while loop
c. for loop
d. while loop
2. Programs to understand structure & unions.
a. structure
b. union
3. Programs to understand pointer arithmetic.
4. Functions & Recursion.
a. recursion b. function
5. Inline functions.
6. Programs to understand different function call mechanism.
a. call by reference b. call by value
7. Programs to understand storage specifiers.
8. Constructors & destructors.
9. Use of "this" pointer using class
10. Programs to implement inheritance and function overriding.
a. multiple inheritance –access Specifiers
b. hierarchical inheritance – function overriding /virtual Function
11. Programs to overload unary & binary operators as member function &non member function.
a. unary operator as member function
b. binary operator as non-member function
12. Programs to understand friend function & friend Class.
a. friend Function b. friend class
13. Programs on class templates

Course Outcomes:

Student will be able to

- Use basic I/O to communicate with the user to populate variables and control program flow.
- Use arithmetic, logical, relational, and string manipulation expressions to process data.
- Write a complete class definition with in the class definition, write class and instance methods including the constructor and overloaded methods.
- Implement appropriate program design using good programming style. Conceptualize, Analyze and write programs to solve more complicated problems using the concepts of Object Oriented and C++.
- Apply validation techniques to build a reliable solution to a given problem. Apply all the programming concepts as and when required in the future application development.

Books:

1. Object oriented programming in C++ by Robert Lafore.

2. Object oriented programming with C++ by David parsons.

3. Object oriented design with C++ by Ken Barclay

SUB	SUB CODE	MAX. MARKS	MIN. MARKS
Data Structure Lab	**IT-308**	**S-40, P-60**	**S-20,P-20**

Course Objectives:

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

Course Contents:

1. Design and Implement List data structure using i) array ii) singly linked list.
2. Design and Implement basic operations on doubly linked list.
3. Design and Implement stack using i) array ii) singly linked list
4. Design and Implement Queue using i) array ii) singly linked list
5. Design and Implement basic operations on Circular Queue
6. Design and Implement basic operations(insertion, deletion, search, findmin and findmax) on Binary Search trees.
7. Implementation of Breadth First Search Techniques.
8. Implementation of Depth First Search Techniques.
9. Implementation of Dijkstra's Algorithm.
10. Implementation of Kruskal's Algorithm.
11. Implementation of Merge Sort.
12. Implementation of Binary Search using arrays.

Course Outcomes:

At the end of this lab session, the student will

· Be able to design and analyze the time and space efficiency of the data structure

·Be capable to identity the appropriate data structure for given problem · Have practical knowledge on the applications of data structures

Books

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India.
2. E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill.
3. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill.
4. Seymour Lipschutz, Data Structures, Schaum's Outlines Series, Tata McGraw-Hill.
5. Ellis Horowitz, Satraj Sahni and Susan Anderson-Freed, Fundamentals of Data Structures in C, W. H. Freeman and Company.
6. R. G. Dromey, How to Solve it by Computer, Prentice-Hall of India

SUB	SUB CODE	MAX. MARKS	MIN. MARKS
Software Lab I	**IT-309**	**S-40, P-60**	**S-20,P-20**

Course Objective:

- To understand the various steps in Program development.
- To understand the basic concepts in C Programming Language.
- To learn how to write modular and readable C Programs
- To learn to write programs (using structured programming approach) in C to solve problems.

Course Contents:

C Basic Declaration & Expressions

Write a C program to print your name, date of birth. and mobile number
Write a C program to print a block F using hash (#), where the F has a height of six characters and width of five and four characters. And also to print a big 'C'.
Write a C program to convert specified days into years, weeks and days.
Write a C program to calculate the distance between the two points.
Write a C program that prints all even numbers between 1 and 50 (inclusive).
Write a C program to print a number, it's square and cube in a line, starting from 1 and print n lines. Accept number of lines (n, integer) from the user.

C Variable Type

Write a C program to generate a random number.
Write a C program to sort the elements of an array.
Write a C program to allocate a block of memory for an array.
Write a C program to convert a string to an integer.

C Basic Input Output Statement

Write a program that converts Centigrade to Fahrenheit.
Write a C program that takes hours and minutes as input, and calculates the total number of minutes.
Write a C program to perform addition, subtraction, multiplication and division of two numbers.
Write a C program to find the third angle of a triangle if two angles are given.

C Conditional Statement

Write a C program to find whether a given year is a leap year or not.
Write a C program to read the age of a candidate and determine whether it is eligible for casting his/her own vote.
Write a C program to read roll no, name and marks of three subjects and calculate the total, percentage and division.

C For Loop

Write a C program to find the sum of first 10 natural numbers.
Write a program in C to display the multiplication table of a given integer.
Write a program in C to display the pattern like right angle triangle using an asterisk.

C Array

Write a program in C to read n number of values in an array and display it in reverse order.
Write a program in C to merge two arrays of same size sorted in descending order.

C Pointer

Write a program in C to add two numbers using pointers.
Write a program in C to print all permutations of a given string using pointers.

C String

Write a program in C to count total number of alphabets, digits and special characters in a string.
Write a program in C to count total number of vowel or consonant in a string.

C Programming Mathematics

Write a C program to check whether an integer is a palindrome or not. An integer is a palindrome when it reads the same forward as backward.
Write a C program to divide two integers (dividend and divisor) without using multiplication, division and mod operator.

C Recursion

Write a program in C to Print Fibonacci Series using recursion.
Write a program in C to find the Factorial of a number using recursion.

C File Handling

Write a program in C to read an existing file.
Write a program in C to write multiple lines in a text file.

Course outcome:

1. Acquire logical thinking, Implement the algorithms and analyze their complexity, Identify the correct and efficient ways of solving problems.
2. Implement real time applications using the power of C language features.

Books

TEXT BOOKS

1. Computer Science: A Structured Programming Approach Using C, B.A.Forouzan and R.F. Gilberg, Third Edition, Cengage Learning.
2. Programming in C. P. Dey and M Ghosh , Oxford University Press.

REFERENCE BOOKS

1. C for All, S. Thamarai Selvi, R.Murugesan, Anuradha Publications.
2. Problem Solving and Program Design in C, J.R. Hanly and E.B. Koffman, 7th Edition, Pearson education.
3. Programming in C, Ajay Mittal, Pearson.
4. Problem solving with C, M.T.Somasekhara, PHI
5. Programming with C, R.S.Bickar, Universities Press.
6. Computer Programming & Data Structures, E.Balagurusamy, 4th edition, TMH.
7. Programming in C – Stephen G. Kochan, III Edition, Pearson Education.
8. The C Programming Language, B.W. Kernighan and Dennis M.Ritchie, PHI.
9. C Programming with problem solving, J.A. Jones & K. Harrow,Dreamtech Press.

SUB	SUB CODE	MAX. MARKS	MIN. MARKS
Seminar	**IT-310**	**S-100**	**S-50**

Course Objective :

To develop
1. Presentation Skills
2. Technical skills
3. Research Skills

Course Contents:

1. Presentation on latest Technology
2. Group Activities (Quizzes & Group Discussion)
3. Expert Lectures

SUB	SUB CODE	MAX. MARKS	MIN. MARKS
Environmental Engineering(MC1)	**IT-311**	**-**	**-**

Course Objective:

The aim of this course is to make students aware of the Ecosystem, Environment related problems and their solutions.

Course Contents:

Unit I Environmental problem and issues:

Ecosystem, global warming, Green House effect, Depletion of ozone layer, Human activity and meteorology. Genetic and plant biodiversity, EL-Nino phenomenon and its effects. Explosion of environmental issues, land and soil pollution.

Unit II. Aquatic Environment:

Standard of water for different uses DOB.O.D. and C.O.D. characteristics sewage & disposal, Water pollution, Sources and effects, and inorganic water pollutants. Introduction of domestic and industrial waste water treatment, basic concepts aerobic and anaerobic treatment process.

Unit III Air Pollution:

Introduction, structure of the atmosphere, chemical and photochemical reactions in the atmosphere, effects of air, pollution sources & classification of air pollutions harmful effects of Co_1 Co_2 CH_4 SO_X NoX H_2 S Ozone & particulate, Basic concepts for air sampling techniques, Photochemical Smog, Acid Rain.

Unit IV Noise Pollution and radioactive Pollution:

Noise pollution- general introduction of noise pollution and its effects, sound unwanted from of noise changers, traffic noise prediction and control, radioactive waste sources characteristics and disposal. Solid and Hazardous waste management sources types and composition of solid waste physical, chemical Biological characteristics, disposal of solid waste.

Unit V Collection of Data:

Introduction and concepts of initial environmental examination (IEE), Environmental Impact Assessment EIA, Environmental Impact statement (EIS), environmental Audit EA Risk Assessment (RA) etc.

Course Outcome:

- Identify environmental problems arising due to engineering and technological activities and the science behind those problems.
- Estimate the population - economic growth, energy requirement and demand.
- Analyses material balance for different environmental systems.
- Realize the importance of ecosystem and biodiversity for maintaining ecological balance.
- Identify the major pollutants and abatement devices for environmental management and sustainable development

Reference Books:

1. Chemistry in Engineering & technology vol-II Tata MC Graw
2. Chemistry of environmental Engineering S awyer and Parkin – Mc Graw Hill international
3. "Environmental by A.K. De, Wiley eastern limited, new delhi.
4. "Environmental pollution monition and conform khopkar S.M. New age international pub.
5. S.R. Khirsagar Sewage and Sewage treatment
6. D.N. May _ Nandbook of Noise assessment Van Nostrand.
7. Introduction to Environmental Engineering & Science – gillberd M. Masters, PHI,

SUB	SUB CODE	MAX. MARKS	MIN. MARKS
Numerical Analysis	**IT-401**	**S-40, T-60**	**S-20,T-20**

Course Objective:

To provide the numerical methods of solving the non-linear equations, interpolation, differentiation, and integration. To improve the student's skills in numerical methods by using the numerical analysis software and computer facilities.

Course Contents:

Unit I

Different types of errors : Relative error , absolute error , truncation error , round off error etc, estimate of error . Solution of Transcendental and polynomial functions, methods of regula falsi , secant , bisection , successive approximation and Newton – Raphson and order of convergence of these methods.

Unit II

Interpolation and Numerical Differentiation: Polynomial interpolation with equal and unequal step size (e.g. Newton's, Gausses, Stirling's, Bessel's, Everett's, etc. formulas) and their error terms. Numerical differentiation with error terms. Spline interpolation (Cubic Splines).

Unit III

Solution of eigen value problem , Linear Simultaneous equations, Chole-sky's method, iterative method (Gauss Seidel method). Convergence and stability of the methods. Second, third and Runge-Kutt methods.

Unit IV

Numerical Integration: Trapezoidal rule , Simpson's 1/3 rule , Simpson's 3/8 rule , Boole's and Weddle's rule.

Unit V

Use of cubic spline, Gausian Integration and their error terms. Ordinary differential equations: Euler's method , multi step predictor corrector methods (Adam and Milne's method) .

Course Outcome:

On completion of this course, student will be able to

- Apply Numerical analysis which has enormous application in the field of Science and some fields of Engineering.
- Be familiar with finite precision computation.
- Be familiar with numerical solutions of nonlinear equations in a single variable.
- Be familiar with numerical integration and differentiation, numerical solution of ordinary differential equations.
- Be familiar with calculation and interpretation of errors in numerical method.

Books :

1. Engineering Mathematics by H. K. Dass
2. Numerical Analysis – Gupta and Malik
3. Numerical Methods in Engineering and Science – Dr. B. S. Grewal
4. Numerical Analysis – P. Kandasamy

SUB	SUB CODE	MAX. MARKS	MIN. MARKS
Discrete Structures	**IT-402**	**S-40, T-60**	**S-20,T-20**

Course Objective:

1. To develop logical thinking and its application to computer science

2. To emphasize the importance of proving statements correctly and de-emphasize the hand-waving approach towards correctness of
an argument.

The subject enhances one's ability to reason and ability to present a coherent and mathematically accurate argument.

Course Contents:

Unit I

Sets, relations, and functions: Basic operations on sets, Cartesian products, disjoint union (sum), and power sets. Different types of relations, their compositions and inverses. Different types of functions, their compositions and inverses. Arbitrary union, intersection and product.

Unit II

Propositional Logic: Syntax and semantics, proof systems, satisfiability, validity, soundness, completeness, deduction theorem, etc. Decision problems of propositional logic. Introduction to first order logic and first order theory -- set theory, axiom of choice. Size of a set: Finite and infinite sets, countable and uncountables, Cantor's diagonal argument and power set theorem, non-computability of all number theoretic functions.

Unit III

Partially ordered sets: Complete partial ordering, chain, lattice. Complete, distributive, modular, and complemented lattices. Boolean and pseudo-Boolean lattices. Different sublattices, monotone map and morphisms, quotient structures, filters. Tarski's fixed points theorem.

Unit IV

Algebraic Structures: Algebraic structures with one binary operation -- semigroup, monoid and group. Congruence relation and quotient structures. Morphisms. Free and cyclic monoids and groups. Permutation group. Substructures, normal subgroup. Error correcting code. Algebric structures with two binary operations- ring, integral domain and field. Boolean algebra and Boolean ring.

Unit- V

Introduction to Counting: Basic counting techniques -- inclusion and exclusion, pigeon-hole principle, permutation, combination, summations. Introduction to recurrence relation and generating function. Introduction to Graph: Graphs and their basic properties -- degree, path, cycle, subgraph, isomorphism, Eulerian and Hamiltonian walk, graph colouring, planar graph, trees.

Course Outcomes:

After completing this course satisfactorily, a student will:
1) Be able to construct simple mathematical proofs and possess the ability to verify them

2) Have substantial experience to comprehend formal logical arguments

3) Be skillful in expressing mathematical properties formally via the formal language of propositional logic and predicate logic

4) Be able to specify and manipulate basic mathematical objects such as sets, functions, and relations and will also be able to verify simple mathematical properties that these objects possess

Books:

1. R. M. Smullyan. First Order Logic , Springer Verlag, 1968.
2. J. B. Fraleigh. A First Course in Abstract Algebra , Narosa, 1990.
3. C. L. Liu. Introduction to Combinatorial Mathematics , McGraw Hill, 1968.

SUB	SUB CODE	MAX. MARKS	MIN. MARKS
Computer Architecture	**IT-403**	**S-40, T-60**	**S-20,T-20**

Course Objective :

The purpose of this subject is to cover the underlying concepts and techniques used in Computer Architecture.

Course Contents :

Unit I :

Introduction to computer organizations and architecture, computer system components, bus organized computer, memory address register, data register, program counter, accumulator, instruction register. Instructions fetch. Decoding and execution. Instruction formats and addressing modes, instruction set design issues, micro operations. Register transfer language.

Unit II :

Control unit organization. Instruction sequencing, instruction interpretation. Hardwired control and micro programmed control organization, control memory, address sequencing, microinstruction formats, micro program sequencer, microprogramming, microinstruction encoding, horizontal and vertical micro instructing.

Unit III :

Arithmetic and logic unit design. Addition and subtraction algorithm. Multiplication algorithm. Division algorithm. Floating point arithmetic. Processor. Configuration, instruction pipelining, branch handling, CISC and RISC architecture features, superscalar architecture.

Unit IV:

Input- output organization, programmed I.O. I/O addressing, I/O instruction. Synchronizations. I/O interfacing, standard I/O interfaces interrupt mechanism, DMA I/O processors and data communication.

Unit V :

Memory organization and multiprocessing basic concepts and terminology. Memory hierarchy, semiconductor memories (RAM, ROM) virtual memory. Cache memory, Associative memory, memory allocation and management policies, structure of multiprocessor.

COURSE OUTCOMES:

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

1. Understand the theory and architecture of central processing unit.
2. Analyse some of the design issues in terms of speed, technology, cost, performance.
3. Understand the architecture and functionality of central processing unit.
4. Exemplify in a better way the I/O and memory organization.

Books:-

1. Computer Organization and Architecture Design and Performance by William Stalling
2. Computer Architecture and Organization by John P. Hayes
3. Computer Architecture and Organization by M. Morris Mano.

SUB	SUB CODE	MAX. MARKS	MIN. MARKS
Database Management System	**IT-404**	**S-40, T-60**	**S-20,T-20**

Course Objective :

The objective of the course is to present an introduction to database management systems, with an emphasis on how to organize, maintain and retrieve - efficiently, and effectively - information from a DBMS

.

Course Contents :

UNIT I

DBMS concepts and architecture: Introduction, review of file organization techniques, database approach v/s traditional file accessing approach, advantages of database systems, data models, schemas and instances, database languages and interface, initial conceptual design of database, DBMS Architecture database system utilities, data independence, functions of DBA and designer.

UNIT II

Entities attributes, entity types, value sets, key attributes, relationships, defining the E-R design of database. Various data models: Relational data models: Domains, tuples, attributes, relations, characteristics of relations, key attributes of relations, relational database, schemas, integrity constraints, update operations on relations. Hierarchical data model: Hierarchical database structures, Integrity constraints, data definition and manipulation in hierarchical model. Network data model: Records, record types and data items, set types and set instances, constraint on set membership, representation of set instances, special types of sets, DBTG proposal and implementation.

UNIT III

Relational algebra and relational calculus: Relational algebra operations like select, project, join, division, outer join, outer union etc., insertion, deletion and modification anomalies. Data definition in SQL, queries, update statements and views in SQL. QUEL and QBE, data and storage definition, data retrieval queries and update statements etc.

UNIT IV

Database Design : Introduction to normalization, normal forms, functional dependency, decomposition, dependency preservation and lossless join, problems with null valued and dangling tuples, multivalued dependencies, inclusion and template dependencies.

UNIT V

Distributed databases, protection , security and integrity constraints, concurrent operations on databases, recovery, transaction processing, database machines. Comparison of various database models, comparison of some existing DBMS.

Course Outcomes :

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

1. List and explain the fundamental concepts of a relational database system.
2. Utilize a wide range of features available in a DBMS package.
3. Analyse database requirements and determine the entities involved in the system and their relationship to one another.
4. Develop the logical design of the database using data modelling concepts such as entity-relationship diagrams.
5. Create a relational database using a relational database package.
6. Manipulate a database using SQL.
7. Assess the quality and ease of use of data modelling and diagramming tools.

Books :

1. Database Management System by Gerald V. Post
2. Database Management System by Raghu Ramakrishnan
3. Fundamentals of Database System – Navathe

SUB	SUB CODE	MAX. MARKS	MIN. MARKS
Theory of Computation	**IT-405**	**S-40, T-60**	**S-20,T-20**

Course Objectives:

1) Introduce students to the mathematical foundations of computation including automata theory; the theory of formal languages and grammars; the notions of algorithm, decidability, complexity, and computability.

2) Enhance/develop students' ability to understand and conduct mathematical proofs for computation and algorithms.

Course Contents:

Unit I :

Automata: Basic machine, FSM , Transition graph, Transition matrix, Deterministic and nondeterministic FSM'S, Equivalence of DFA and NDFA, Mealy & Moore machines, minimization of finite automata, Two-way finite automata. Regular Sets and Regular Grammars: Alphabet, words, Operations, Regular sets, Finite automata and regular expression, Myhill- Nerode theorem Pumping lemma and regular sets, Application of pumping lemma, closure properties of regular sets

UNIT II:

Context –Free Grammars: Introduction to CFG, Regular Grammars, Derivation trees and Ambiguity, Simplification of Context free grammars, Normal Forms (Chomsky Normal Form and Greibach Normal forms).

UNIT III:

Pushdown Automata: Definition of PDA, Deterministic Pushdown Automata, PDA corresponding to given CFG, CFG corresponding to a given PDA. Context Free Languages: The pumping lemma for CFL's, Closure properties of CFL's, Decision problems involving CFL's.

UNIT IV:

Turing Machines: Introduction, TM model, representation and languages acceptability of TM Design of TM, Universal TM & Other modification, Church's hypothesis, composite & iterated TM. Turing machine as enumerators. Properties of recursive & recursively enumerable languages, Universal Turing machine

UNIT V:
Tractable and Un-tractable Problems: P, NP, NP complete and NP hard problems, examples of these problems like satisfy ability problems, vertex cover problem, Hamiltonian path problem, traveling sales man problem, Partition problem etc. Suggested Reading:

Course Outcomes :

1. Explain the models of computation, including formal languages, grammars and automata, and their connections.
2. Analyse and design finite automata, pushdown automata, Turing machines, formal languages, and grammars.

Suggested Books:

1. John C. Martin, “Introduction to languages & the theory of Computation” TNM.
2. Peter Linz, “An Introduction to formal languages & automata” Narosa Publication House.
3. Z. Kovahi “Switching & Finite Automata Theory” McGraw Hill.
4. M.A. Harrison “Introduction to Formal Langues Theory” Addison Wesley.
5. J.E. Hopcroft & J.D. Ullman “Introduction automata theory languages & computation” Addison Wesley.

SUB	SUB CODE	MAX. MARKS	MIN. MARKS
Soft Skills Lab	**IT-406**	**S-40, P-60**	**S-20,P-20**

COURSE OBJECTIVE:

1. Course aims at thorough understanding of the fundamental soft skills and of their practical social and workplace usage.

2. It helps participants to communicate effectively and to carry themselves confidently and in harmony with the surroundings.

3. They also learn how to identify and overcome the barriers in interpersonal relationships, and to employ oral and written communication, teamwork, leadership, problem-solving and decision-making skills, to gain best results.

4. Students would find this course immensely useful for landing a great job, building a career and also finding employment as soft skills trainers, both in India and abroad.

SYLLABUS:

UNIT I

1. Soft Skills: An Introduction – Definition and Significance of Soft Skills; Process, Importance and Measurement of Soft Skills Development. 2. Self-Discovery: Discovering the Self; Setting Goals; Beliefs, Values, Attitude, Virtue. 3. Positivity and Motivation: Developing Positive Thinking and Attitude; Driving out Negativity; Meaning and Theories of Motivation; Enhancing Motivation Levels.

UNIT II

1. Communication: Definition, process, barriers, team communication; developing interpersonal relationships through effective communication, listening skills, essential formal writing . 2. Public Speaking: Skills, Methods, Strategies and Essential tips for effective public speaking. 3. Group Discussion: Importance, Planning, Elements, Skills assessed; Effectively disagreeing, Initiating, Summarizing and Attaining the Objective. 4. Non-Verbal Communication: Importance and Elements; Body Language. 5. Leadership Skills: Concept of Teams; Building effective teams; Concept of Leadership and honing Leadership skills.

UNIT III

1. Interview Skills: Interviewer and Interviewee – in-depth perspectives. Before, During and After the Interview. Tips for Success. 2. Presentation Skills: Types, Content, Audience Analysis. 3. Etiquette and Manners – Social and Business. 4. Time Management – Concept, Essentials, Tips. 5. Personality Development – Meaning, Nature, Features, Stages, Models; Learning Skills; Adaptability Skills.

UNIT IV

Report writing: Definition of Report, Types of Report , Strategies for Report Writing, Evaluation and Organisation of Data, Structure of Report.

UNIT V

Emotional Intelligence: Meaning, History, Features, Components, Intrapersonal and Management Excellence; Strategies to enhance Emotional Intelligence.

COURSE OUTCOME:

1. Understand the significance and essence of a wide range of soft skills.
2. Learn how to apply soft skills in a wide range of routine social and professional settings.
3. Learn how to employ soft skills to improve interpersonal relationships.
4. Learn how to employ soft skills to enhance employability and ensure workplace and career success.

TEXT AND REFERENCE BOOKS:

1. Managing Soft Skills for Personality Development, edited by B.N.Ghosh, McGraw Hill, 2012.
2. English and Soft Skills, S.P.Dhanavel, Orient Blackswan India, 2010.
3. Soft Skills for Everyone, Butterfield,Jeff., New Delhi, Cenagage Learning., 2010.
4. Soft Skills, Chauhan, G.S. and Sangeeta Sharma, New Delhi, Wiley, 2016.
5. Working with Emotional Intelligence, Goleman, Daniel, London, Banton Books. 1998.
6. Business Correspondence and Report Writing, Sharma R.C. and Krishan Mohan, New Delhi, TMH, 2016.

SUB	SUB CODE	MAX. MARKS	MIN. MARKS
Computer Architecture Lab	**IT-407**	**S-40, P-60**	**S-20,P-20**

Course Objectives:

1. Understanding the components and devices used in computers
2. Understanding the working of hardware of a Computer

Course Content:

Testing and troubleshooting of all the hardware as well as software components used in the computer:

1. Power supply
2. Memory
3. Monitor
4. Keyboard
5. Motherboard
6. Processor
7. Operating System
8. Other I/O devices

Course Outcome:

After completion of this course, the students will be able to understand the assembly of a computer, functions of all the hardware and software components and devices used in the system.

SUB	SUB CODE	MAX. MARKS	MIN. MARKS
DBMS Lab	**IT-408**	**S-40, P-60**	**S-20,P-20**

Course Objectives:

The objective of this lab course is to understand the practical applicability of database management system concepts. Working on existing database systems, designing of database, creating relational database, analysis of table design. The lab course also provides practical knowledge to understand advanced database concepts such as Datamining and Big Data Analysis.

Course Contents:

Develop a software using Oracle for any of the following:

• Library Management

• Reservation system

• Payroll system

• Inventory control

• Student information system

Course Outcomes:

1. Students get practical knowledge on designing and creating relational database systems.
2. Understand various advanced queries execution such as relational constraints, joins, set operations, aggregate functions, trigger, views and embedded SQL.
3. Use of various software to design and build ER Diagrams, UML, Flow chart for related database systems.
4. Students will be able to design and implement database applications on their own

Books

1. Date C J, “An Introduction To DatabaseSystem”, Pearson Educations
2. Korth, Silbertz,Sudarshan, “Fundamental of Database System”, McGraw Hill
3. Rob, “ Data Base System:Design Implementation & Management”, Cengage Learninig
4. Elmasri, Navathe, “Fundamentals Of Database Systems”, Pearson Educations
5. Atul Kahate , “ Introduction to Database Management System”, Pearson Educations
6. Oracle 9i Database Administration Fundamental-I, Volume I, Oracle Press,TMH.

SUB	SUB CODE	MAX. MARKS	MIN. MARKS
Software Lab II	**IT-409**	**S-40, P-60**	**S-20,P-20**

Course Objective:

The course is designed to provide Basic knowledge of Python Pandas & to make aware how to make data frames, how to do indexing, joining, merging & so on.

Course Content:

Write a Pandas program to compare the elements of the two Pandas Series.
Write a Pandas program to convert the first column of a Data Frame as a Series.
Write a Pandas program to change the order of index of a given series.
Write a Pandas program to convert a series of date strings to a time series.

Pandas Data Frame

Write a Pandas program to create and display a Data Frame from a specified dictionary data which has the index labels.
Write a Pandas program to get the first 3 rows of a given Data Frame.
Write a Pandas program to get list from Data Frame column headers.

Pandas Indexing

Write a Pandas program to get the index of an element of a given Series.
Write a Pandas program to insert a column at a specific index in a given Data Frame
Write a Pandas program to find integer index of rows with missing data in a given data frame

Pandas String & Regular Expression

Write a Pandas program to remove whitespaces, left sided whitespaces and right sided whitespaces of the string values of a given pandas series.
Write a Pandas program to convert all the string values to upper, lower cases in a given pandas series. Also find the length of the string values.

Pandas Join

Write a Pandas program to join the two given data frames along rows and assign all data.
Write a Pandas program to append rows to an existing Data Frame and display the combined data.

Pandas Time Series

Write a Pandas program to create a date from a given year, month, day and another date from a given string formats.
Write a Pandas program to get a time series with the last working days of each month of a specific year.

Python Styling

Create a data frame of ten rows, four columns with random values. Write a Pandas program to highlight the minimum value in each column.
Create a data frame of ten rows, four columns with random values. Write a Pandas program to set data frame background Colour black and font colour yellow.

Course outcome :

1. To acquire programming skills in core Python.
2. To acquire Object Oriented Skills in Python
3. To develop the skill of data storage , manipulation of vast amount of data in Python
4. To develop the ability to write applications in Python
5. Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

Books:

1. Python-(Mark Lutz)
2. Python Training guide (BPB Publications)
3. Learning Pandas – Python Data Discovery and Analysis Made Easy
4. Learning the Pandas Library- *By Matt Harrison*
5. Pandas Cookbook-*By Theodore Petrou*

SUB	SUB CODE	MAX. MARKS	MIN. MARKS
Seminar	**IT-410**	**S-100**	**S-50**

Course Objective :

To develop
1. Presentation Skills
2. Technical skills
3. Research Skills

Course Contents:

1. Seminar /Presentation on topics related to the branch (latest Technology)
2. Research Paper Writing
3. Quizzes & Group Discussion

SUB	SUB CODE	MAX. MARKS	MIN. MARKS
MC-2 (Constitution of India)	**IT-411**	**-**	**-**

COURSE OBJECTIVE:

• To acquaint the students with legacies of constitutional development in India and help those to understand the most diversified legal document of India and philosophy behind it.
• To make students aware of the theoretical and functional aspects of the Indian Parliamentary System.

Course Contents :

Unit I

Introduction and Basic Information about Indian Constitution: Meaning of the constitution law and constitutionalism, Historical Background of the Constituent Assembly, Government of India Act of 1935 and Indian Independence Act of 1947,Enforcement of the Constitution, Indian Constitution and its Salient Features, The Preamble of the Constitution, Fundamental Rights, Fundamental Duties, Directive Principles of State Policy, Parliamentary System, Federal System, Centre-State Relations, Amendment of the Constitutional Powers and Procedure, The historical perspectives of the constitutional amendments in India, Emergency Provisions: National Emergency, President Rule, Financial Emergency, and Local Self Government – Constitutional Scheme in India.

Unit II

Union Executive and State Executive: Powers of Indian Parliament Functions of Rajya Sabha, Functions of Lok Sabha, Powers and Functions of the President, Comparison of powers of Indian President with the United States, Powers and Functions of the Prime Minister, Judiciary – The Independence of the Supreme Court, Appointment of Judges, Judicial Review, Public Interest Litigation, Judicial Activism, LokPal, Lok Ayukta, The Lokpal and Lok ayuktas Act 2013, State Executives – Powers and Functions of the Governor, Powers and Functions of the Chief Minister, Functions of State Cabinet, Functions of State Legislature, Functions of High Court and Subordinate Courts.

Unit II

Introduction and Basic Information about Legal System: The Legal System: Sources of Law and the Court Structure: Enacted law -Acts of Parliament are of primary legislation, Common Law or Case law, Principles taken from decisions of judges constitute binding legal rules. The Court System in India and Foreign Courtiers (District Court, District Consumer Forum, Tribunals, High Courts, Supreme Court). Arbitration: As an alternative to resolving disputes in the normal courts, parties who are in dispute can agree that this will instead be referred to arbitration. Contract law, Tort, Law at workplace.

Course Outcome:

At the end of the course, learners should be able to
1. Identify and explore the basic features and modalities about Indian constitution.
2. Differentiate and relate the functioning of Indian parliamentary system at the center and state level.
3. Differentiate different aspects of Indian Legal System and its related bodies.
4. Discover and apply different laws and regulations related to engineering practices.

Books:

• Brij Kishore Sharma: Introduction to the Indian Constitution, 8th Edition, PHI Learning Pvt. Ltd.
• Granville Austin: The Indian Constitution: Cornerstone of a Nation (Classic Reissue), Oxford University Press.
• Subhash C. Kashyap: Our Constitution: An Introduction to India's Constitution and constitutional Law, NBT, 2018.
• Madhav Khosla: The Indian Constitution, Oxford University Press.
• PM Bakshi: The Constitution of India, Latest Edition, Universal Law Publishing.

SUB	SUB CODE	MAX. MARKS	MIN. MARKS
Software Engineering	**IT-501**	**S-40, T-60**	**S-20,T-20**

Course Objectives:

- To Understand the Software Engineering Practice & Process Models.
- Familiarize students with different software life cycle models.
- Understand the importance of the software development process.
- Understand the importance of modeling and modeling languages.
- Design and develop correct and robust software products.

Course Contents:

UNIT-I

Software Engineering process: Basic concepts of System Design, Software life cycle, Software process models: Linear Sequential model, Prototyping Model, RAD Model, Evolutionary Process Models like Incremental Model, Spiral Model, Component Assembly Model, RUP and Agile processes, CMM.

UNIT-II

Requirement Analysis and Specification: Function and Non-functional requirements. Requirement Sources and Elicitation Techniques, Initiating the Requirements Engineering Process, Eliciting Requirements, Developing Use Cases building the Analysis Model, Negotiating Requirements, Validating Requirements.

UNIT-III

Software Design: Overview of System Design, Decomposing the system, System Design Concepts, System Design Activities, Addressing Design Goals, Managing System Design, Design for Web Apps, Design Issues for Web Engineering, Web E Design Pyramid, Interface Design, Architecture Design – Navigation Design – Component Level Design

UNIT-IV

Testing: Testing Strategies, Strategic Approach to Software Testing, Strategic Issues, Test Strategies for Object Oriented Software, Validation Testing, System Testing, The Art of Debugging, Software quality Assurance, Software Reliability.

UNIT-V

Software Maintenance: Software Supportability, Reengineering, Business Process Reengineering, Software Reengineering, Reverse Engineering, Restructuring, Forward Engineering, Economics of Reengineering, Project Metrics

Course Outcomes:

Upon completing the course, students will be able to:

- A clear understanding of Software Engineering concepts.
- Knowledge gained of Analysis and System Design concepts.
- Ability to manage change during development.
- Basic idea of the SOA and AOP concepts

Books:

1. Roger S. Pressman, Software Engineering: A Practitioner's Approach, McGraw – Hill, Sixth Edition
2. Ian sommerville "Software Engineering", Pearson Edu,9th edition, 2010.
3. Hans Van Vliet, "Software Engineering: Principles and Practices", 2008.
4. Richard Fairley, "Software Engineering Concepts",2008

SUB	SUB CODE	MAX. MARKS	MIN. MARKS
Analysis & Design of Algorithm	**IT-502**	**S-40, T-60**	**S-20,T-20**

Course Objectives:

1. Reinforce basic design concepts (e.g., pseudocode, specifications, top-down design)
2. Knowledge of algorithm design strategies
3. Familiarity with an assortment of important algorithms
4. Ability to analyze time and space complexity

Course Contents :

UNIT-I

Introduction to Algorithms: Notion of algorithms, properties, important areas of research in connection with the study of algorithms, Types of algorithms; Analysis- best case, worst case, and average case. Performance issues - Time and space complexity; Asymptotic analysis. Mathematical preliminaries; functions & their growth rates; Recurrence relations, Methods for solving recurrences.

UNIT-II

Selected Algorithms for Sorting, Searching and matrix multiplication: Elementary sorting techniques: Selection, Bubble, and Insertion sorts; Advanced sorting techniques: Heap, Merge and Quick sorts; Radix & Bucket sorts. Searching techniques: Linear and binary search; Searching minimum and maximum elements. Divide–and-Conquer strategy, Strassen's matrix multiplication.

UNIT-III

Greedy Method and Dynamic Programming: Algorithms design techniques based on Greedy Method and Dynamic programming. Illustration of these strategies using appropriate examples including Knapsack problem, optimal storage on tapes, finding shortest path, all pairs shortest path, finding minimum cost spanning trees, and Matrix chain multiplication problem.

UNIT-IV

Backtracking, Branch-and- Bound, and String Matching: Backtracking and Branch-and Bound algorithm design techniques, Illustration of these techniques using appropriate examples like Queens Problem, subset sum problem, traveling salesperson problem, etc. Introduction to string matching problem, Applications, String matching algorithms: Naive algorithm, Rabin-Karp, Knuth-Morris-Pratt, Boyer-Moore, etc.

UNIT-V

Theory of NP-Completeness: Non-deterministic Algorithms: Introduction. Nondeterministic Complexity, Decision and optimization problems, Tractable and Intractable Problems, Computational Classes: – P, NP, NP-Complete, and NP-Hard; reducibility, Selected NP-Complete and NP-Hard problems: Hamiltonian cycle, Traveling Salesperson (TSP). Satisfiability, Clique problems, etc.

Course Outcomes:

Students who have completed this course should be able to:
1. Apply design principles and concepts to algorithm design
2. Have the mathematical foundation in analysis of algorithms
3. Understand different algorithmic design strategies
4. Analyze the efficiency of algorithms using time and space complexity theory

Books Recommended:

1. Thomas H Cormen, Charles E Lieserson, Ronald L Rivest and Clifford Stein, Introduction to Algorithms, Second Edition, MIT Press/McGraw-Hill, 2001.
2. Michael T Goodrich and Roberto Tamassia, Algorithm Design: Foundations, Analysis, and Internet Examples, Second Edition, Wiley, 2006.
3. Jon Kleinberg and ÉvaTardos, Algorithm Design, Pearson, 2005.
4. E. Horowitz, S. Sahni, S Rajasekaran, Computer Algorithms, Galgotia Publications.
5. Saara Base, Computer Algorithms: Introduction to Design and Analysis, Addision Wesley, 2/e, 1988.
6. Knuth, D, The art of computer programming, Vols. 1-2-3, Addision Wesley 1968-73.
7. A V Aho, J E Hopcroft& J D Ullman, The Design and Analysis of Computer Algorithms, Addison Wesley, 1974.
8. Vijay V Vazirani, Approximation Algorithms, Springer-Verlag, 2001

SUB	SUB CODE	MAX. MARKS	MIN. MARKS
Operating Systems	**IT-503**	**S-40, T-60**	**S-20,T-20**

Course Objectives:

- Students will learn how Operating System is Important for Computer System.
- To make aware of different types of Operating System and their services.
- To learn different process scheduling algorithms and synchronization techniques to achieve better performance of a computer system.
- To know virtual memory concepts.
- To learn secondary memory management.

Course Contents :

UNIT-I

Introduction: Role of OS: Types of OS, Batch Systems; Multiprogramming; Time Sharing; Distributed & Real time OS. Computer structure and OS: System Architecture – I/O, Storage, Processors; System components- OS Services, System Calls , System Programs; System Design, Implementation and Generation.

UNIT-II

Process Management: Concepts of process: Process status, Process description, Process model. Process Scheduling: Concepts, Scheduler organization, preemptive and non- preemptive scheduler strategies, scheduling algorithms: FCFS, SJN, Priority Scheduling, Round Robin Scheduling, Multiple Processor scheduling, Thread Concepts and Multiple threaded OS.

UNIT-III

Process Synchronization and Deadlock: Process Co-operation, Concepts of Inter-process communication, Process Synchronization, Synchronization Issues, Critical Section problem, Mutual exclusion Primitives and Algorithms, Process Synchronization with semaphores. Concepts of Deadlock, Conditions for Deadlocks, Resource Concepts & Abstractions, Deadlock Prevention, Avoidance and Recovery, Banker Algorithms for Deadlock Avoidance

UNIT-IV

Memory Management and File system: Paging, Segmentation and Contiguous memory allocation. Virtual Memory: Demand Paging, Page replacement and Frame Allocation policies, Thrashing. File System: Concepts, Access Method, Directory Structure, and File System Management.

UNIT-V

Disk management and other issues: Disk management: Disk Structure and Scheduling. File systems, and operating system support for distributed systems. Protection and Security related issues. Case studies of contemporary operating systems.

Course Outcomes:

- Understands the different services provided by Operating System at different level.
- They learn real life applications of Operating System in every field.
- Understands the use of different process scheduling algorithm and synchronization techniques to avoid deadlock.
- They will learn different memory management techniques like paging, segmentation and demand paging etc.

BOOKS RECOMMENDED:

[1] Silberschatz, Galvin and Gagne, Operating System Principles, 7th Ed. Addison Wesley.
[2] Gary Nutt, Operating Systems, 3rd Ed. Pearson Education, India
[3] Tanenbaum, Modern Operating Systems, PHI.
[4] W. Stalling, Operating Systems, Macmillan.
[5] H. M. Dietel, Operating Systems, Addison Wesley Longman.
[6] Maurice J. Bach, The design of Unix Operating system, Pearson Education, India.
[7] Sumitabha Das, Unix Concepts & Applications: includes SCO UNIX & Linux, Tata McGraw Hill.

SUB	SUB CODE	MAX. MARKS	MIN. MARKS
Communication Systems	**IT-504**	**S-40, T-60**	**S-20,T-20**

Course Objectives:

- To review the basic Fourier techniques and its application in these processes.
- To provide knowledge of basic principles of analog and digital communication.
- To introduce the various processes like sampling, digital coding techniques, modulation and channel coding techniques that are used in modern telecommunication system.
- To give exposure to quantitative method of measuring information and determining the capacity of communication system.
- To provide knowledge of spread spectrum techniques.

Course Contents :

UNIT-I

Review of Fourier techniques, Fourier techniques for linear system analysis, Fourier transform properties convolution, Error Function and complimentary error function, Introduction to analog modulation techniques like AM, FM, PM.

UNIT-II

Line coding: NRZ, RZ, Biphase, Duo binary etc. their comparison and spectrum associated with their wave forms, bandwidth of digital data. Signal and Spectra: classification of signals, Parseval's theorem, energy spectral density, power spectral density, auto-correlation, crosscorrelation, random variables.

UNIT-III

Sampling and quantization, Digital coding techniques, PCM, DPCM, ADPCM, DM, ADM, vocoders, matched filter. Digital modulation techniques, BPSK, QPSK, MSK, performance analysis and comparison of digital modulation techniques in presence of noise.

UNIT-IV

Information theory: concept of amount of information, entropy, information rate, coding to increase average information per bit, Huffman coding, channel capacity, Shannon's theorem of channel capacity. Channel coding: Linear block codes, systematic Linear blocks codes, parity check matrix, syndrome testing, cyclic codes, hamming codes.

UNIT-V

Introduction to spread spectrum techniques – spread spectrum overview, spreading sequences, properties of spreading sequences, spreading gain, direct sequence spread spectrum system, jamming margin, frequency hopping system, spread spectrum applications.

Course Outcomes:

Upon completing the course, students will be able to:

- Understand frequency domain analysis and its importance.
- Understand about the digital data transmission using line coding.
- Understand the working of transmitter and receiver in digital communication system.
- Understand how to detect and correct the errors introduced during the transmission.
- Understand basics of secured communication using spread spectrum techniques.

Books Recommended:

1. Lathi B.P., “Modern Analog and Digital Communication Systems”, Oxford Univ. Press,
2. Taub & Schilling, “Principal of Communication System”, Tata McGraw Hill publication,.
3. J.G. Proakis, “Digital Communication”, McGraw Hill publication,
4. Haykins Simon, “Digital Communication”, Wiley Publication,
5. Haykins Simon, “Analog and Digital Communication”, Wiley Publication,
6. Bernard Sklar, “Digital communication”, Pearson Education,

SUB	SUB CODE	MAX. MARKS	MIN. MARKS
Core Elective –I (Distributed Systems)	**IT-505**	**S-40, T-60**	**S-20,T-20**

Course Objectives:

• Provide an understanding of the principles of distributed operating systems. Questions concerning distributed system architecture, concepts and design, functioning; and how these meet the demands of contemporary distributed applications will be addressed.

• Undertake problem identification, formulation and solution. Capacity for independent critical thought, rational inquiry and self-directed learning.

• Realizing the challenges encountered during the design and analysis of a distributed system.

• Identifying efficient methods for facing these challenges and designing efficient distributed algorithms and systems. Pre requisites: Basic knowledge of Operating System concepts.

Course Contents

UNIT-I

Introduction to Distributed Systems: Distributed Computing Systems, Evolution of Distributed Computing System, Distributed Computing System Models, Distributed Operating System, Examples of Distributed Systems, Design Approaches & Issues, Computer Network and Layered protocols, Network Operating System and Distributed Operating System, Introduction to Distributed Computing Environment (DCE), Operating System Structures.

UNIT-II

Message Passing & Remote Procedure Calls(RPC): Overview of Computer Networks, Communication Inter-process communication(IPC), The Critical Section Problem, Features of a Good Message Passing System, Issues in IPC by Message Passing, Synchronization, Group Communication, Case Study: 4.3 BSD UNIX IPC Mechanism. The RPC Model, Transparency of RPC, Implementing RPC Mechanism, Stub Generation, RPC Messages, Marshaling Arguments and Results, Case Studies: Sun RPC.

UNIT-III

Synchronization in Distributed Systems: Logical clocks, Physical clocks, Vector Clock, Clock synchronization and related algorithms, Mutual Exclusion, Non-Token Based Algorithms – Lamport's Algorithm, Token-Based Algorithms, Suzuki-Kasami's Broadcast Algorithm, Election Algorithms, Dead locks in Distributed Systems, Thrashing.

UNIT-IV

Distributed Shared Memory: Introduction, General Architecture of DSM Systems, Algorithm, Protocols, Design and Implementation Issues of DSM, Page based Distributed Shared Memory, Shared variable Distributed shared Memory, and Object based Distributed shared Memory, Granularity, Structure of Shared Memory Space, Consistency Models, Replacement Strategy, Thrashing, Other approaches to DSM, Heterogeneous DSM, Advantages of DSM. Resource Management: Introduction, Desirable Features of a Good Global Scheduling Algorithm, Task Assignment Approach, Load – Balancing Approach, Load – Sharing Approach, Process Management: Introduction, Process Migration, Threads, Case studies.

UNIT-V

Distributed File Systems: Introduction, Desirable Features & Goals, Distributed File System, File models, File–Accessing Models, File – Sharing Semantics, File – Caching Schemes, File Replication, Fault Tolerance, Atomic Transactions, Design Principles, Security in Distributed File system. Trends in distributed file system, case study Case study: Amoeba, Mach, Chorus and their comparison.

Course Outcomes:

Upon completing the course, students will be able to:

- Distinguish the theoretical and conceptual foundations of distributed computing.
- Recognize the feasibility and the impossibilities in managing resources.
- Identify the core concepts of distributed systems and also identify the problems in developing distributed applications.
- Apply existing solutions to the core problems and develop appropriate variations of existing solutions to meet the development contexts.
- Examine how existing systems have applied the concepts of distributed operating systems in designing large systems, and will additionally apply the concepts to develop sample systems.

Books Recommended:

1. P K Sinha, “Distributed operating systems; Concepts and design”, PHI Learning.
2. Coulouris, Dollimore, Kindberg, "Distributed System: Concepts and Design”, Pearson Ed.
3. Coulouris, Dollimore, Kindberg, "Distributed System: Concepts and Design”, Pearson Ed.
4. Sunita Mahajan & Shah, Distributed Computing, Oxford Press
5. Tanenbaum and steen, “Distributed systems: Principles and paradigms”, 2nd edition, PHI Learning.
6. Asilberschatz P.B Garvin Operating System Concept, John Wiley & Sons (Asia) Pte 2000.
List of Practical Assignment:

SUB	SUB CODE	MAX. MARKS	MIN. MARKS
Core Elective –I (Unix & Shell Programming)	**IT-505**	**S-40, T-60**	**S-20,T-20**

Course Objectives:

The student will have ability to:

- Understand the UNIX operating system and its memory management, input/output processing, internal and external commands.
- Learn the File Systems and Process Management of UNIX.
- Learn and explore the use of operating system utilities such as text editors.
- Understand Shell Scripting and Shell Programming.

Course Contents :

UNIT–I Overview of UNIX:

UNIX Operating System, Architecture, Kernel & Shell, Installation Process, Features, Internal And External Commands, Basic Commands: cal, date, echo, bc, script, passwd, PATH, who, uname, pwd, cd, mkdir, rmdir etc. Command Structure, Shell Script & Shell Programming, UNIX Server.

UNIT–II File System:

Definition of File System, Boot Block, Super Block, Inode. File creations and its related commands cat, cp, rm, mv, more, file, ls, wc, pg, cmp, comm, diff. Zipping & unzipping files, gzip, tar, zip, df, du, mount, umount, etc. The vi editor. File Permissions with chgrp & chmod. Process Control: Viewing a Process, Command to display Process, Process Attributes, Process States, Process Fields, ps Commands options, Handling Jobs, Foreground & Background Jobs.

UNIT–III Redirection & Pipes:

Standard I/O Streams, Redirection & Pipes, Command Execution, Command-Line Editing, Quotes. Filters: Filters, Concatenating, Beginning and End of files, Cut and Paste, Sorting, Translating Characters, Ordering a File. Regular Expressions: Atoms, operators, grep, sed, awk etc.

UNIT–IV System Security:

Physical Security, Boot level security (GRUB), Controlling System Access, Restricted Shells, File Access Commands, Access Control List(ACLs), Restricting Root Access, Monitoring & Securing Super User Access.

UNIT–V Shell Scripting:

Introduction to Shell, Types of Shell, C shell features, writing first script writing script, Executing & Debugging script. Shell Programming: Shell variables, Output, Input, exit Status of a Command, Branching Control Structures, Loop-Control Structure, and Continue and break Statements, Expressions, Command Substitution, Command Line Arguments and Functions.

Course Outcomes:

Upon completion of the subject, students will be able to:
1. Identify and use UNIX utilities to create and manage simple file processing operations,
2. Organize directory structures with appropriate security.
3. Effectively use the UNIX system.
4. Monitor system performance and lean the shell scripts.
5. Use the shell scripts in designing a programs for engineering problems.

Books Recommended:

1. Yashavant P. Kanetkar “Unix Shell Programming”, BPB Publications.
2. Venkatesh Murthy, “Introduction to Unix &Shell”, Pearson Edu.
3. Forouzan, “Unix & Shell Programming”, Cengage Learning.
4. Sumitab Das,”Unix Concept & Application”, TMH.
5. Venkateshwavle,”Linux Programming Tools Unveil`ed”, BS Publication.
6. Richard Peterson,”Unix Complete Reference”,TMH.

SUB	SUB CODE	MAX. MARKS	MIN. MARKS
Core Elective –I (Embedded Systems)	**IT-505**	**S-40, T-60**	**S-20,T-20**

Course Objective:

1. To introduce students with knowledge about the basic functions and applications of embedded systems
2. To introduce the architecture of embedded systems
3. To introduce the various communication protocols
4. To enable students to have knowledge of the memory types and supporting technologies of embedded systems.
5. To enable students to have knowledge about the development of embedded software

Course Contents:

UNIT-I

Introduction to Embedded Systems: Definition of embedded system, embedded systems vs. general computing systems, history of embedded systems, classification, major application areas, purpose of embedded systems, characteristics and quality attributes of embedded systems, common design metrics, and processor technology: general purpose processor, application specific processor, single purpose processor.

UNIT-II

Embedded System Architecture: Von Neumann v/s Harvard architecture, instruction set architecture, CISC and RISC instructions set architecture, basic embedded processor, microcontroller architecture, CISC & RISC examples: 8051, ARM, DSP processors.

UNIT-III

Input Output and Peripheral Devices Timers and counters, watchdog timers, interrupt controllers, PWM, keyboard controller, analog to digital converters, real time clock. Introduction to communication protocols: basic terminologies, concepts, serial protocol: I2C, CAN, firewire, USB. Parallel protocols: PCI bus, IrDA, bluetooth, IEEE 802.11, wireless protocols.

UNIT-IV

Memory System Architecture Caches, virtual memory, MMU, address translation, memory and interfacing, memory write ability and storage performance. Memory types, composing memory – advance RAM interfacing, microprocessor interfacing I/O addressing, interrupts, direct memory access, arbitration multilevel bus architecture.

UNIT-V

Embedded System Supporting Technologies Difference between normal OS and RTOS, scheduling algorithms. Case study: Tiny OS, VxWorks, QNX. Overview of VLSI technology, introduction to device drivers. Case studies: washing machine, air-conditioning, auto focus camera.

Course Outcomes:

Upon completion of this course, students will be able to
1. Explain the embedded system concepts and architecture of embedded systems
2. Describe the architecture of 8051 microcontroller and write embedded program for 8051 microcontroller
3. Select elements for an embedded systems tool.
4. Understand the memory types used in embedded systems
5. Design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability

Books:

1. F Vahid, T Giogarvis, Embedded systems: A unified hardware/software approach, Wiley, 1999.
2. Raj Kamal, Embedded Systems Introduction, 2nd Ed., TMH publication, 2015.
3.David E Simons, An Embedded Software Primer, Pearson, 1999.

SUB	SUB CODE	MAX. MARKS	MIN. MARKS
Analysis & Design of Algorithm Lab	**IT-506**	**S-40, P-60**	**S-20,P-20**

Course Contents:

List of Experiments (expandable):

1. Write a program for Iterative and Recursive Binary Search.
2. Write a program for Merge Sort.
3. Write a program for Quick Sort.
4. Write a program for Strassen's Matrix Multiplication.
5. Write a program for optimal merge patterns.
6. Write a program for Huffman coding.
7. Write a program for minimum spanning trees using Kruskal's algorithm.
8. Write a program for minimum spanning trees using Prim's algorithm.
9. Write a program for single sources shortest path algorithm.
10. Write a program for Floye-Warshal algorithm.
11. Write a program for traveling salesman problem.
12. Write a program for Hamiltonian cycle problem.

SUB	SUB CODE	MAX. MARKS	MIN. MARKS
Operating System Lab	**IT-507**	**S-40, P-60**	**S-20,P-20**

List of Practical:

- Experiments to understand operating system (Ubuntu) installation process, file system portioning and dual boot setup.
- Experiment to learn command line interface (shell) and exploring various commands of UNIX.
- Writing programs to create and execute shell script.
- Program to implement various algorithms for process scheduling.
- Program to implement various algorithms for page replacement activity in memory management.
- Writing programs to use inter process communication constructs (File sockets/ Shared memory).

SUB	SUB CODE	MAX. MARKS	MIN. MARKS
Communication Systems Lab	**IT-508**	**S-40, P-60**	**S-20,P-20**

List of Experiments

1. Amplitude modulation and demodulation
2. Generation and Detection of DSB-SC,SSB,VSB
3. Frequency modulation and demodulation
4. Radio transmitter and Receiver
5. Noise performance of AM & FM systems.
6. Sampling Theorem and data reconstruction
7. Generation and detection of PAM, PWM, PCM, PTM. Delta modulation, ADM.
8. Generation and Detection of ASK, PSK, DPSK, FSK, QAM.

SUB	SUB CODE	MAX. MARKS	MIN. MARKS
Software Lab III	**IT-509**	**S-40, P-60**	**S-20,P-20**

Course Objectives:

1. Understand fundamentals of programming such as variables, conditional and iterative execution, methods, etc.
2. Understand fundamentals of object-oriented programming in Java and be familiar of the important concepts like class, inheritance and multithreading, AWT and JDBC.
3. Students will able to use the Java SDK environment to create, debug and run simple Java programs.

Course Contents :

Overview of Java, Installation, First Simple Program, Compilation process , Java Keywords , Identifiers , Literals, Comments, Data Types, Variables, Dynamic initialization, type conversion and casting, Operators, Control Statements, Declaring Objects, Introducing Methods, Constructors, this Keyword, Garbage Collection, finalize Method, Overloading Methods, Overloading Constructors, Using Objects as Parameters, Inheritance, Creating a Multilevel Hierarchy, Packages and Interfaces, Exception Handling,

List of Experiments:
1. Write a program that accepts two numbers from the user and print their sum.
2. Write a program to calculate addition of two number using prototyping of methods.
3. Program to demonstrate function overloading for calculation of average.
4. Program to demonstrating overloaded constructor for calculating box volume.
5. Program to show the detail of students using concept of inheritance.
6. Program to demonstrate package concept.
7. Program to demonstrate implementation of an interface which contains two methods declaration square and cube.
8. Program to demonstrate exception handling in case of division by zero error.

Course Outcomes:

On the completion of this course students will be able to understand:
1. The concepts of Java programming
2. The basic terminology used in computer programming and write, compile and debug programs in JAVA language.
3. The different data types, decision structures, loops, functions to design Java programs.
4. Develop program using the java collection API as well as the java standard class library.

Reference Books:

1. E. Balagurusamy, “Programming with Java A Primer”, McGrawHill.
2. Sharanam Shah, “Core Java 8 for Beginners”, Shroff Publisher.
3. Naughton & Schildt, “The Complete Reference Java 2”, Tata McGraw Hill.
4. Horstmann & Cornell, “Core Java 2” (Vol I & II), Pearson.

SUB	SUB CODE	MAX. MARKS	MIN. MARKS
Seminar/Intership I	**IT-510**	**S-100**	**S-50**

Presentation on the internship/Training completed during III & IV semester. A report and certificate of the internship/training to be submitted from the industry/organization.

SUB	SUB CODE	MAX. MARKS	MIN. MARKS
COMPUTER GRAPHICS AND MULTIMEDIA	**IT-601**	**S-40, T-60**	**S-20,T-20**

COURSE OBJECTIVES:

The purpose of this subject is to introduce the concepts and techniques used in Computer Graphics and Multimedia

Course Contents :

Unit I

Introduction to Raster scan displays, Storage tube displays, refreshing, flickering, interlacing, color monitors, display processors resolution, working principle of dot matrix, inkjet laser printers, working principles of keyboard, mouse scanner, digitizing camera, track ball, tablets and joysticks, graphical input techniques, positioning techniques, rubber band techniques, dragging etc.

Unit II

Scan conversion techniques, point plotting, line drawing: simple DDA, Bresenham's Algorithm, Circle drawing algorithms : general method, symmetric DDA, Bresenham's Algorithm, 2D & 3D transformation system, Translation, Rotation, Scaling, Shearing, Reflection, Inverse transformation, Composite transformation.

Unit III

Windowing & Clipping: World coordinate system, screen coordinate system, parallel and perspective projection, Representation of 3D object on 2D screen. Point Clipping. Line Clipping Algorithms, Polygon Clipping algorithms. Curves, parametric function, Bezier Method, B-spline Method,

Unit IV

Introduction to Hidden Surface elimination, Basic illumination model, diffuse reflection, specular reflection, phong shading, Gouraud shading ray tracing, color models like RGB, YIQ, CMY, HSV etc.

Unit V

Multimedia applications – Multimedia System Architecture – Evolving technologies for Multimedia – Defining objects for Multimedia systems – Multimedia Data interface standards, Multimedia components, Multimedia Hardware, SCSI, IDE, MCI, Multimedia data and file formats, RTF, TIFF, MIDI, JPEG, DIB, MPEG, Multimedia Tools, Presentation tools, Authoring tools. Compression & Decompression – Multimedia Data & File Format standards :-TIFF, MIDI, JPEG, DIB, MPEG,RTF

COURSE OUTCOMES:

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

1. Understand the basics of computer graphics, different graphics systems and applications of computer graphics.

2. Discuss various algorithms for scan conversion and filling of basic objects and their comparative analysis.

3. Use of geometric transformations on graphics objects and their application in composite form.
4. Extract scene with different clipping methods and its transformation to graphics display device.

Books:

1. Donald Hearn and M.Pauline Baker, “Computer Graphics C Version”, Pearson Education, 2003.

2. Prabat K Andleigh and Kiran Thakrar, “Multimedia Systems and Design”, PHI Learning, 3rd Indian reprint edition , 2008.

3. Tay Vaughan, “Multimedia making it work”, Tata McGraw Hill edition.

4. Rogers, “Principles of Computer Graphics” TMH.

SUB	SUB CODE	MAX. MARKS	MIN. MARKS
Compiler Design	**IT-602**	**S-40, T-60**	**S-20,T-20**

COURSE OBJECTIVE:

This Course describes the theory and practice of compilation, in particular, the lexical analysis, parsing and code generation and optimization phases of compilation, and design a compiler for a concise programming language.

Course Contents :

Unit I:

Introduction to loading. linking and relocation. design of the linker. relocation factor and types of relocation. Compiler Structure: Compilers and Translators, Various Phases of Compiler, Structure of Compiler, Bootstrapping of Compiler. Lexical Analysis: The role of Lexical Analyzer, A simple approach to the design of Lexical Analyzer, Implementation of Lexical Analyzer. The Syntactic Specification of Programming Languages: CFG, Derivation and Parse tree, Ambiguity, Capabilities of CFG. Basic Parsing Techniques: Top-Down parsers with backtracking, LR parsers, SLR and LALR parsing table. Recursive Descent Parsers, Predictive Parsers.

Unit II:

Bottom–up Parsers, Shift-Reduce Parsing, Operator Precedence Parsers, LR parsers (SLR, Canonical LR, LALR) Syntax Analyzer Generator: YACC, Intermediate Code Generation: Different Intermediate forms: three address code, Quadruples & Triples.

Unit III:

Syntax. directed translation schemes. intermediate code generation. syntax. trees. three address code. quadruple and triples. translation of various type of statements like assignment. while. case. for etc. Introduction to symbol table generation. data structure used for symbol table generation. error detection and recovery in a compiler. removal of lexical. syntactic. semantics errors and errors. encountered in other phases.

Unit IV:

Run Time Memory Management: Static and Dynamic storage allocation, stack based memory allocation schemes, Symbol Table management, Error Detection and Recovery, Lexical phase errors, Syntactic phase errors, Semantic errors.

Unit V :

Introduction to code optimization. loop optimization. techniques using DAG. reducible flow graphs. depth first search etc. data flow analysis. Introduction to code generation. code generation using DAG. register allocation and assignment in code generation. problems in code generation.

COURSE OUTCOMES:

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

1. Understand the major phases of compilation

2. Construct the intermediate code representations and generation

3. Convert source code for a novel language into machine code for a novel computer.

Books:

1. Louden, “Compiler construction”, Cengage learning.

2. Principle of compiler design by Alfred V. Aho and Jeffery D. Ullman

3. . H.C. Holub, “Compiler Design in C”, Prentice Hall.

SUB	SUB CODE	MAX. MARKS	MIN. MARKS
Computer Networks	**IT-603**	**S-40, T-60**	**S-20,T-20**

Course Objectives:

• To provide students with an overview of the concepts and fundamentals of computer networks • To familiarize with the basic taxonomy and terminology of computer networking area.

• Describe how computer networks are organized with the concept of layered approach

• To experience the designing and managing of communication protocols while getting a good exposure to the TCP/IP protocol suite

Course Contents:

Unit I

Importance of computer networks, broadcast and point to point networks, Local area networks and Wide area networks, ISO-OSI reference model, TCP/IP model , interfaces and services, Protocol data unit, connection oriented and connectionless services, service primitives, Binding Protocol Address- ARP & RARP, packet format, Encapsulation.

Unit II

Data-Link layer: - Data link layer design issues, framing, flow & error control , physical addressing, Stop & Wait protocol ,Go back N ARQ ,selective repeat ARQ ,piggybacking and pipelining ,HDLC LAN Protocol stack-Logical link control and Media Access Control sublayer, IEEE 802.2 LLC Frame format; MAC layer Protocols- static and dynamic allocation, Pure and slotted ALOHA, Carrier sense multiple access, Persistent and non-persistent CSMA, IEEE standard 802.3, 802.4, 802.5, FDDI,

Unit III

The Network layer- logical addressing, classful & classless addressing, packet delivery & forwarding. unicast routing protocols , multicast routing protocols, Routing algorithm- Least Cost, Dijkstra's, Bellman-ford, Introduction to Internet protocol, IPv4 header, IPv4 Datagrams, Encapsulation, Fragmentation and Reassembly, IP routing, Subnet addressing, Subnet mask, Super netting- special case of IP addresses, Ipv6-Motivation, frame format and addressing. ICMP: Introduction, ICMP Header, ICMP message types.

Unit IV

Transport layer- TCP: Introduction, Transport services , Process to process delivery, TCP, congestion control algorithms, quality of service, headers, connection establishment and termination, timeout of connection establishment, maximum segment size, port no. and socket addresses, TCP timers, UDP: Introduction, UDP header, UDP checksum, UDP operations, encapsulation & decapsulation, queuing, SCTP-Services, transmission sequence number, stream identifier, stream sequence number, packet format.

Unit V
Application layer - BOOTP:-operation, packet format, DHCP:-Address allocation, configuration & packet Format, DNS: Distribution of name spaces, DNS in the internet, FTP:-Connection, Communication, command processing, TFTP, E-Mail: SMTP, POP, IMAP, SNMP. study of internetworking devices and their configuration– switches, hubs, Bridges, routers and Gateways.

Course Outcomes:

Upon successful completion of this course the students will:
• Have a good understanding of the OSI Reference Model and its Layers
• Identify core networking and infrastructure components and the roles they serve; and given requirements and constraints, design an IT infrastructure including devices, topologies, protocols, systems software, management and security;
• Analyze the requirements for a given organizational structure and select the most appropriate networking architecture and technologies
• Specify and identify deficiencies in existing protocols, and then go onto formulate new and better protocols

Books:

1. .“Computer Networks” - Tanenbaum ,PHI Learning
2. “Data Communication & Networks ” , Fourouzan TMH
3. “TCP/IP-Protocol suite”, Forouzan, TMH 3rd edition
4. “Computer Networks and Internets”, D.E.Comer, Pearson
5. “TCP/IP Illustrated” W. Richard Stevens, Volume I, Addison Wesley,
6. “Internetworking with TCP/IP Vol. I, II & III”, Comer , PHI Learning.

SUB	SUB CODE	MAX. MARKS	MIN. MARKS
Core Elective II (Web Technology)	**IT-604**	**S-40, T-60**	**S-20,T-20**

Course Objectives:

To be able to learn the concepts related to web and internet technology and should be able to implement it.

Course Outcome :

Unit I:

History of the internet, internetworking concepts, architecture, and protocol: switch, router, protocols for internetworking, internet address and domains. Introduction World Wide Web (WWW), working of web browser and web server, Web server and its deployment, N-tier architecture, services of web server, Common gateway interface (CGI), Uniform Resource Locator (URL), format of the URL, Hyper Text Transfer Protocol (HTTP), feature of HTTP protocol HTTP request-response model, Hyper Text Transfer Protocol Secure (HTTPS).

Unit II:

Introduction to Hyper Text Markup Language (HTML), HTML elements, XHTML syntax and Semantics, extensible Markup Language (XML), element, attributes, entity declarations. DTD files and basics of Cascading Style Sheet (CSS).Document object Model (DOM) history and levels, Document tree, DOM event handling.

UNIT III:

Introduction to Java Script, Basic concepts, variables and data types, functions, conditional statements, Loops, Operators, Arrays, Standard Objects and form processing in Java

Unit IV:

Domain name system: Introduction, DNS client server Model, Server hierarchy, server architectures, optimization of DNS performance, DNS entry types, message format.

Unit V:

Web applications: Remote login, TELNET, FTP, NFS, TFTP, electronic mail (SMTP, MIME), Internet Management(SNMP) and NMS.

COURSE OUTCOMES:

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

1. Should be able to learn the concepts of HTML and Java Script.

2. To be able to build web pages using HTML , Java Script.

Books:

1. Web Technologies- A computer science perspective By Jeffrey C. Jackson, Pearson Eduction .
2. Web Technologies-TCP/IP Architecture, and Java Programming By Achyut S. Godbole and Atul Kahate

3. An introduction to Web Design+Programming by Paul S. Wang Sanda, S Katila,CENGAGE Learning.

SUB	SUB CODE	MAX. MARKS	MIN. MARKS
Core Elective II (Optimization Techniques)	**IT-604**	**S-40, T-60**	**S-20,T-20**

Course Objective:

1. Gain an understanding of the foundations of meta-heuristic search.

2. Types of algorithms that will be discussed include genetic algorithms, ANN, genetic programming and ant-colony optimization .

Course Contents :

Unit I: Artificial Neural Networks: Supervised Learning:

Introduction and how brain works, Neuron as a simple computing element, The perceptron, Backpropagation networks: architecture, multilayer perceptron, backpropagation learning-input layer, accelerated learning in multilayer perceptron, The Hopfield network, Bidirectional associative memories (BAM), RBF Neural Network.

Unit II: Artificial Neural Networks: Unsupervised Learning:

Hebbian Learning, Generalized Hebbian learning algorithm, Competitive learning, Self-Organizing Computational Maps: Kohonen Network.

Unit III:

Genetic algorithms basic concepts, encoding, fitness function, reproduction-Roulette wheel, Boltzmann, tournament, rank, and steady state selections, Convergence of GA, Applications of GA case studies.

Unit IV:

Ant Colony Optimization (ACO) - Theoretical Considerations, Combinatorial optimization and meta heuristic, Stigmergy, Convergence Proofs, ACO Algorithm, ACO and Model Based Search, Variations Of ACO: Elitist Ant System (EAS), Minmax Ant System (MMAS) and Rank Based Ant Colony System (RANKAS), ACO Algorithm for Travelling Sales Person problem, ACO algorithm for feature selection.

Unit V:

Particle Swarm Optimization: Principles of Bird Flocking and Fish Schooling, Evolution of PSO, Operating Principles, PSO Algorithm, Neighbourhood Topologies, Convergence Criteria, Variations of PSO.

Course Outcomes:

At the end of the course, the student will be able to:

- Explain the principles underlying Evolutionary Computation in general.
- Apply Evolutionary Computation Methods to find solutions to complex problems
- Analyze and experiment with parameter choices in the use of Evolutionary Computation

Books:

1. S.N. Shivnandam, “Principle of soft computing”, Wiley. S. Rajshekaran and G.A.V. Pai, “Neural Network , Fuzzy logic And Genetic Algorithm”, PHI.

2. Jack M. Zurada, “Introduction to Artificial Neural Network System” JAico Publication.

3. Simon Haykins, “Neural Network- A Comprehensive Foudation” Timothy J.Ross, “Fuzzy logic with Engineering Applications”, McGraw-Hills 1.

SUB	SUB CODE	MAX. MARKS	MIN. MARKS
Core Elective II (Neural Networks and Fuzzy Logic)	**IT-604**	**S-40, T-60**	**S-20,T-20**

Course Objectives:

To understand the concepts of Neural Networks and Fuzzy Logic

Course Contents :

Unit I :

Introduction: Artificial Neuron, Single layer artificial neural network, Multilayer, Training of artificial neural network, Biological model for artificial neural network.

Unit II:

Perception & back propagation: Perception representation, Ex-of, Linear sepratibility, Perception learning & training algorithm, Back propagation training algorithm.

Unit III:

Counter propagation network & statistical method : Introduction network structure, Training of the Kohonen layer & application Boltzmann training Cauchy training , Artificial specific heat method statistical Hopfield networks , Hopfield nets & Boltmann Method.

Unit IV :

Adaptive resonance theory: ART architecture, ART classification operation, ART implementation, ART training . Optical neural network, Electro optical matrix multiplier, Holographic correlators, Optical neurons , introduction to cognitron & non cognitron.

Unit V :

Introduction to fuzzy logic, neuro fuzzy, and soft computing, from conventional AI to computational intelligence, Neural Network, Evolutionary computation, Neuro fuzzy and soft computing characteristics, Fuzzy set theory; Basic definition & terminology, set theoretic operations, MF formulation & parameterization, Fuzzy union, intersection & compliment. Fuzzy Rules & fuzzy Reasoning, Extension Principles and Fuzzy Relations, Fuzzy if-then rules, linguistic Variables, Fuzzy reasoning, compositional rules of inference, Fuzzy systems as function estimators, Fuzziness as multivalence.

COURSE OUTCOMES:

Upon completion of the course, the student will be able to

1. Comprehend the concepts of feed forward neural networks

2. Analyze the various feedback networks.

3. Understand the concept of fuzziness involved in various systems and fuzzy set theory.

Books:

1. Neural Network by Ranga Kutta

2. Neural Network by Philip D. Wasserma

3. S.R. Jang, Sun & Mizutani, Neuro-Fuzzy and soft computing, PHI.

4. Bart Kosko, Neural Network & Fuzzy Systems, PHI.

SUB	SUB CODE	MAX. MARKS	MIN. MARKS
Open Elective I (E- Commerce)	**IT-605**	**S-40, T-60**	**S-20,T-20**

Course Objectives :

• Discuss fundamentals of E-commerce, types and applications.
• Evaluate the role of the major types of information systems in a business environment and their relationship to each other
• Assess the impact of the Internet and Internet technology on business electronic commerce and electronic business
• Learn strategies for e-commerce, e government, Wireless Application Protocol, WAP technology and electronic payment system.

Course Contents :

Unit I:
Introduction Definition of Electronic Commerce, Brief history of Ecommerce, e, E-Commerce: technology and prospects, incentives for engaging in electronic commerce, needs of E-Commerce, advantages and disadvantages, , Inter Organizational E-Commerce Intra Organizational E-Commerce, and Consumer to Business Electronic Commerce, Architectural framework ,Impact of E-commerce on business, E-Commerce Models.

Unit II:
Network Infrastructure for E- Commerce Internet and Intranet based E-commerce- Issues, problems and prospects, Network Infrastructure, Network Access Equipments, Broadband telecommunication (ATM, ISDN, FRAME RELAY). Mobile Commerce: Introduction, Wireless Application Protocol, WAP technology, Mobile Information device. Emerging Client Server Security Threats, firewalls & Network Security.

Unit III:
E-Marketplaces, e Procurement and e Payment Systems Define e-Marketplace and Describe their Functions, Explain e-Marketplace types and their features, Describe the various types of auctions and list their characteristics, Discuss the benefits, limitations and impacts of auctions, E-Commerce in the wireless environment, Competition in the DE and impact on industry, Integration and e-Business suits, ERP, eSCM, CRM, e-Procurement definition, processes, methods and benefits , ePayment, Discuss the categories and users of smart cards, Describe payment methods in B2B EC

Unit IV:
Electronic Payment System Electronic Payments Overview of Electronics payments, Overview, The SET protocol, Payment Gateway, Digital Token based Electronics payment System, magnetic strip card, E-Checks, Smart Cards, Credit Card, Debit Card based EPS, Emerging financial Instruments, Home Banking, Online Banking.

Unit V:
E-Government Definition of E-Governments, theoretical background of E-governance, issues in E-governance applications, evolution of e-governance, Implementation, E-Government Services, Challenges and Opportunities, E-Government Benefits, E-governance models- broadcasting, critical flow, comparative analysis, mobilization and lobbying, interactive services / G2C2G.

Course Outcomes :

Upon successful completion of this course the student will be able to:

- Understand the e-business concepts.
- Understand the e-business models and infrastructure.
- Learn how E-business concepts are applied to different fields, such as: education, banking, tourism and so on.

Reference Books :

1. Ravi Kalakota, Andrew Winston, “Frontiers of Electronic Commerce”, Addison Wesley.
2. Pete Lohsin , John Vacca “Electronic Commerce”, New Age International
3. Goel, Ritendra “E-commerce”, New Age International
4. Laudon, “E-Commerce: Business, Technology, Society”, Pearson Education
5. Bajaj and Nag, “E-Commerce the cutting edge of Business”, TMH
6. Turban, “Electronic Commerce 2004: A Managerial Perspective”, Pearson Education
7. Denieal Amor, “ The E-Business Revolution”, Addision Wesley
8. Diwan, Sharma, “E-Commerce” Excel
9. J. Satyanarayan, “E-government: The science of the possible”, PHI Learning Private Limited
10. C.S.R. Prabhu, “E-governence: concept and case study”, PHI Learning Private Limited

SUB	SUB CODE	MAX. MARKS	MIN. MARKS
Open Elective I (Bio Informatics)	**IT-605**	**S-40, T-60**	**S-20,T-20**

Course Objective:

The course has been designed to be an entry level in Bioinformatics. It is introductory in nature and will provide an overview of the concepts and practices in Bioinformatics. The course structure has been designed such that students will acquire skills required to become Assistant Programmer/Technical Assistant in Bioinformatics. It would also help students to acquire a good foundation to take up further studies.

Course Contents :

Unit-I Introduction:

Introduction to bioinformatics, objectives of bioinformatics, Basic chemistry of nucleic acids, structure of DNA & RNA, Genes, structure of bacterial chromosome, cloning methodology, Data maintenance and Integrity Tasks.

Unit-II Bioinformatics Databases & Image Processing:

Types of databases, Nucleotide sequence databases, Protein sequence databases, Protein structure databases, Normalization, Data cleaning and transformation, Protein folding, protein function, protein purification and characterization, Introduction to Java clients, CORBA, Using MYSQL, Feature Extraction.

Unit-III Sequence Alignment and database searching:

Introduction to sequence analysis, Models for sequence analysis, Methods of optimal alignment, Tools for sequence alignment, Dynamics Programming, Heuristic Methods, Multiple sequences Alignment

Unit-IV Gene Finding and Expression:

Cracking the Genome, Biological decoder ring, finding genes through mathematics & learning, Genes prediction tools, Gene Mapping, Application of Mapping, Modes of Gene Expression data, mining the Gene Expression

Unit V Data Proteomics & Problem solving in Bioinformatics:

Proteome analysis, tools for proteome analysis, Genetic networks, Network properties and analysis, complete pathway simulation: E-cell, Genomic analysis for DNA & Protein sequences, Strategies and options for similarity search , flowcharts for protein structure prediction

Course Outcomes:

After Completing the course student should be able to:
1. To get introduced to the basic concepts of Bioinformatics and its significance in Biological data analysis.
2. Describe the history, scope and importance of Bioinformatics and role of internet in Bioinformatics.
3. Explain about the methods to characterize and manage the different types of Biological data. 4. Classify different types of Biological Databases.
5. Introduction to the basics of sequence alignment and analysis.

Recommended Books:

1. Gopal & Jones, BIOINFORMATICS with fundamentals of Genomics & Proteomics ,TMH Pub
2. Rastogi , Bioinformatics –Concepts , skills & Applications , CBS Pub
3. Claverie , Bioinformatics , Wiley pub
4. Stekel , Micrarray BioInformatics , Cambrid

SUB	SUB CODE	MAX. MARKS	MIN. MARKS
Open Elective I (Internet of Things)	**IT-605**	**S-40, T-60**	**S-20,T-20**

Course Objective:

Students will understand the concepts of Internet of Things and can able to build IoT applications.

Course Contents:

UNIT I

Introduction: Definition, Characteristics of IOT, IOT Conceptual framework, IOT Architectural view, Physical design of IOT, Logical design of IOT, Application of IOT.

UNIT II

Machine-to-machine (M2M), SDN (software defined networking) and NFV(network function virtualization) for IOT, data storage in IOT, IOT Cloud Based Services.

UNIT III

Design Principles for Web Connectivity: Web Communication Protocols for connected devices, Message Communication Protocols for connected devices, SOAP, REST, HTTP Restful and Web Sockets. Internet Connectivity Principles: Internet Connectivity, Internet based communication, IP addressing in IOT, Media Access control.

UNIT IV

Sensor Technology, Participatory Sensing, Industrial IOT and Automotive IOT , Actuator, Sensor data Communication Protocols ,Radio Frequency Identification Technology, Wireless Sensor Network Technology.

UNIT V

IOT Design methodology: Specification -Requirement, process, model, service, functional & operational view. IOT Privacy and security solutions, Raspberry Pi & arduino devices. IOT Case studies: smart city streetlights control & monitoring.

Course Outcomes:

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

1. Understand the key components that make up an IoT system.
2. Appreciate the role of big data, cloud computing and data analytics in a typical IoT system.
3. Understand where the IoT concept fits within the broader ICT industry and possible future trends.
4. Able to realize the revolution of Internet in Mobile Devices, Cloud & Sensor Networks.
5. Apply the knowledge and skills acquired during the course to build and test a complete, working IoT system involving prototyping, programming and data analysis

Recommended Books:

1. Rajkamal,"Internet of Things", Tata McGraw Hill publication
2. Vijay Madisetti and Arshdeep Bahga, "Internet of things (A-Hand-on-Approach)" 1st Edition, Universal Press
3. Hakima Chaouchi "The Internet of Things: Connecting Objects", Wiley publication.
4. Charless Bell "MySQL for the Internet of things", Apress publications.
5. Francis dacosta "Rethinking the Internet of things:A scalable Approach to connecting everything", 1st edition, Apress publications 2013.
6. Donald Norris"The Internet of Things: Do-It-Yourself at Home Projects for Arduino, Raspberry Pi and BeagleBone Black", McGraw Hill publication.

SUB	SUB CODE	MAX. MARKS	MIN. MARKS
Computer Graphics and Multimedia Lab	**IT-606**	**S-40, P-60**	**S-20,P-20**

• Implementation of various Line drawing & circle drawing algorithms.

• Implementation of curve generation algorithms.

• Implementation of 2D and 3D translation algorithm.

• Mouse programming.

• Design multimedia application using FLASH, DREAM WEAVER and PHOTOSHOP.

• Game designing.

SUB	SUB CODE	MAX. MARKS	MIN. MARKS
Compiler Design Lab	**IT-607**	**S-40, P-60**	**S-20,P-20**

(i) Study and design pass I & pass II of an assembler for simple instruction set.

(ii) Program to generate different data structure used in assembler.

(iii) Study of linking & loading of programs.

(iv) Implementation of various passes of compiler.

SUB	SUB CODE	MAX. MARKS	MIN. MARKS
Computer Networks Lab	**IT-608**	**S-40, P-60**	**S-20,P-20**

Course Objective:

The objective of this lab course is to get practical knowledge of working principles of various communication protocols

Course Contents:

Exercises comprising simulation of various protocols and performance study; TCP/IP Level Programming, Routing Algorithms and internetworking.

Course Outcome:

On completion of the course, students will be able to understand

1. The Practical approach to network communication protocols

2. understand the various routing protocols/Algorithms and Internetwroking

SUB	SUB CODE	MAX. MARKS	MIN. MARKS
Minor Project	**IT-609**	**S-40, P-60**	**S-20,P-20**

A project Based on (expandable)

1. Mobile App Development
2. Python Based Project
3. MATLAB Based Project on neural network , Fuzzy logic etc
4. IOT/Embedded systems/Microcontroller based

SUB	SUB CODE	MAX. MARKS	MIN. MARKS
Seminar	**IT-610**	**S-100**	**S-50**

Presentation on topics related to branch (latest technology)

Research Project guidance

Expert Lectures

Group Discussion.

SUB	SUB CODE	MAX. MARKS	MIN. MARKS
Machine Learning	**IT-701**	**S-40, T-60**	**S-20,T-20**

Course Objective:

To introduce students to the basic concepts and techniques of Machine Learning and to develop skills of using recent machine learning software for solving practical problems.

Course Contents:

UNIT I:

Introduction to machine learning, scope and limitations, regression, probability, statistics and linear algebra for machine learning, convex optimization, data visualization, hypothesis function and testing, data distributions, data preprocessing, data augmentation, normalizing data sets, machine learning models, supervised and unsupervised learning.

UNIT II:

Linearity vs non linearity, activation functions like sigmoid, ReLU, etc., weights and bias, loss function, gradient descent, multilayer network, backpropagation, weight initialization, training, testing, unstable gradient problem, auto encoders, batch normalization, dropout, L1 and L2 regularization, momentum, tuning hyper parameters.

UNIT III:

Convolutional neural network, flattening, subsampling, padding, stride, convolution layer, pooling layer, loss layer, dance layer 1x1 convolution, inception network, input channels, transfer learning, one shot learning, dimension reductions, implementation of CNN like tensor flow, keras etc.

UNIT IV:

Recurrent neural network, Long short-term memory, gated recurrent unit, translation, beam search and width, Bleu score, attention model, Reinforcement Learning, RL-framework, MDP, Bellman equations, Value Iteration and Policy Iteration, , Actor-critic model, Q-learning, SARSA

UNIT V:

Support Vector Machines, Bayesian learning, application of machine learning in computer vision, speech processing, natural language processing etc, Case Study: ImageNet Competition

Course Outcome:

After Completing the course student should be able to:

1. Apply knowledge of computing and mathematics to machine learning problems, models and algorithms;

2. Analyze a problem and identify the computing requirements appropriate for its solution;

3. Design, implement, and evaluate an algorithm to meet desired needs

4. Apply mathematical foundations, algorithmic principles, and computer science theory to the modeling and design of computer-based systems in a way that demonstrates comprehension of the trade-offs involved in design choices.

Book :

1. Christopher M. Bishop, "Pattern Recognition and Machine Learning", Springer-Verlag New York Inc., 2nd Edition, 2011.

2. Tom M. Mitchell, "Machine Learning", McGraw Hill Education, First edition, 2017.

3. Ian Goodfellow and Yoshua Bengio and Aaron Courville, "Deep Learning", MIT Press, 2016

SUB	SUB CODE	MAX. MARKS	MIN. MARKS
IT Project Management	**IT-702**	**S-40, T-60**	**S-20,T-20**

Course Objective:

This course is aimed at introducing the primary important concepts of project management related to managing software development projects. They will also get familiar with the different activities involved in Software Project Management. Further, they will also come to know how to successfully plan and implement a software project management activity, and to complete a specific project in time with the available budget.

Course Contents:

UNIT – I ENGINEERING MANAGEMENT

Engineering Management, Scientific Management, Administrative and Behavioral Management, Functions of technology management, Planning and forecasting, Decision making, Organizing, Leading Technical people, Controlling.

UNIT –II PRODUCT MANAGEMENT

Managing Technology through product life cycle, Managing the research function, Product development process, Production planning and control systems, Product quality, Engineering ethics, Effectiveness achievement, Globalization, Managerial opportunities for Engineers.

UNIT - III PROJECT PLANNING

Project initiation, proposals and contracts, Requirement specification, Project planning, task-set, scheduling and tracking of project, project resources, Estimation, Process definition and tailoring, Process Capability baseline, Effort estimation and scheduling, Quality planning and defect estimation, Risk Management.

UNIT - IV PROJECT EXECUTION

Project Management plan, Project metrics, Configuration Management, Project execution, Life cycle execution, Peer review, Project monitoring and control, Time management, Cost management, HR Management, Communication management, Project Audits, Project closure, ISO 9000 to CMM, software process improvement.

UNIT – V ERP BASICS

Introduction to ERP, Basic concepts of ERP, Risks and benefits of ERP, Functional modules, Market place dynamics, Related technologies, ERP implementation basics, Life cycle, Package selection, Strategies, Process of implementation, Consultants, vendors and employees, Success & Failure factors of ERP implementation, ERP operation and maintenance, Maximizing ERP system, ERP and E business.

Course Outcome:

1. Identify the different project contexts and suggest an appropriate management strategy.
2. Practice the role of professional ethics in successful software development.
3. Identify and describe the key phases of project management.
4. Determine an appropriate project management approach through an evaluation of the business context and scope of the project.

Books :

1. IT Project Management- Kathy Schwable (Vikas Pub)

2. Elements of Management- H. Koontz

3. Principles of Management- Stonier (PHI)

4. IT Project Management- Joshep Phillips (TMH)

5. Information Technology Project Management- Jack T. Marchewka (Wiley)

SUB	SUB CODE	MAX. MARKS	MIN. MARKS
Core Elective III (Data Mining & Data Warehousing)	**IT-703**	**S-40, T-60**	**S-20,T-20**

Course Objective :

1. Student should understand the value of Historical data and data mining in solving real world problems.
2. Student should become affluent with the basic Supervised and unsupervised learning algorithms commonly used in data mining.
3. Student develops the skill in using data mining for solving real-world problems.

UNIT-I

Data Warehousing: Introduction, Delivery Process, Data warehouse Architecture, Data Preprocessing: Data cleaning, Data Integration and transformation, Data reduction. Data warehouse Design: Data warehouse schema, Partitioning strategy Data warehouse Implementation, Data Marts, Meta Data, Example of a Multidimensional Data model. Introduction to Pattern Warehousing.

UNIT-II

OLAP Systems: Basic concepts, OLAP queries, Types of OLAP servers, OLAP operations etc. Data Warehouse Hardware and Operational Design: Security, Backup and Recovery.

UNIT-III

Introduction to Data& Data Mining: Data Types, Quality of data, Data Preprocessing, Similarity measures, Summary statistics, Data distributions, Basic data mining tasks, Data Mining V/s knowledge discovery in databases. Issues in Data mining. Introduction to Fuzzy sets and fuzzy logic.

UNIT-IV

Supervised Learning: Classification: Statistical-based algorithms, Distance-based algorithms, Decision tree-based algorithms, Neural network-based algorithms, Rule-based algorithms, Probabilistic Classifiers.

UNIT-V

Clustering & Association Rule mining: Hierarchical algorithms, Partitional algorithms, Clustering
large databases – BIRCH, DBSCAN, CURE algorithms. Association rules : Parallel and distributed
algorithms such as Apriori and FP growth algorithms.

Course Outcome:

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

1. Understand the need of designing Enterprise data warehouses and will be enabled to approach
business problems analytically by identifying opportunities to derive business.
2. Compare and contrast, various methods for storing & retrieving data from different data sources/repository.
3. Ascertain the application of data mining in various areas and preprocess the given data and visualize it for a given application or data exploration/mining task
4. Apply supervised learning methods to given data sets such as classification and its various types.
5. Apply Unsupervised learning methods to given data sets such as clustering and its various types.
6. Apply Association rule Mining to various domains.

Text Books:

1. Pang – ningTan , Steinbach & Kumar, “Introduction to Data Mining”, Pearson Edu, 2019.
2. Jaiwei Han, Micheline Kamber, “Data Mining : Concepts and Techniques”, Morgan Kaufmann Publishers.
3. Margaret H. Dunham, “Data Mining : Introductory and Advanced topics”, Pearson Edu., 2009.
4. Anahory& Murray, “Data Warehousing in the Real World”, Pearson Edu., 2009.

SUB	SUB CODE	MAX. MARKS	MIN. MARKS
Core Elective III (Cloud Computing)	**IT-703**	**S-40, T-60**	**S-20,T-20**

Course Objective:

1. To provide students with the fundamentals and essentials of Cloud Computing.
2. To provide students a sound foundation of the Cloud Computing so that they are able to start using and adopting Cloud Computing services and tools in their real life scenarios.

Course Contents:

UNIT I:

Introduction: Historical development, Vision of Cloud Computing, Characteristics of cloud computing as per NIST, Cloud computing reference model, Cloud computing environments, Cloud services requirements, Cloud and dynamic infrastructure, Cloud Adoption and rudiments. Overview of cloud applications: ECG Analysis in the cloud, Protein structure prediction, Gene Expression Data Analysis, Satellite Image Processing, CRM and ERP, Social networking.

UNIT II:

Cloud Computing Architecture: Cloud Reference Model, Types of Clouds, Cloud Interoperability & Standards, Scalability and Fault Tolerance, Cloud Solutions: Cloud Ecosystem, Cloud Business Process Management, Cloud Service Management. Cloud Offerings: Cloud Analytics, Testing Under Control, Virtual Desktop Infrastructure.

UNIT III:

Cloud Management & Virtualization Technology: Resiliency, Provisioning, Asset management, Concepts of Map reduce, Cloud Governance, High Availability and Disaster Recovery. Virtualization: Fundamental concepts of compute, storage, networking, desktop and application virtualization. Virtualization benefits, server virtualization, Block and file level storage virtualization Hypervisor management software, Infrastructure Requirements, Virtual LAN(VLAN) and Virtual SAN(VSAN) and their benefits.

UNIT IV:

Cloud Security: Cloud Information security fundamentals, Cloud security services, Design principles, Secure Cloud Software Requirements, Policy Implementation, Cloud Computing Security Challenges, Virtualization security Management, Cloud Computing Security Architecture.

UNIT V:

Market Based Management of Clouds, Federated Clouds/Inter Cloud: Characterization & Definition, Cloud Federation Stack, Third Party Cloud Services. Case study: Google App Engine, Microsoft Azure, Hadoop, Amazon, Aneka COURSE OUTCOMES

Course Outcomes:

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

1 State Cloud fundamentals & its application.

2 Describe the architecture of cloud & various solutions.

3.Paraphrase virtualization technologies & describe cloud management.

4. Explain cloud security fundamentals.

5.Apply various cloud platforms like Google App Engine, Hadoop etc.

Reference Books

1 Buyya, Selvi ," Mastering Cloud Computing ",TMH Pub

2. Kumar Saurabh, "Cloud Computing" , Wiley Pub

3. Krutz , Vines, "Cloud Security " , Wiley Pub

4. Velte, "Cloud Computing- A Practical Approach" ,TMH Pub

5. Sosinsky, " Cloud Computing" , Wiley Pub

SUB	SUB CODE	MAX. MARKS	MIN. MARKS
Core Elective III (Human Computer Interaction)	**IT-703**	**S-40, T-60**	**S-20,T-20**

Course Objectives:

- To understand the principles, techniques and methods in the field.
- To introduce students to theoretical frameworks, models and major developments in HCI.
- To design and evaluate interactive technologies on various grounds to improve the interaction between humans and computers.

Course Contents:

UNIT I

Introduction, History and Foundations of HCI, the challenges: People and Technology, human and Machine- Interaction, Command Line Interface, Graphical User Interface, Ergonomics, Cybernetics, Haptics, Usability of a computer based interactive system, areas of knowledge that relate with HCI, HCI in the context of mobile devices, consumer devices, business applications, scientific applications, web-based applications, collaboration systems, games, etc. Social issues influencing HCI

UNIT II

Basics of Interaction Design: Design, Design process, Navigation design, Screen design and layout. Design rationale. Rules for designing GUIs: Principles, Standards, Guidelines, Golden rules and heuristics, HCI patterns. Implementation details: Perception, gestalt perception, typography, Graphic design- color, display, paper, and other output devices,designing forms and information visualization, events, action object and object action. Overview of the elements of windowing systems, Programming the application, using toolkit and User interface management systems. Software process involved in HCI, Usability engineering, Iteration and prototyping, virtual reality.

UNIT III

Evaluation, Universal Design and User Support: Evaluation techniques: evaluation, Goals of evaluation, Evaluation through expert analysis, Evaluation through user participation, choosing an evaluation method. Heuristic evaluation and cognitive walkthroughs. Universal design: principles, Multi-modal interaction, designing for diversity. User support: Requirements of user support, Approaches to user support, Adaptive help systems, designing user support systems.

UNIT IV

Models and Theories: Cognitive models: Goal and task hierarchies, Linguistic models, The challenge of display-based systems, Physical and device models, Cognitive architectures. Socio-organizational issues and stakeholder requirements: Organizational issues, Capturing requirements. Communication and collaboration models: Face-to-face communication, Conversation, Text-based communication, Group working. Task analysis: Differences between task analysis and other techniques, Task decomposition, Knowledge-based analysis, Entity–relationship-based techniques, Sources of information and data collection, Uses of task analysis. Dialog notations and design, Models of the system: Standard formalisms, Interaction models, Continuous behaviour Modelling rich interaction.

UNIT V

Groupware, Ubiquitous computing and WWW: Groupware: Groupware systems, Computer-mediated communication, Meeting and decision support systems, Shared applications and artifacts, Frameworks for groupware, implementing synchronous groupware. Ubiquitous computing and augmented realities: Ubiquitous computing applications research, Virtual and augmented reality, Information and data visualization. Hypertext, multimedia and the World Wide Web: Understanding hypertext, Finding things, Web technology and issues, Static web content, Dynamic web content. Case Studies.

Course Outcomes:

1. Evaluate the usability of a computer- based system using the concepts studied with respect to HCI
2. Integration of HCI concerns in the software development process

BOOKS RECOMMENDED:

[1] Alan Dix, Janet E. Finlay, “Human-Computer interaction”, Pearson Education.
[2] Olsen, “Human-Computer Interaction”, Cengage Learning.
[3] Preece, J. Sharp, H. & Rogers, “Interaction design: beyond human-computer interaction”, Y. Wiley.
[4] Smith AtakanSerengal, “Human-Computer Interaction”, Cengage Learning.

SUB	SUB CODE	MAX. MARKS	MIN. MARKS
Open Elective II (Mobile Computing)	**IT-704**	**S-40, T-60**	**S-20,T-20**

Course Objectives:

To understand the principles and techniques of how computers use and share data in an environment in which location is not fix.

Course Contents:

Unit-I

Review of Wireless communication technologies. Mobile computing definition, difference between mobile communication and mobile computing, Adaptability-key to mobile computing, mechanisms for adaptation, Support for building Adaptive Mobile Applications-Transcoding Proxy, Odyssey, Rover models

Unit-II

Mobility Management: Mobility Management, Location Management principles and techniques: registration area based location management, dynamic update schemes, location caching, replicating location information, flat and hierarchical organization, location management case studies PCS, Mobile IP

Unit-III

Data Dissemination and Management Challenges, Publish-subscribe mode, information caching, Data Dissemination, mobile data caching, mobile cache Maintenance schemes, Mobile Web Caching Unit-IV Context Aware Computing: Ubiquitous or Pervasive Computing, Context: various definitions and Types, Context Aware Computing and Applications, Middleware support, Middleware for application development: Adaption and Agents.

Unit-V

Service Discovery Middleware: Finding needed Services, Services, Discovery and Advertisement Protocols, Garbage Collection, Eventing, Security, Interoperability.

Course Outcomes: Upon Completing the Course, students will gain the knowledge of various issues involved in mobile computing environment and techniques to resolve.

Books:

1. Frank Adelstein, Sandeep K. Gupta, Golden G. Richard, Loren Schwiebert, Fundamentals of Mobile and Pervasive Computing, McGraw-Hill Education (India), 2005.
2. Reading material from other online sources.

SUB	SUB CODE	MAX. MARKS	MIN. MARKS
Open Elective II (Digital Image Processing)	**IT-704**	**S-40, T-60**	**S-20,T-20**

Course Objective :

• To study the image fundamentals and mathematical transforms necessary for image processing. • To study the image enhancement techniques • To study image restoration procedures. • To study the image compression procedures.

UNIT 1:
Digital Image fundamentals, A simple image model, Sampling and Quantization. Relationship between pixels. Imaging geometry. Image acquisition systems, Different types of digital images.

UNIT 2:
Image transformations, Types of transformation, Walsh transformation, Hadmord transformation, Discrete Cosine Transformation.

UNIT 3:
Image enhancement, Filters in spatial and frequency domains, Histogram based processing. Image subtraction, Averaging, Image smoothing, filtering, Nedion filtering, Image sharpening.

UNIT 4:
Image encoding and segmentation, Encoding: Mapping, Quantizer, Coder. Error free compression, Lossy Compression schemes. JPEG Compression standard. Detection of discontinuation by point detection, Line detection, edge detection, Edge linking and boundary detection, Local analysis, Global processing via Hough transforms and graph theoretic techniques

UNIT 5:
Mathematical morphology- Binary, Dilation, crosses, Opening and closing, Simple methods of representation, Signatures, Boundary segments, Skeleton of a region, Polynomial approximation.

Course Outcome :

1. Review the fundamental concepts of a digital image processing system.
2. Analyze images in the frequency domain using various transforms.
3. Evaluate the techniques for image enhancement and image restoration.
4. Categorize various compression techniques.
5. Interpret Image compression standards.
6. Interpret image segmentation and representation techniques

Books:

1. Rafael C Gonzalez, Richard E Woods 3rd Edition, Digital Image Processing Pearson.
2. Rafael C Gonzalez, Richard E Woods 3rd Edition, Digital Image Processing using Matlab – TMH.
3. Sonka, Digital Image Processing & Computer Vision, Cengage Learning
4 Jayaraman, Digital Image Processing, TMH.
5. Pratt, Digital Image Processing, Wiley India
6 Annadurai, Fundamentals of Digital Image Processing, Pearson Education.

SUB	SUB CODE	MAX. MARKS	MIN. MARKS
Open Elective II (Intellectual Property Rights)	**IT-704**	**S-40, T-60**	**S-20,T-20**

Course Objective :

1. To introduce fundamental aspects of Intellectual property Rights to students who are going to play a major role in development and management of innovative projects in industries.
2. To disseminate knowledge on patents, patent regime in India and abroad and registration aspects
3. To disseminate knowledge on copyrights and its related rights and registration aspects
4. To disseminate knowledge on trademarks and registration aspects

UNIT I:

Introduction- Introduction and Justifications of IPR, Nature of IP, Major forms of IP- Copyright, Patent, Trade Marks Designs, Geographic indication, layout design of Semiconductors, Plant varieties, Concept & Meaning of Intellectual Property. Major international documents relating to the protection of IP - Berne Convention, Paris Convention, TRIPS. The World Intellectual Property Organization (WIPO).

UNIT II:

Copyright Meaning and historical development of copyright, Subject matter, Ownership of copyright, Term of copyright, Rights of owner, Economic Rights, Moral Rights. Assignment and license of rights, Infringement of copyright, Exceptions of infringement, Remedies, Civil, Criminal, Administrative, Registration Procedure.

UNIT III:

Patents Meaning and historical development, Criteria for obtaining patents, non-patentable inventions, Procedure for registration, Term of patent, Rights of patentee, Compulsory license, Revocation, Infringement of patents, Exceptions to infringement, Remedies, Patent office and Appellate Board.

UNIT IV:

Trade Marks, Designs & GI Trade Marks: Functions of marks, Procedure for registration, Rights of holder, Assignment and licensing of marks, Infringement, Trade Marks Registry and Appellate Board. Designs: Meaning and evolution of design protection, Registration, Term of protection, Rights of holder, unregistered designs. Geographical Indication: Meaning and evolution of GI, Difference between GI and Trade Marks, Registration, Rights, Authorized user.

UNIT V:

Contemporary Issues & Enforcement of IPR, IPR & sustainable development, The Impact of Internet on IPR. IPR Issues in biotechnology, ECommerce and IPR issues, Licensing and enforcing IPR, Case studies in IPR.

References:

1. P. Narayanan, Intellectual Property Law, Eastern Law House
2. Neeraj Pandey and Khushdeep[Dharni, Intellectual Property Rights, PHI, 2014
3. N.S Gopalakrishnan and T.G. Agitha, Principles of Intellectual Property, Eastern Book Co. Lucknow, 2009.
4. Anand Padmanabhan, Enforcement of Intellectual Property, Lexis Nexis Butterworths, Nagpur, 2012.
5. Managing Intellectual Property The Strategic Imperative, Vinod V. Sople, PHI.
6. Prabuddha Ganguli, " Intellectual Property Rights" Mcgraw Hill Education, 2016.

Course Outcome: -

1. Students will be able to understand Primary forms of IPR.
2. Students will be able to asses and critique some basic theoretical justification for major forms of IP Protection.
3. Students will be able to compare and contrast the different forms of IPR in terms of key differences and similarities.
4. Students will be able understand the registration procedures related to IPR.
5. Students will be exposed to contemporary issues and enforcement policies in IPR.

SUB	SUB CODE	MAX. MARKS	MIN. MARKS
Machine Learning Lab	**IT-705**	**S-40, P-60**	**S-20,P-20**

List of Assignment in Machine Learning Lab:

- Problem based on different machine Learning & Deep Learning
- Works on different machine learning & Deep Learning Tools
- Case Studies on different data sets

SUB	SUB CODE	MAX. MARKS	MIN. MARKS
Advance Technology Lab I	**IT-706**	**S-40, P-60**	**S-20,P-20**

Course Objective:

• To learn Designing and developing Web applications
•Designing Enterprise based applications by encapsulating an application's business logic.
•Designing applications using pre-built frameworks.

Unit I
Java Database Connectivity(JDBC): JDBC Product, Types of Drivers, Two-Tier Client/Server Model, ThreeTier Client/Server Model, Basic Steps of JDBC, Creating and Executing SQL Statement, The Result Set Object, Working with Database MetaData Interface
Unit II
Java Servlets:Servlet Interaction & Advanced Servlets, Life cycle of Servlet, Java Servlet Development Kit, Javax.servletpackage, Reading Servlet Parameters, Reading Initialization Parameters, The javax.servlet.http Package, Handling HTTP.

Unit III
JavaServer Pages(JSP): JSP Technologies, Understanding the Client-Server Model, Understanding Web server software, Configuring the JSP Server, Handling JSP Errors, JSP Translation Time Errors, JSP Request Time Errors, Creating a JSP Error Page Remote Method Invocation (RMI): RMI Architecture, Designing RMI application, Executing RMI application

Unit IV
Enterprise Java Beans (EJB): Types of Enterprise Java beans, Session Bean & Entity Bean, Features of Session Bean, Life-cycle of Stateful Session Bean, Features of Entity Bean, Life-cycle of Entity Bean, Containermanaged Transactions & Bean-managed Transactions, Implementing a container-managed Entity Bean

Unit V
Struts: Introduction to the Apache Struts, MVC Architecture, Struts Architecture, How Struts Works? Introduction to the Struts Controller, Introduction to the Struts Action Class, Using Struts ActionFrom Class, Using Struts HTML Tags, Introduction to Struts Validator Framework, Client Side Address Validation in Struts, Custom Validators Example, Developing Application with Struts Tiles

Course Outcomes:

Upon successful completion of this course students will be able to-

- learn to access database through Java programs, using Java Data Base Connectivity (JDBC)
- create dynamic web pages, using Servlets and JSP.
- make a resusable software component, using Java Bean.
- invoke the remote methods in an application using Remote Method Invocation (RMI)
- understand the multi-tier architecture of web-based enterprise applications using Enterprise JavaBeans (EJB).
- develop Stateful, Stateless and Entity Beans.
- use Struts frameworks, which gives the opportunity to reuse the codes for quick development.

Books :

1.Java the Complete Reference, ninth edition by Herbert Schild, Publisher: McGraw Hills
2.Head First EJB 3.0 by Kathy Sierra, Bert Bates, Publisher: O'Reilly Media
3.Head First Servlets and JSP by Bryan Basham, Kathy Sierra & Bert Bates, Publisher: O'Reilly Media
4.Just Hibernate, A Lightweight Introduction to the Hibernate Framework by Madhusudhan Konda, Publisher: O'Reilly Media
5.Programming Jakarta Struts, 2nd Edition by Chuck Cavaness, Publisher: O'Reilly Medi

SUB	SUB CODE	MAX. MARKS	MIN. MARKS
Major Project Phase I	**IT-707**	**S-40, P-60**	**S-20,P-20**

Final Year Projects represent the culmination of study towards the Bachelor of Engineering degree. Projects offer the opportunity to apply and extend material learned throughout the program.
Major project is to be completed in two phases, phase I in VII semester and Phase II in VIII semester. Assessment will be based on seminar presentation, submission of a thesis and final Presentation and viva-voce by the examiner.

SUB	SUB CODE	MAX. MARKS	MIN. MARKS
Seminar	**IT-708**	**S-100**	**S-50**

The aim of this course is to improve presentation skills, Technical skill, Research skills with the help of individual and group activities like quizzes/group discussions/Mock tests/Expert lectures/presentations etc.

SUB	SUB CODE	MAX. MARKS	MIN. MARKS
Internship/Training II	**IT-709**	**S-100**	**S-50**

Credits for the internship/Training completed in the III year will be awarded in this semester.

SUB	SUB CODE	MAX. MARKS	MIN. MARKS
Online certification Course	**IT-710**	**S-100**	**S-50**

Online course certification on any topic related to the branch (latest/upcoming technology) is to be completed. The course duration should be 50 hours(minimum). Any MOOC course from SWAYAM portal or any other online platform can be taken. For assessment, A presentation and submission of the Certificate is mandatory.

SUB	SUB CODE	MAX. MARKS	MIN. MARKS
Network Security	**IT-801**	**S-40, T-60**	**S-20,T-20**

Course Objectives:

This Course focuses towards the introduction of network security using various cryptographic algorithms. It also focuses on the practical applications that have been implemented and are in use to provide email and web security.

Course Contents:

UNIT I:

Introduction to Network Security, Computer Security and Cyber Security. Security Terminologies and Principle, Security Threats, Types of attacks (Operating System, application level, Shrink Wrap code, Misconfiguration attacks etc.). Introduction to Intrusion, Terminologies, Intrusion Detection System (IDS), Types of Intrusion Detection Systems, System Integrity Verifiers (SIVS).Indication of Intrusion: System Indications, File System Indications Network Indications. Intrusion Detection Tools ,Post attack IDS Measures & Evading IDS Systems. Penetration Testing, Categories of security assessments, Vulnerability Assessment, Types of Penetration Testing. Risk Management.

UNIT II:

Cryptography, Classical Cryptographic Techniques, Encryption, Decryption, Code Breaking: Methodologies, Cryptanalysis, Cryptography Attacks, Brute-Force Attack, Use of Cryptography. Public key cryptography, Principles of Public key Cryptosystems, Cryptographic Algorithms RSA, Data Encryption Standard (DES), RC4, RC5, RC6, Blowfish, Key Management, Diffie-Hellman key exchange, elliptic curve cryptography.

UNIT III:

Hash Functions, One-way Hash Functions, SHA (Secure Hash Algorithm), Authentication Requirements, Authentication Functions, Kerberos. Message Authentication codes, Message Digest Functions, MD5, SSL (Secure Sockets Layer), SSH (Secure Shell), Algorithms and Security, Disk Encryption, Government Access to Keys (GAK) Digital Signature: Analysis, Components, Method, Applications, Standard, Algorithm: Signature Generation/Verification, ECDSA, EIgamal Signature Scheme, Digital Certificates.

UNIT IV:

Trojans and Backdoors: Overt and Covert Channels, Working, Types (Remote Access Trojans, Data-Sending Trojans, Destructive Trojans, Trojans, Proxy Trojans, FTP Trojans, Security Software Disablers). Viruses and Worms: Characteristics, Working, Infection Phase, Attack Phase. Sniffers: Definition, spoofing, Sniffing, Vulnerable Protocols, Types.Phishing: Methods, Process, Attacks Types (Man-in-the-Middle Attacks, URL Obfuscation Attacks, Hidden Attacks, Client-side Vulnerabilities, Deceptive Phishing, Malware-Based Phishing, DNS Based Phishing, Content-Injection Phishing, Search Engine Phishing). Web Application Security- Secured authentication mechanism, secured session management, Cross-site Scripting, SQL Injection and other vulnerabilities Denial-of Service Attacks: Types of Attacks (Smurf Attack, Buffer Overflow Attack, Ping of Death Attack, Teardrop Attack, SYN Attack, SYN Flooding), DDoS Attack(Distributed DoS Attack.), Session Hijacking, Spoofing v Hijacking, TCP/IP hijacking, CAPTCHA Protection.

UNIT V:

IP Security, Web Security, Firewalls: Types, Operation, Design Principles, Trusted Systems. Computer Forensics, Need, Objectives, Stages & Steps of Forensic Investigation in Tracking Cyber Criminals, Incident Handling. Hacking, Classes of Hacker (Black hats, grey hats, white hats, suicide hackers), Foot printing, Scanning (Types-Port, Network, Vulnerability), E-Mail Spiders, Overview of System Hacking Cycle.

Course Outcomes:

1. Analyze and evaluate the cyber security needs of an organization.
2. Analyze software vulnerabilities and security solutions to reduce the risk of exploitation.
3. Measure the performance and troubleshoot cyber security systems.
4. Implement cyber security solutions and use of cyber security, information assurance, and cyber/computer forensics software/tools.
5. Design and develop security architecture for an organization.
6. Design operational and strategic cyber security strategies and policies.

Books:

1. William Stallings, “Cryptography and Network Security: Principles and Practice” Pearson Charlie Kaufman, Radia Perlman, Mike Speciner, Michael Speciner, “Network Security - Private communication in a public world” TMH
2. Fourozon, “Cryptography & Network Security” TMH.
3. Joseph Migga Kizza, Computer Network Security, Springer International Edition.
4. Atul Kahate, “Cryptography and Network Security” Mc Graw Hill
5. Carl Endorf, Eugene Schultz, Jim Mellander “Intrusion Detection & Prevension” TMH.
6. Neal, Krawetz, Introduction to Network Security,Cengage Learning

SUB	SUB CODE	MAX. MARKS	MIN. MARKS
Core Elective IV (Data Science)	**IT-802**	**S-40, T-60**	**S-20,T-20**

Course Objective:

The objective of this course is to familiarize students with the roles of a data scientist and enable them to analyze data to derive meaningful in formation from it.

Course Contents:

Unit I

Data Science and Big Data Overview: Types of data, Sources of data, Data collection, Data storage and management, Big Data Overview, Characterization of Big data, Drivers of Big Data, Challenges, Big Data Use Cases, Defining Big Data Analytics and examples of its use cases, Data Analytics Lifecycle: Discovery, Data Preparation, Model Planning, Model Building, Communicate Results, Operationalize.

Unit II

Advanced Analytical Theory and Methods: Clustering, K-means, Additional Clustering Algorithms, Association Rules, Apriori Algorithm, Applications of Association Rules, Regression, Linear Regression, Logistic Regression, Classification, Decision Trees, Naive Bayes, Additional Classification Methods, Text Analysis, Text Analysis Steps, Determining Sentiments.

Unit III

Advanced Analytics-Technology and Tools: Analytics for Unstructured Data Use Cases, MapReduce, Apache Hadoop, Traditional database vs. Hadoop, Hadoop Core Components, HDFS, Design of HDFS, HDFS Components, HDFS Architecture, Hadoop 2.0 Architecture, Hadoop-2.0 Resource Management, YARN.

Unit IV

The Hadoop Ecosystem: Introduction to Hive, Hbase, Hive Use Cases: Face book, Healthcare; Hive Architecture, Hive Components. Integrating Data Sources, Dealing with Real-Time Data Streams, Complex Event Processing, Overview of Pig, Difference between Hive and Pig, Use Cases of Pig, Pig program structure, Pig Components, Pig Execution, Pig data models, Overview of Mahout, Mahout working.

Unit V

Introduction to R, Basic Data Analytics Methods Using R, Communicating and Operationalizing an Analytics Project, Creating the Final Deliverables, Data Visualization Basics.

Course Outcomes:

After the completion of this course, the students will be able to:
1. Demonstrate proficiency with statistical analysis of data.
2. Build and assess data-based models.
3. Execute statistical analyses with professional statistical software.
4. Demonstrate skill in data management.
5. Apply data science concepts and methods to solve problems in real-world contexts and will communicate these solutions effectively

Books:

1. EMC Education Services, “Data Science and Big Data Analytics”, Wiley, 2015.
2. Judith Hurwitz, Alan Nugent, Fern Halper, and Marcia Kaufman, “Big Data for Dummies”,Wiley & Sons,2013.
3. VigneshPrajapati, “Big Data Analytics with R and Hadoop” ,Packt Publishing, 2013.
4. David Dietrich, Barry Heller, and Beibei Yang“Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data”, John Wiley & Sons, Inc.

SUB	SUB CODE	MAX. MARKS	MIN. MARKS
Core Elective IV (Natural Language Processing)	**IT-802**	**S-40, T-60**	**S-20,T-20**

Course Objective:

To gain the knowledge for developing advanced technology of computer systems like Speech recognition and machine translation.

Course Contents :

UNIT I

Introduction to Natural Language Understanding- Levels of language analysis- Syntax, Semantics, Pragmatics, Applications, Ambiguity, Morphology, Parsing with Finite State Transducers, Regular Expressions, Stemmer, Spelling errors.

UNIT II

Computational Phonology: speech sound, phonetic transcription, text to speech, Pronunciation Variations, Bayesian Method to spelling and pronunciations, Minimum Edit Distance, Weighted Automata, N-grams.

UNIT III

HMM and speech recognition, Viterbi algorithm, Acoustic processing of speech, Feature Extraction, Speech Synthesis; Part-of-Speech Tagging: rule based, stochastic, transformation based.

UNIT IV

Syntax Processing: Parsing with CFG, CKY parsing and the Earley parser, Probabilistic parsing; Semantic Processing: Meaning representation, First Order Predicate Calculus. Lexical Semantics: Internal structure of words, thematic roles, Primitive decomposition, WordNet.

UNIT V

Word sense disambiguation; Information Retrieval: Vector space model, Improving user queries; Pragmatic Processing: Discourse; Natural Language Generation, Machine Translation.

Course Outcomes:

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

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

Books:

[1] D. Jurafsky and J.H. Martin; Speech and Language Processing; Processing; Prentice Hall; 2000.

[2] C. Manning and H. Schutze, "Foundations of Statistical Natural Language Processing",

[3] James Allen."NaturalLanguage Understanding",AddisonWesley,1994.

[4] Richard M Reese, Natural Language Processing with Javall, OReilly Media, 2015.

[5] Tanveer Siddiqui, U.S. Tiwary, Natural Language Processing and Information Retrieval, Oxford University Press, 200

SUB	SUB CODE	MAX. MARKS	MIN. MARKS
Core Elective IV (Block Chain Technology)	**IT-802**	**S-40, T-60**	**S-20,T-20**

Course Objective:

To understand the concept of Blockchain and its platforms- Bitcoin, Ethereum, Hyperledger and Multichain. The course provides an overview of the structure and mechanism of Blockchain.

Course Contents:

Unit I

Introduction and crypto foundation: Elliptic curve cryptography, ECDSA, Cryptographic hash function, SHA-256, Merkle trees, Cryptocurrencies.

Unit II

Bitcoin, Bitcoin addresses, Bitcoin blockchain, block header, mining proof of work (PoW) algorithm, difficulty adjustment algorithm, mining pools, transactions, double spending attack, The 51% attacker, block format, transaction format, Smart contacts (escrow, micropayments, decentralized lotteries), payment channels.

Unit III

Ethereum: Overview of differences between Ethereum and bitcoin, block format, mining algorithm, proof-of-stake (PoS) algorithm, account management, contracts and transactions, Solidity language, decentralized application using Ethereum.

Unit IV

Smart Contracts Different Blockchains and Consensus mechanisms.

UNIT V

Blockchain and Security R3, CORDA and Hyperledger System architecture, ledger format, chain code, transaction flow and ordering, private channels, membership service providers, case studies.

Course Outcomes:

After Completing the course student should be able to:

1. Understand blockchain architecture and requisite crypto foundation.
2. Understand various consensus protocol and their usage for their specific application.
3. Understand and Resolve security concern in blockchain.
4. Explore blockchain advances and upcoming platforms.
5. Learn to write smart contracts.
6. Understand use cases.

Books:

1. Mastering Bitcoin:Unblocking Digital Cryptocurrencies, by Andreas Antonopoulos.
2. Mastering Ethereum, Antonopoulos, Andreas M. and Wood, O'Reilly Media,Inc.,2018
3. An Introduction to Bitcoin, V. Saravanan, Lecture Notes.
4. Bitcoin and Cryptocurrencies Technologies: A Comprehensive Introduction, Arvind Narayanan, Princeton University Press(July 19,2016)ISBN-10:0691171696.

SUB	SUB CODE	MAX. MARKS	MIN. MARKS
Core Elective V (Artificial Intelligence)	**IT-803**	**S-40, T-60**	**S-20,T-20**

Course Objectives:

- Study the concepts of Artificial Intelligence.
- Learn the methods of solving problems using Artificial Intelligence.
- Learn the knowledge representation techniques, reasoning techniques and planning
- Introduce the concepts of Expert Systems and machine learning.

Course Contents:

UNIT-I Introduction:
Introduction to AI-Problem formulation, Problem Definition -Production systems, Control strategies, Search strategies. Problem characteristics, Production system characteristics Problem solving methods – Defining the problem as state space search, Problem graphs, Matching, Indexing and Heuristic functions.

UNIT-II Search Techniques:
Hill Climbing-Depth first and Breath first, heuristic search strategies- Bestfirst search, A*, AO* search, Constraints satisfaction, Means end analysis, simulated annealing, etc. Measure of performance and analysis of search algorithms. Adversarial search –Minimax search procedure, alpha-beta pruning, iterative deepening, genetic algorithms - Related algorithms, etc.

UNIT-III Representation of Knowledge :
Game playing - Knowledge representation, Knowledge representation using Predicate logic, Introduction to predicate calculus, Resolution, Use of predicate calculus, Knowledge representation using other logic-Structured representation of knowledge. Knowledge representation -Production based system, Frame based system, Scripts, CD, Ontologies, Sementic web and RDF.

UNIT-IV Knowledge Inference and Planning:
Inference – Backward chaining, forward chaining, Rule value approach, uncertain knowledge and reasoning: Probabilistic reasoning, Bayesian networks, Fuzzy logic and reasoning, Theory-Bayesian Network-Dempster - Shafer theory. Planning overview, components of planning system, Goal stack planning, Hierarchal planning, and other planning techniques.

UNIT-V Machine Learning and Expert Systems:
Overview of different forms of learning, Statistical methods, Learning Decision Trees, Neural Networks, Clustering- basic agglomerative, divisive algorithm based on similarity/dissimilarity measures. Introduction to Natural Language Processing. Architecture of expert systems, Roles of expert systems - Knowledge Acquisition –Meta knowledge. Typical expert systems - MYCIN, DART, XOON, Expert systems shells. Basic knowledge of Prolog programming language.

Course Outcomes:

Upon completing the course, students will be able to:

- Familiar with Artificial Intelligence, its foundation and principles.
- Identify appropriate AI methods to solve a given problem.
- Examine the useful search techniques, knowledge representation techniques, Inference methods; learn their advantages, disadvantages and comparison.
- Understand important concepts like Expert Systems, AI applications.
- Learn Prolog Programming to program intelligent systems.

Books:

1. Kevin Night and Elaine Rich, Nair B., “Artificial Intelligence (SIE)”, Mc Graw Hill2008.
2. Stuart Russel and Peter Norvig “AI – A Modern Approach”, 2nd Edition, Pearson Education 2007Peter Jackson, “Introduction to Expert Systems”, 3 rd Edition, Pearson Education, 2007.
3. Dan W. Patterson, “Introduction to AI and ES”, Pearson Education, 2007. (Unit-III).
5. Carl Townsend, “Introduction to Turbo PROLOG”, BPB Publication.
6. Ivan Bratko,”Prolog Programming for Artificial Intelligence”, 3rd Edition, Pearson Education.

SUB	SUB CODE	MAX. MARKS	MIN. MARKS
Core Elective V (Pattern Recognition)	**IT-803**	**S-40, T-60**	**S-20,T-20**

Course Objective :

- To learn about supervised and unsupervised pattern classifiers.
- To familiarize about different feature extraction techniques.
- To explore the role of Hidden Marko model and SVM in pattern recognition.
- To understand the application of Fuzzy logic and genetic algorithms for pattern classifier

UNIT I:

Introduction to Pattern Recognition, Regular Pattern, Irregular Pattern, Approaches to Pattern Recognition, Parametric, Non-Parametric Approaches. Parzen window method for density estimation, Feature selection, Search methods, Pattern Recognition Applications.

UNIT II:

Discriminant functions, Decision surfaces, Classification algorithms: Naive Bayes, Random Tree, Random Forest, Multiple Polynomial Regression, Classification using SVM. Classifier Ensembles, Linear Regression.

UNIT III:

Introduction to hidden Markov models (HMMs), Discrete HMMs and Evaluation problem, Forward method for evaluation problem, backward method for evaluation problem, Parameter estimation for HMMs, Continuous density HMMs (CDHMMs).

UNIT IV:

Types of Clustering, K-Mean Clustering, Isodata Clustering, Clustering Metrics, Clustering applications, Fuzzy K-Mean, Clustering tendency, Semi Supervised learning. Fuzzy variants of classification and clustering algorithms.

UNIT V:

Neural networks fundamentals, Genetic Algorithms, Neural and Genetic based 30 approaches for Pattern recognition, Self-organizing maps, Advantages/Disadvantages of Neural based approaches for Pattern Recognition.

Course Contents:

Upon completion of the course the student will be able to

- Differentiate between supervised and unsupervised classifiers
- Classify the data and identify the patterns.
- Extract feature set and select the features from given data set.
- Apply fuzzy logic and genetic algorithms for classification problems

References:

1. Pattern recognition and image processing Earl Gose

2. Pattern classification Duda, Hart, stork.

SUB	SUB CODE	MAX. MARKS	MIN. MARKS
Core Elective V (Parallel Computing)	**IT-803**	**S-40, T-60**	**S-20,T-20**

Course Objectives:

Parallel programming is ubiquitous in today's multi-core era and solves many real-world scientific problems. Massive parallelism entails significant hardware and software challenges. The course is structured so that the participants understand challenges in efficient execution of large-scale parallel applications. The course will also involve a research-oriented component.

Course Contents:

Unit I:
Introduction and Message passing Why parallel computing? Shared memory and distributed memory parallelism, Amdahl's law, speedup and efficiency, supercomputers.MPI basics, point-to-point communication, collective communication, synchronous/asynchronous send/recv, algorithms for gather, scatter, broadcast, reduce.

Unit II:
Parallel communication Network topologies, network evaluation metrics, communication cost, routing in interconnection networks, static and adaptive routing, process-to-processor mapping.

Unit III:
Performance Scalability, benchmarking, performance modeling, impact of network topologies, parallel code analysis and profiling.

Unit IV:
Designing parallel codes Domain decomposition, communication-to-computation ratio, load balancing, adaptivity, case studies: weather and material simulation codes.

Unit V:
Parallel I/O and Additional topics MPI I/O algorithms, contemporary large-scale I/O architecture, I/O bottlenecks. Job scheduling, RDMA, one-sided communication, NVM, extreme scale computing: issues and trends.

Course Outcomes:

After completing of this course, the students will learn theoretical/practical aspects of parallel computing, and they will be able to effectively use parallel machines. Also, students will gain exposure to perform research on parallel computing, and to learn programming multicore processors.

Books:

[1] Peter S Pacheco, An Introduction to Parallel Programming, Morgan Kaufmann, 2011.
[2] DE Culler, A Gupta and JP Singh, Parallel Computer Architecture: A Hardware/Software Approach Morgan-Kaufmann, 1998.
[3] Marc Snir, Steve W. Otto, Steven Huss-Lederman, David W. Walker and Jack Dongarra, MPI - The Complete Reference, Second Edition, Volume 1, The MPI Core.
[4] William Gropp, Ewing Lusk, Anthony Skjellum, Using MPI : portable parallel programming with the message-passing interface, 3rd Ed., Cambridge MIT Press, 2014.
[5] A Grama, A Gupta, G Karypis, and V Kumar, Introduction to Parallel Computing. 2nd Ed., Addison-Wesley, 2003.
[6] JL Hennessy and DA Patterson, Computer Architecture: A Quantitative Approach, 4th Ed., Morgan Kaufmann/Els India, 2006.
[7] MJ Quinn, Parallel Computing: Theory and Practice, Tata McGraw Hill, 2002.

SUB	SUB CODE	MAX. MARKS	MIN. MARKS
Core Elective V (Advanced Computer Architecture)	**IT-804**	**S-40, T-60**	**S-20,T-20**

Course Objectives:

This subject aims to provide students with a fundamental knowledge of computer hardware and computer systems, with an emphasis on system design and performance. The module concentrates on the principles underlying systems organization, issues in computer system design, and contrasting implementations of modern system

Course Contents:

Unit-I

Flynn's Classification, System Attributes to Performance, Parallel computer models Multiprocessors and multicomputer, Multi vector and SIMD Computers. Data and resource dependences, Hardware and software parallelism, Program partitioning and scheduling, Grain size and latency, Control flow, data flow and Demand driven mechanisms. Static interconnection networks, Dynamic interconnection Networks: Bus Systems, Crossbar Switch, Multiport Memory, Multistage and Combining Networks

Unit- II

Instruction set architecture, CISC Scalar Processors , RISC Scalar Processors, VLIW architecture, Memory Hierarchy, Inclusion, Coherence and Locality, Memory capacity planning. Interleaved memory organization- memory interleaving, pipelined memory access, Bandwidth and Fault Tolerance. Backplane Bus System: Backplane bus specification, Addressing and timing protocols, Arbitration transaction and interrupt.

Unit-III

Linear pipeline processor, Nonlinear pipeline processor, Instruction pipeline design, Mechanisms for instruction pipelining, pipeline hazards, Dynamic instruction scheduling – score boarding and Tomosulo's algorithm, Branch handling techniques, Arithmetic Pipeline Design, Static arithmetic pipeline, Multifunctional arithmetic pipelines. Superscalar pipeline design, Super pipeline processor design.

Unit-IV

Cache coherence, Snoopy protocols, Directory based protocols. Message routing schemes in Multi computer network, deadlock and virtual channel. Vector Processing Principles, Vector Instruction types, Vector-access memory schemes. Vector supercomputer architecture, SIMD organization: distributed memory model and shared memory model. Principles of Multithreading: Multithreading Issues and Solutions, Multiple-Context Processors

Unit-V

Parallel Programming Models, Shared-Variable Model, Message-Passing Model, Data-Parallel Model, Object-Oriented Model, Functional and Logic Models, Parallel Languages and Compilers, Language Features for Parallelism, Parallel Programming Environment, Software Tools and Environments.

Course Outcomes:

1. Discuss the classes of computers, and new trends and developments in computer architecture.
2. Study advanced performance enhancement techniques such as pipelines, dynamic scheduling branch predictions, caches.
3. Compare and contrast the modern computer architectures such as RISC, Scalar, and multi CPU systems.
4. Critically evaluate the performance of different CPU architecture.
5. Improve the performance of applications running on different CPU architectures.
6. Develop applications for high performance computing systems.

References:

1. Kai Hwang, “Advanced computer architecture”, TMH. 2013 - 14

2. J.P.Hayes, “computer Architecture and organization”; MGH.

3. V.Rajaranam & C.S.R.Murthy, “Parallel computer”; PHI Learning.

4. Kain,”Advance Computer Architecture: - A System Design Approach”, PHI Learning

5. M.J Flynn, “Computer Architecture, Pipelined and Parallel Processor Design”; Narosa

Publishing.

6.Hwang and Briggs, “Computer Architecture and Parallel Processing”; MGH.

SUB	SUB CODE	MAX. MARKS	MIN. MARKS
Core Elective V (Robotics)	**IT-804**	**S-40, T-60**	**S-20,T-20**

Course Objectives: To familiarize student with the introductory concepts of Robotics.

Course Contents:

Unit-I

Introduction-Introduction to robotics, Robot Usage, Robot subsystems, Robot Classification, Technology of Robots, Basic Principles in robotics.

Unit-II

Spatial Descriptions, Transformation and Sensors Robot Architecture , Descriptions: Positions , Orientations and Frames , Mappings :Changing descriptions from Frame to Frame ,Operators: Translations, Rotations and Transformations , Transform Equations , Coordinate Transformations, Sensor Classification , Internal Sensors, External sensors , Vision system , sensor selection .

Unit-II

Kinematics- Link- Connection Description, Forward and Inverse Positional Analysis , Velocity Analysis: Jacobian Matrix ,Link Velocities, Acceleration analysis, Statics: Forces and Moment Balance, Recursive Calculation, Equivalent Joint Torques, Force Ellipsoid, Dynamics : Inertia Properties, Dynamics Algorithms .

Unit-IV

Control-Control Techniques, Second order Linear systems, Feedback Control, Performance of feedback control systems, Joint controller, Nonlinear Trajectory Control, State space Representation and control, Stability, Cartesian and force controls.

Unit-V

Motion Planning and Computer for Robots - Joint space Planning, Cartesian space planning, Position and orientation Trajectories, Point to Point Planning, Continuous path Generation, Computational speed, Hardware requirements, Control considerations, Robot Programming, Hardware architecture. A case study for Autonomous Mobile Robot.

Course Outcome:

After Completion of the course, students will be able to understand

1. Basic Principle of operation of Robotics
2. Robot Architecture
3. Robot Kinematics

Books:

1. Saha , Introduction to Robotics , TMH Pub.

2. Craig , Introduction to Robotics ,Mechanics and control , Pearson Pub

3. Ghosal , Robotics –Fundamental Concepts and Analysis , Oxford Pub.

4. Niku , Introduction to Robotics:Analysis , System & Applications , PHI

5. Fu , Robotics ,TMH Pub

SUB	SUB CODE	MAX. MARKS	MIN. MARKS
Core Elective V (Cyber Law & Forensics)	**IT-804**	**S-40, T-60**	**S-20,T-20**

Course Objective :

The aim of this course is to make the students aware of security aspect related to online data, cybercrimes and related laws

Unit I:

Cyber world: an overview, internet and online resources, security of information, digital signature, intellectual property (IP), historical background of IP, IPR governance, National patent offices, the world intellectual property organization (WIPO).

Unit II:

Introduction about the cyber space, cyber law, regulation of cyber space, scope of cyber laws: e-commerce; online contracts; IPRs (copyright, trademarks and software patenting), e-taxation; e-governance and cybercrimes, cyber law in India with special reference to Information Technology Act, 2000.

Unit III:

Introduction to computer and cybercrimes. Cybercrimes and related concepts, distinction between cybercrimes and conventional crimes, Cyber criminals and their objectives. Kinds of cybercrimes cyber stalking; cyber pornography, forgery and fraud, crime related to IPRs, cyber terrorism; computer vandalism etc. Cyber forensics, computer forensics and the law, forensic evidence, computer forensic tools.

Unit IV:

Regulation of cybercrimes, Issues relating to investigation, issues relating to jurisdiction, issues relating to evidence, relevant provisions under Information Technology Act 2000, Indian penal code, pornography Act and evidence Act etc.

Unit V:

Copyright issues in cyberspace: linking, framing, protection of content on web site, international treaties, And trademark issues in cyberspace: domain name dispute, cyber-squatting, uniform dispute resolution policy, computer software and related IPR issues

Course Outcome :

Upon successful completion of the Course

a) Analyze and evaluate the cyber security needs of an organization.

b) Determine and analyze software vulnerabilities and security solutions to reduce the risk of exploitation.

c) Measure the performance and troubleshoot cyber security systems.

d) Implement cyber security solutions and use of cyber security, information assurance, and cyber/computer forensics software/tools.

Books:

1. Nelson, Phillips, “Computer Forensics and Investigations”, Cengage Learning India.
2. Vinod V. Sople, “Managing Intellectual Property” PHI Learning Private Limited.
3. Dr.R.K.Tiwari P.K.Sastri,K.V. Ravikumar, “Computer crime and Computer Forensics”, First Edition 2002, Select publishers.
4. NUT, Understanding Forensics in IT, PHI Learning.
5. IT Act 2000 Details www.mit.gov.in
6. Simpson, “Ethical Hacking and Network Defense”, Cengage Learning India

SUB	SUB CODE	MAX. MARKS	MIN. MARKS
Advance Technology Lab II	**IT-805**	**S-40, P-60**	**S-20,P-20**

Course Objective:

To familiarize students with open source academic software like Scilab or licensed software like Matlab to carryout experiments in various fields in due course like computer graphics and multimedia, soft-computing, image processing, data mining etc. Experimental works in web design will enable students to design web pages and develop web based projects.

Course Contents:

Introduction to MATLAB/SciLab Installing MATLAB/SciLab Under windows/linux, Basics of MATLAB programming, Data Types, Creating variables, comments, multiline comments, Array operations in MATLAB/Scilab, Loops and execution control statements, inbuilt mathematical functions, Working with files: Scripts and Functions, Plotting and program output, overview of various toolboxes, introduction to Matlab simulink.

Introduction to Web Design Introduction, Elements, Tags, Attributes, Paragraph, Headings, Line Breaks, Horizontal Rule, Lists, Formatting, Color Codes, Font, Text Links, Email, Images, Image Link, Forms, Table, Frames, Comments, Music Codes, Video Codes, Div, DHTML: Cascading Style Sheet Introduction, Types of CSS, Selectors (Tags), Class and Id with the Selectors, CSS Background & Color, CSS Text, CSS Font, CSS Border, CSS Padding.

Suggested List of Experiments/ program (Expandable):

1. Write your first Matlab/Scilab program.
2. Extract an individual element of an array
3. Write Matlab/Scilab program to illustrate loops and control statements.
4. Create a simple plot.
5. Name the title, axes title of the plot.
6. Create a webpage with HTML describing your department on following points: Use paragraph and list tags. Apply various colours to suitably distinguish key words. Also apply font styling like italics, underline and two other fonts to words you find appropriate. Also use header tags.
7. Create a web page using HTML for following: Create a table to show your class timetable. Use tables to provide layout to your HTML page describing your university infrastructure.

Reference Books:

1. Fausett L.V. (2007) Applied Numerical Analysis Using MATLAB, 2nd Ed., Pearson Education
2. Chapra S.C. and Canale R.P. (2006) Numerical Methods for Engineers, 5th Ed., McGraw Hill
3. N.P. Gopalan, “Web Technology”, PHI.
4. Ivan Bayross, “HTML, JavaScript, DHTML and PHP”, BPB Publication.

SUB	SUB CODE	MAX. MARKS	MIN. MARKS
Major Project Phase II	**IT-806**	**S-40, P-60**	**S-20,P-20**

Final Year Projects represent the culmination of study towards the Bachelor of Engineering degree. Projects offer the opportunity to apply and extend material learned throughout the program. Assessment is by means of a seminar presentation, submission of a thesis, and final Presentation and viva-voce by the examiner.

SUB	SUB CODE	MAX. MARKS	MIN. MARKS
Network Security Lab	**IT-807**	**S-40, P-60**	**S-20,P-20**

Course Objectives:
1. To provide deeper understanding into cryptography, its application to network security, threats/vulnerabilities to networks and countermeasures.
2. To explain various approaches to Encryption techniques, strengths of Traffic Confidentiality, Message Authentication Codes.
3. To familiarize symmetric and asymmetric cryptography

Syllabus List Of Experiments:

Lab 1: Implementation of Caesar Cipher technique
Lab 2: Implement the Play fair Cipher
Lab 3: Implement the Pure Transposition Cipher
Lab 4: Implement DES Encryption and Decryption
Lab 5: Implement the AES Encryption and decryption
Lab 6: Implement RSA Encryption Algorithm
Lab 7: Implementation of Hash Functions

Course Outcomes:
At the end of this course students will be able to:
1. Identify basic security attacks and services
2. Use symmetric and asymmetric key algorithms for cryptography
3. Make use of Authentication functions

SUB	SUB CODE	MAX. MARKS	MIN. MARKS
General Proficiency	**IT-808**	**S-40, P-60**	**S-20,P-20**

This course aims for overall personality development of a students and making him ready for his future endevours.

SUB	SUB CODE	MAX. MARKS	MIN. MARKS
Seminar	**IT-809**	**S-100**	**S-50**

The aim of this course is to improve presentation skills, Technical skill, Research skills with the help of individual and group activities like quizzes/group discussions/Mock tests/Expert lectures/presentations etc.

SUB	SUB CODE	MAX. MARKS	MIN. MARKS
Online certification Course	**IT-810**	**S-100**	**S-50**

Online course certification on any topic related to the branch (latest/upcoming technology) is to be completed. The course duration should be 50 hours(minimum). Any MOOC course from SWAYAM portal or any other online platform can be taken. For assessment, presentation and submission of the Certificate is mandatory.