DR. A P J ABDUL KALAM UNIVERSITY,

INDORE

SYLLABUS

of

BACHELOR OF ENGINEERING

Computer science & Engineering

(Third Sem, Grading System)

(Session July- December 2017)

College of Engineering

Dr. A P J Abdul Kalam University, Indore

DR. A P J ABDUL KALAM UNIVERSITY, INDORE

Syllabus for Bachelor of Engineering

Computer science & Engineering

List of Subject (Third Sem, Grading System)

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Sub Code : MA220T **Sub Name :** Mathematics-III **4 Credits**

Unit I Functions of complex variables

Analytic functions, Harmonic Conjugate, Cauchy-Riemann Equations, Line Integral, Cauchy's Theorem, Cauchy's Integral Formula, Singular Points, Poles & Residues, Residue Theorem, Application of Residues theorem for evaluation of real integrals.

Unit II Numerical Solution of Algebraic and Transcendental Equations

Errors & Approximations, Solution of Algebraic & Trancedental Equations (Regula Falsi , Newton-Raphson, Iterative, Secant Method), Solution of simultaneous linear equations by Gauss Elimination, Gauss Jordan, Crout's methods , Jacobi's and Gauss-Siedel Iterative methods

Unit III Interpolation, Numerical differentiation & Integration

Difference Operators, Interpolation (Newton Forward & Backward Formulae, Central Interpolation Formulae, Lagrange's and divided difference formulae), Numerical Differentiation and Numerical Integration.

Unit IV Functions of Complex Variables

Solution of Ordinary Differential Equations(Taylor's Series, Picard's Method, Modified Euler's Method, Runge-Kutta Method, Milne's Predictor & Corrector method), Correlation and Regression, Curve Fitting (Method of Least Square).

Unit V Transformation

Fourier Transform: Definition and properties of Fourier transform, Sine and Cosine transform. Z-transform .Testing of Hypothesis :Students t-test, Fisher's z-test, Chi-Square Method

References:

1. Erwin Kreyszig: Advanced Engineering Mathematics, Wiley India.
2. B.S. Grewal: Higher Engineering Mathematics , Khanna Publication.
3. Engineering Mathematics By Samnta Pal and Bhutia, Oxford Publication
4. Ramana: Advance Engg. Mathematics, TMH New Delhi
5. Numerical Methods for Engineers by Steven C. Chapra, McGraw Hill Education
6. Introductory Methods of Numerical Analysis by S. S. Sastry, PHI Learning Pvt. Ltd.
7. Numerical Methods By Shrimanta Pal, Oxford

Unit-1

Introduction to semiconductor physics: insulator, conductor, semiconductor and semiconductor types. Drift and diffusion carries, Hall Effects. **Review of PN junction diode**: PN junction diode in forward and reverse bias, temperature dependence of V-I characteristics, diode resistances, diode junction capacitance. Types of diodes: Zener Diode, Varactor Diode, Tunnel Diode, PIN Diode, Schottky Diode, LED and Photo Diodes, Switching characteristics of diode.

Unit-2

Bipolar junction transistor - Construction, basic operation, current components and equations, CB, CE and CC configuration, input and output characteristics, Early effect, Region of operations: active, cut-off and saturation region. BJT as an amplifier. Ebers-Moll model, Power dissipation in transistor ($P_{d,max}$ rating), Photo transistor. **Transistor biasing circuits and analysis:** Introduction, various biasing methods:Fixed bias,Self bias, Voltage Divider bias, Collector to base bias, Load-line analysis: DC and AC analysis, Operating Point and Bias Stabilization and Thermal Runaway. Transistor as a switch.

Unit-3

Small Signal analysis: Small signal Amplifier,Amplifier Bandwidth, Hybrid model, analysis of transistor amplifier using h-parameter, Multistage Amplifier: Cascading amplifier, Boot-strapping Technique, Darlington amplifier and cas-code amplifier, Coupling methods in multistage amplifier, Low and high frequency response, Hybrid π model, Current Mirror circuits. **Large Signal analysis and Power Amplifiers:** Class A,Class B,Class AB,Class C,Class D, Transformer coupled and Push-Pull amplifier.

Unit-4

FET construction- JFET: Construction, n-channel and p-channel, transfer and drain characteristics, parameters, Equivalent model and voltage gain, analysis of FET in CG, CS and CD configuration. Enhancement and Depletion MOSFET drain and transfer Characteristics.

Unit-5

Uni-junction Transistor (UJT) and Thyristors:UJT: Principle of operation, characteristics, UJT relaxation oscillator, PNPN Diode and its characteristics, Silicon controlled rectifier: V-I characteristics, DIAC and TRIAC, Thyristors parameters and applications.

References:

1. Millman and Halkias: Integrated electronics, TMH.
2. Boylestad and Nashelsky: Electronic Devices and Circuit Theory, Pearson Education.
3. Sedra and Smith: Microelectronics, Oxford Press.
4. Anil K. Maini, VarshaAgarwal: Electronic Devices and Circuits, Wiley Publications.
5. Rashid: Electronic Devices and Circuits, Cengage learning.
6. Salivahanan: Electronic Circuits Analysis and Design, TMH.
7. Kumar and Jain: Electronic Devices and Circuits, PHI.
8. David A. Bell Electronic Devices and Circuits Oxford University press.

Sub Code CS-301P Sub Name: Electronic Devices & Circuits **1** Credits

PRACTICAL LIST:

1. To determine and analyze the V-I characteristics of PN Junction diode and Zener diode.
2. To determine input and output characteristics of transistor amplifiers in CE, CB &CC configurations.
3. To determine the frequency response of transistor CE amplifier, direct coupled and RC coupled amplifier.
4. To determine characteristics of UJT as relaxation Oscillator.
5. To determine Drain and Transfer Characteristics of JFET Amplifier.
6. To determine Drain and Transfer Characteristics of MOSFET Amplifier.
7. To determine characteristics of class A and B power amplifiers.
8. To determine characteristics of class C and AB power amplifiers.

Sub Code: CS-302T **Sub Name:** Digital circuits & Design **3 Credits**

Unit-1

Review of Logic gates and binary operations- AND, OR, NOT, NAND, NOR, Exclusive–OR and Exclusive–NOR Implementations of Logic Functions using gates, NAND–NOR implementations – Multi level gate implementations- Multi output gate implementations. Introduction to number systems and binary operations. **Boolean postulates and laws** – De-Morgan's Theorem - Principle of Duality, Boolean function, Canonical and standard forms,Minimization of Boolean functions, Minterm, Maxterm, Sum of Products (SOP), Product of Sums (POS),Karnaugh map Minimization, Don't care conditions, Quine-McCluskey method of minimization.

Unit-2

Combinational logic circuits: Half adder – Full Adder – Half subtractor - Full subtractor– Parallel binary adder, parallel binary Subtractor – Fast Adder - Carry Look Ahead adder– Serial. Adder/Subtractor - BCD adder – Binary Multiplier – Binary Divider - Multiplexer/De-multiplexer – decoder - encoder – parity checker – parity generators –code converters - Magnitude Comparator.

Unit-3

Sequential logic circuits: Latches, Flip-flops - SR, JK, D, T, and Master-Slave, Characteristic table and equation–Application table – Edge triggering – Level Triggering – Realization of one flip flop using other flip flops – serial adder/subtractor.

Unit-4

Registers and Counters: Asynchronous Ripple or serial counter. Asynchronous Up/Down counter – Synchronous counters – Synchronous Up/Down counters – Programmable counters – Design of Synchronous counters: state diagram-State table –State minimization –State assignment - Excitation table and maps-Circuit. Implementation -Modulo–n counter, Registers – shift registers - Universal shift registers. Shift register counters – Ring counter – Shift counters - Sequence generators.

Unit-5

Logic Families: Introduction to different logic families and their characteristics ,RTL,DTL,TTL, ECL, IIL,TTL inverter – circuit description and operation, CMOS inverter – circuit description and operation, other TTL and CMOS gates, **Memories** – ROM - ROM organization - PROM – EPROM – EEPROM – EAPROM, RAM – RAM organization Static RAM, Dynamic RAM, Programmable Logic Array (PLA) - Programmable Array Logic (PAL).

References:

1. M. Morris Mano, Digital Design, 3rd Edition, Prentice Hall of India Pvt. Ltd., 2003 Pearson Education (Singapore) Pvt. Ltd., New Delhi, 2003.
2. Donald P.Leach and Albert Paul Malvino, Digital Principles and Applications, 6thEdition,TMH, 2003.
3. Anil K. Maini, Digital electronics Principles and Integrated circuits Wiley India Pvt. Ltd.
4. Anand kumar- fundamental of digital circuit. 3rd edition.PHI.
5. John. F. Wakerly, Digital Design, Principles and Practices, Pearson Prentice Hall

Sub Code: CS-302P **Sub Name:** Digital Circuits & Design **1 Credits**

PRACTICAL LIST:

1. Signal sampling and reconstruction.
2. Generation and detection of amplitude modulation.
3. Generation and detection of Frequency modulation.
4. Pulse code modulation & Demodulation.
5. Delta modulation & Demodulation.
6. BFSK modulation & Demodulation.
7. BPSK modulation & Demodulation.
8. Time division multiplexing and Demultiplexing.
9. Line coading and decoading technique.
10. Ampitude shift keying (ASK). Frequency shift keying Technique (FSK), & Phase shift keying(PSK) using Matlab.

Sub Code : CS-303 T **Sub Name : Data Structure II** **3 Credits**

Unit1: Introduction –Common operations on data structures, Types of data structures, Data structures & Programming, Linear Data Structures - Sequential representations - Arrays and Lists, Stacks, Queues and Dequeues, strings, Application. Linear Data Structures, Link Representation - Linear linked lists, circularly linked lists. Doubly linked lists, application. Program Design, Complexities, Time Complexity, order of Growth, Asymptotic Notation.

Unit 2: Sorting –Need for sorting , Types of sorting algorithm-Stable sorting Algorithm, Internal & External sorting algorithm , Outline and offline algorithm ,Sorting Techniques-Insertion , Shell , Selection ,Merge ,Quick sort, Radix sort ,bucket sort .

Unit 3: Advanced Data Structures-Hash tables ,Heaps , Complexity , Analysis of Heap Operations , Application of Heap , AVL tress , Insertion & Deletion in AVL tree , Red Black Trees , Properties of Red Black trees ,Insertion & Deletion in Red Black tree .

Unit 4: Augmenting Data structures – Augmenting a red black trees, Retrieving an element with a given rank , Determining the rank of element ,Data structure Maintenance ,An augmentation strategy ,Interval Trees.

Unit 5: File structures- Basic file operations, File organization –Sequential file organization, Indexed sequential file organization, Direct file organization. External merge sort, Multiway Merge sort, Tournament Tree , Replacement Selection .

REFERENCES:

[1]. Horowitz and Sahani, “Fundamentals of data Structures”,University Press

[2]. Trembley and Sorenson , “Data Structures”, TMH Publications

[3]..A. M. Tenenbaum, “Data Structures using C & C++”, Pearson Pub

[4]. Venkatesan , Rose, “Data Structures” Wiley India Pvt.Ltd

[5]. Pai; Data structure and algorithm , TMH Publications

[6]. T.H.Coreman,”Introduction to algorithm”,PHI.

Sub Code : CS-303 P **Sub Name : Data Structure II** **3 Credits**

PRACTICAL LIST:

1. Algorithm to search ab element using Linear search.
2. Algorithm to search ab element using Binary search.
3. Algorithm Matrix multiplication.
4. Algorithm to sort array using quick sort.
5. Algorithm to implement Binary search.
6. Algorithm to implement Linked list.
7. Algorithm to implement Double Linked list.
8. Algorithm to implement Queue as Linked list.
9. Algorithm to implement Stack using Linked list.
10. Algorithm to implement Stack as Linked list.
11. Algorithm to convert an infix to postfix Expression.
12. Algorithm to evaluate postfix expression.
13. Algorithm to sort array using bubble sort.
14. Algorithm to sort array using Selection sort.
15. Algorithm to merge two sorted array.
16. Algorithm for tree traversal.

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Sub Code CS-304T Sub Name: Discrete Structure 4 Credits

Unit 1: Set Theory, Relation, Function, Theorem Proving Techniques : Set Theory: Definition of sets, countable and uncountable sets, Venn Diagrams, proofs of some general identities on sets Relation: Definition, types of relation, composition of relations, Pictorial representation of relation, Equivalence relation, Partial ordering relation, Job-Scheduling problem Function: Definition, type of functions, one to one, into and onto function, inverse function, composition of functions, recursively defined functions, pigeonhole principle. Theorem proving Techniques: Mathematical induction, Proof by contradiction.

Unit 2: Algebraic Structures: Definition, Properties, types: Semi Groups, Monoid, Groups, Abelian group, properties of groups, Subgroup, cyclic groups, Cosets, factor group, Permutation groups, Normal subgroup, Homomorphism and isomorphism of Groups, example and standard results, Rings and Fields: definition and standard results.

Unit 3: Propositional Logic: Proposition, First order logic, Basic logical operation, truth tables, tautologies, Contradictions, Algebra of Proposition, logical implications, logical equivalence, predicates, Normal Forms, Universal and existential quantifiers. Introduction to finite state machine Finite state machines as models of physical system equivalence machines, Finite state machines as language recognizers

Unit 4: Graph Theory: Introduction and basic terminology of graphs, Planer graphs, Multigraphs and weighted graphs, Isomorphic graphs, Paths, Cycles and connectivity, Shortest path in weighted graph, Introduction to Eulerian paths and circuits, Hamiltonian paths and circuits, Graph coloring, chromatic number, Isomorphism and Homomorphism of graphs. Posets, Hasse Diagram and Lattices: Introduction, ordered set, Hasse diagram of partially, ordered set, isomorphic ordered set, well ordered set, properties of Lattices, bounded and complemented lattices.

Unit 5: Combinatorics: Introduction, Permutation and combination, Binomial Theorem, Multimonial Coefficients Recurrence Relation and Generating Function: Introduction to Recurrence Relation and Recursive algorithms , Linear recurrence relations with constant coefficients, Homogeneous solutions, Particular solutions, Total solutions , Generating functions , Solution by method of generating functions.

References:

1. C.L.Liu, “Elements of Discrete Mathematics” Tata Mc Graw-Hill Edition.

2. Trembley, J.P & Manohar; “Discrete Mathematical Structure with Application CS”, McGraw Hill.

3. Kenneth H. Rosen, “Discrete Mathematics and its applications”, McGraw Hill.

4. Bisht, “Discrete Mathematics”,Oxford University Press

5. Biswal,”Discrete Mathematics & Graph Theory”, PHI

Sub Code CS-305T Sub Name: Communication 1 Credits

Unit-1
Introduction: Communication, definition and role of communication, Process of communication.

Unit-2
Importance of professional communication, Levels of communication, Types of communication, Challenges in communication.

Unit-3
Non –verbal communication – Body language, personal appearance, posture, gesture and hand movement, eye contact, facial expressions,

Unit-4
Paralinguistic features - proxemics, haptics, chronemics. Oral presentations.

Unit-5
Case studies on different case or topic.

References:

1. Business Communication, Mc Graw Hill Education, Matthukutty M. Monippally.
2. Effective Business Communication , Mc Graw Hill Education, Neera Jain, Shoma Mukherji.
3. Technical Communication , Cengage , P. Subba Rao, B. Anita Kumar, C. Hima Bindu.
4. Business Correspondence & Report Writing , Mc graw Hills. , R.C. Sharma & Krishna Mohan .
5. Technical Communication – Principles & Practice , Oxford , Meenakshi Raman.
6. Business Communication- Mc graw Hills , Peter Cordom.
7. Communication Skills , Oxford , Sanjay Kumar & Pushpa TMH.
8. Effective Technical Communication, M. Ashraf Rizvi ,Mc Graw Hill Education.

Sub Code HU220P	Sub Name: Communication Skills	1 Credits

PRACTICAL LIST:

Language Lab II

Module 1 : Reading comprehension

Module 2 : Role plays

Module 3 : Debate

Module 4 : Group discussion

Module 5 : Resume writing

Module 6 : Interview skills

Module 7 : Body language

Module 8 : Oral presentations

Sub Code HU221P Sub Name: Idea Generation 2 Credits

The purpose of the subject Idea Generation student design business ideas and involve in coming up with many ideas in a group discussion, selecting the best idea or ideas, working to create a plan to implement the idea, and then actually taking that idea and putting it into practice. The idea can be tangible, something you can touch or see, or intangible, something symbolic or cultural. In this subject students figure out solutions to any number of difficult challenges faces by the industries or companies.

Sub Code HU222P Sub Name: Learning Through Experts 2 Credits

The purpose of the subject is students learn through subject expert in different areas and fields. Expert understands how student learn. Experts are skilled instructional designers and are able to create interaction-rich learning experiences that support a given outcome. In the corporate world, a learning expert should also have an understanding of the business needs of a given learning experience and design it in a way that supports those needs. Students benefit from the expert to create a good critical thinking related to the subjects as well as business needs.

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INDORE

SYLLABUS

of

BACHELOR OF ENGINEERING

Computer science & Engineering

(Fourth Sem, Grading System)

(Session July- December 2017)

College of Engineering

Dr. A P J Abdul Kalam University, Indore

DR. A P J ABDUL KALAM UNIVERSITY, INDORE

Syllabus for Bachelor of Engineering

Computer science & Engineering

List of Subject (Fourth Sem, Grading System)

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5	CS-403T	Theory of computation	7
6	CS2-404T	Analysis & Design of algorithm	8
7	CS-404P	Analysis & Design of algorithm	9
8	CS-405T	Fundamental of IOT	10
9	CS-406T	Machine Learning	11
10	HU229P	NSS/NCC *	12
11	CS-407P	Java /Dot Net Technology(any one)	13

Sub Code : CS-401T Sub Name : Computer system organization 4 Credits

Unit 1:Basic Structure of Computer: Structure of Desktop Computers, CPU: General Register Organization- Memory Register, Instruction Register, Control Word, Stack Organization, Instruction Format, ALU, I/O System, bus,CPU and Memory Program Counter, Bus Structure, Register Transfer Language- Bus and Memory Transfer, addressing modes.

Unit 2: Control Unit Organization: Basic Concept of Instruction, Instruction Types, Micro Instruction Formats, Fetch and Execution cycle, Hardwired control unit, Micro-programmed Control unit- microprogram sequencer Control Memory, Sequencing and Execution of Micro Instruction.

Unit 3:Computer Arithmetic: Additionand Subtraction, Tools Compliment Representation, Signed Addition and Subtraction, Multiplication and division, Booths Algorithm, Division Operation, Floating Point Arithmetic Operation. design of Arithmetic unit

Unit 4: I/O Organization: I/O Interface – PCI Bus, SCSI Bus, USB, Data Transfer: Serial, Parallel, Synchronous, Asynchronous Modes of Data Transfer, Direct Memory Access (DMA), I/O Processor.

Unit 5: Memory Organization: Main memory- RAM, ROM, Secondary Memory – Magnetic Tape, Disk, Optical Storage, Cache Memory: Cache Structure and Design, Mapping Scheme, Replacement Algorithm, Improving Cache Performance, Virtual Memory, memory management hardware

Unit 6: Multiprocessors: Characteristics of Multiprocessor, Structure of Multiprocessor- Inter-processor Arbitration, Inter-Processor Communication and Synchronization. Memory in Multiprocessor System, Concept of Pipelining, Vector Processing, Array Processing, RISC And CISC, Study of Multicore Processor – Intel, AMD.

References:

1. Morris Mano , "Computer System Organization " PHI

2. Alan Clements: "Computer Organization and Architecture", Cengage Learning

3. Subrata Ghosal: "Computer Architecture and Organization", Pearson

4. William stalling ,"Computer Architecture and Organization" PHI

5. M. Usha, T.S. Shrikant: "Computer System Architecture and Organization", Willey India

6. Chaudhuri, P.Pal: "Computer Organization and Design", PHI

7. Sarangi: "Computer Organization and Architecture",Mc- Graw Hills

Practical List:

1) Study of Multiplexer and Demultiplexer

2. Study of Half Adder and Subtractor

3. Study of Full Adder and Subtractor

4. WAP to add two 8 bit numbers and store the result at memory location 2000

5. WAP to multiply two 8 bit numbers stored at memory location 2000 and 2001 and stores the result at memory location 2000 and 2001.

6) WAP to add two 16-bit numbers. Store the result at memory address starting from 2000.
7)WAP which tests if any bit is '0' in a data byte specified at an address 2000. If it is so, 00 would be stored at address 2001 and if not so then FF should be stored at the same address.

8) Assume that 3 bytes of data are stored at consecutive memory addresses of the data memory starting at 2000. Write a program which loads register C with (2000), i.e. with data contained at memory address 2000, D with (2001), E with (2002) and A with (2001).

9) Sixteen bytes of data are specified at consecutive data-memory locations starting at 2000. Write a program which increments the value of all sixteen bytes by 01.

10) WAP to add t 10 bytes stored at memory location starting from 3000. Store the result at memory location 300A.

Sub Code CS-402T Sub Name: **Object Oriented Programming Methodology** 3 Credits

UNIT-I

Overview of C++: Object Oriented Programming -Concepts ,Advantages, Usage, Program Development Environment, C++ Language Standards- Introduction to Various C++ Compilers, C++ Standard Libraries, Main Function in C++ Meaning of Empty Argument List, Function Prototyping, Default Arguments and Argument Matching, User Defined Data Types, Classes & Objects : Structure Union & Classes ,Inline Function, Scope Resolution Operator, Static Class Members: Static Data Member ,Static Member Function, Passing Objects to Function, Returning Objects, Object Assignment Friend Function, Friend Classes

UNIT- II

Array Pointers References & the Dynamic Allocation Operators: Array of Objects, Pointers to Object, Type Checking C++ Pointers, This Pointer, Pointer to Derived Types, Pointer to Class Members, References: Reference Parameter Call by Reference and Return by Reference, Passing References to Objects Returning Reference Independent Reference C++'S Dynamic Allocation Operators Initializing Allocated Memory Allocating Array Allocating Objects.

Constructor & Destructor: Introduction Constructor Access Specifiers for Constructors and Instantiation Parameterized Constructor Multiple Constructor in a Class Constructor with Default Argument Copy Constructor Destructor

UNIT- III

Overloading as Polymorphism Function & Operator Overloading, Function Overloading, Overloading, Constructor Function Finding the Address of an Overloaded Function, Operator Overloading: Creating a Member Operator Function, Creating Prefix & Postfix Forms of the Increment & Decrement Operation, Overloading the Shorthand Operation (I.E. +=-= etc.) Operator Overloading Restrictions Operator Overloading Using Friend Function, Overloading New & Delete Overloading Some Special Operators Overloading [ ] ( ) - Comma Operator Overloading <<

UNIT- IV

Inheritance: Base Class Access Control, Protected Base Class Inheritance Inheriting Multiple Base Classes Constructors Destructors & Inheritance When Constructor & Destructor Function are Executed Passing Parameters to Base Class Constructors Granting Access Virtual Base Classes Virtual Functions & Polymorphism: Virtual Function Pure Virtual Functions Early Vs. Late Binding.

UNIT- V

Exception Handling Exception Handling in C++ Try Throw Catch Sequence Multiple Catch Blocks Uncaught Exceptions Catch-All Exception Handler the C++ I/O System Basics: C++ Streams the Basic Stream Classes C++ Predefined Streams Formatted I/O: Formatting Using the IOS Members Setting the Formal Flags Clearing Format Flags an Overloaded Form of Setf() Using Width() Precision() and Fill() Using Manipulators to Format I/O Creating Your Own Manipulators.

Reference Books:

1. E. Balagurusamy – Programming in C – Tata McGraw Hill 3rd Edition– 2004.
2. K.R. Venugopal Sudeep R. Prasad – Programming with C – Tata McGraw Hill - 2002.
3. Yashavant Kanetkar – Let Us C – BPB Publications- 5th Edition - 2004.

Practical List:

1. Write a program that just outputs "Hello World".
2. Write a program that output value as number and as character.
3. Implement the function that calculates the cross sum of an integer.
4. Determine the number of characters in a string.
5. Raising a number n to a power p is the same as multiplying n by itself p times.
   Write a function called power() that takes a double value for n and an int value for p, and returns the result as double value. Use a default argument of 2 for p, so that if this argument is omitted, the number will be squared. Write a main() function that gets values from the user to test this function.
6. Write a program that uses a structure called point to model a point. Define three points, and have the user input values to two of them. Then set the third point equal to the sum of the other two, and display the value of the new point.
   Enter coordinates for P1: 3 4
   Enter coordinates for P2: 5 7
   Coordinates of P1+P2 are :8, 11
7. Write a program that uses constructor and destructor.
8. Make a class Employee with a number and salary. Make a class Manager inherit from Employee. Add an instance variable, names department, of type string. Supply a method to string that prints the manager s name, department and salary. Make a class Executive inherit from Manager. Supply a method to String that prints the string Executive followed by the information stored in the Manager superclass object. Supply a test program that tests these classes and methods.
9. Write a function called reversit() that reverses a string (an array of char). Use a for loop that swaps the first and last characters, then the second and nest to last characters and so on. The string should be passed to reversit() as an argument. Write a program to exercise reversit(). The program should get a string from the user, call reversit(), and print out the result. Use an input method that allows embedded blanks. (Test the program with Napoleons famous phrase, Able was I ere I saw Elba).
10. Create a base class called shape. Use thais class to store two double type values that could be used to compute the area of figures. Derive two specific classes calledtriangle and rectangle from the base shape. Add to the base class, a member function get_data() to initialize base class data members and another member function display_area() to compute and display the area of figures. Make display_area() as a virtual function and redifne this function in the derived classes to suit their requirements. Using these classes, design a program that will accept dimensions of a triangle or a rectangle interactively and display the area. Remember the two values given as input will be treated as lengths of two sides in the case of rectangles and as base and height in the case of triangles and used as follows:
    Area of rectangle = x*y
    Area of triangle =1/2* x*y
11. Consider the following class definition

```
Class father {
Protected : int age;
Public;
Father(int x) { age=x;}
Virtual void iam()
{
Cout<< "I am the father,my age is :"<<age<<endl;}
};
```

    Derive the two classes son and daughter from the above class and for each, define iam() to write our similar but appropriate messages. You should also define suitable constructors for these classes.
    Now, write a main() that creates objects of the three classes and then calls iam() for them. Declare pointer to father. Successively, assign addresses of objects of the two derived classes to this pointer and in each case, call iam() through the pointer to demonstrate polymorphism in action.

UNIT 1: 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 2: 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 3: 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 4: 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 5: Tractable and Untractable 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.

References:

1. John E. Hopcroft, Jeffery Ullman,"Introduction to Automata theory, Langauges & computation" , Narosa Publishers.
2. K.L.P Mishra & N.Chandrasekaran,"Theory of Computer Science", PHI Learning
3. Michael Sipsev,"Theory of Computation",Cenage Learning
4. John C Martin, "Introdution to languages and theory of computation", McGraw Hill
5. Daniel I.A. Cohen,"Introduction to Computer Theory",Wiley India.
6. Kohavi,"Switching & Finite Automata Theory",TMH

Sub Code : CS-404T **Sub Name : Analysis & Design of algorithm** **3Credits**

Unit 1: Algorithms, Designing algorithms, analyzing algorithms, asymptotic notations, heap and heap sort. Introduction to divide and conquer technique, analysis, design and comparison of various algorithms based on this technique, example binary search, merge sort, quick sort, strassen's matrix multiplication.

Unit 2: Study of Greedy strategy, examples of greedy method like optimal merge patterns, Huffman coding, minimum spanning trees, knapsack problem, job sequencing with deadlines, single source shortest path algorithm

Unit 3: Concept of dynamic programming, problems based on this approach such as 0/1 knapsack, multistage graph, reliability design, Floyd-Warshall algorithm Backtracking concept and its examples like 8 queen's problem, Hamiltonian cycle, Graph coloring problem etc.

Unit 4: Introduction to branch & bound method, examples of branch and bound method like traveling salesman problem etc. Meaning of lower boundtheory and its use in solving algebraic problem, introduction to parallel algorithms.

Unit 5: Binary search trees, height balanced trees, 2-3 trees, B-trees, basic search and traversal techniques for trees and graphs (In order, preorder, postorder, DFS, BFS), NP-completeness.

References:

1. Coremen Thomas, Leiserson CE, Rivest RL; Introduction to Algorithms; PHI.
2. Horowitz & Sahani; Analysis & Design of Algorithm
3. Dasgupta; algorithms; TMH
4. Ullmann; Analysis & Design of Algorithm;
5. Michael T Goodrich, Robarto Tamassia, Algorithm Design, Wiely India

Sub Code : CS-404 P **Sub Name : Analysis & Design of algorithm** **1 Credits**

Practical List:

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 salesmanproblem.
12. Write a program for Hamiltonian cycle problem.

Sub Code 405T	Sub Name: Fundamental of IOT	4 Credits

Unit I Introduction To Internet of Things

Definition & Characteristics of IoT - Challenges and Issues - Physical Design of IoT, Logical Design of IoT - IoT Functional Blocks, Security.

Unit II Components In Internet of Things

Control Units Communication modules Bluetooth Zigbee Wifi GPS- IOT Protocols (IPv6, 6LoWPAN, RPL, CoAP etc), MQTT, Wired Communication, Power Sources.

Unit III Technologies Behind IoT

Four pillars of IOT paradigm, - RFID, Wireless Sensor Networks, SCADA (Supervisory Con- trol and Data Acquisition), M2M - IOT Enabling Technologies - BigData Analytics, Cloud Computing, Embedded Systems.

Unit IV IoT Applications

Business models for the internet of things, Smart city, smart mobility and transport, smart buildings and infrastructure, smart health, environment monitoring and surveillance.

Unit V Resource Management in IoT

Clustering, Clustering for Scalability, Clustering Protocols for IOT.

Text Book(s)

1. Dieter Uckelmann et.al, Architecting the Internet of Things, Springer, 2011
2. Arshdeep Bahga and Vijay Madisetti, Internet of Things A Hand-on Approach, Universities press, 2015

Reference Books

1. Charalampos Doukas , Building Internet of Things with the Arduino, Create space, April 2002
2. Dr. Ovidiu Vermesan and Dr. Peter Friess, Internet of Things: From research and innovation to market deployment, River Publishers 2014.

Sub Code CS-406T	Sub Name: Machine Learning	4 Credits

UNIT I
What is Machine Learning, Examples of Various Learning Paradigms, Perspectives and Issues, Version Spaces, Finite and Infinite Hypothesis Spaces, PAC Learning.

UNIT II
Learning a Class from Examples, Linear, Non-linear, Multi-class and Multi-label classification, Generalization error bounds: VC Dimension, Decision Trees: ID3, Classification and Regression Trees, Regression: Linear Regression, Multiple Linear Regression, Logistic Regression.

UNIT III
Neural Networks: Introduction, Perceptron, Multilayer Perceptron, Support vector machines: Linear and Non-Linear, Kernel Functions, K-Nearest Neighbors.

UNITIV
Ensemble Learning Model Combination Schemes, Voting, Error-Correcting Output Codes, Bagging: Random Forest Trees, Boosting: Adaboost, Stacking.

UNIT V
Introduction to clustering, Hierarchical: AGNES, DIANA, Partitional: K-means clustering, KMode Clustering, Self-Organizing Map, Expectation Maximization, Gaussian Mixture Models.

Text Book
1. Ethem Alpaydin, Introduction to Machine Learning , MIT Press, Prentice Hall of India, Third Edition 2014

Reference Books
1. Sergios Theodoridis, Konstantinos Koutroumbas, Pattern Recognition, Academic Press, 4th edition, 2008, ISBN:9781597492720.
2. Mehryar Mohri, Afshin Rostamizadeh, Ameet Talwalkar ”Foundations of Machine Learning, MIT Press, 2012
3. Tom Mitchell, Machine Learning, McGraw Hill, 3rd Edition,1997

Sub Code: HU223P	Sub Name: NSS/NCC	0 Credits

Objective of NSS/NCC:

Objective of NSS/NCC is to improve the Helping Nature in Social/ Develop Skills, Respect to each other, Communication and Convincing/ Understanding skills of students and it is to give student an opportunity to exercise their rights to express themselves.

Evaluation will be done by assigned faculty based on Qualifier