UTTAR PRADESH TECHNICAL UNIVERSITY
LUCKNOW

Syllabus

for

B.TECH. INFORMATION TECHNOLOGY
of

Second Year

(Effective from the Session: 2014-15)

B.TECH INFORMATION TECHNOLOGY

STUDY & EVALUATION SCHEME

2nd Year SEMESTER III

S. No.	Course Code	Subject	Periods			Evaluation Scheme				Subject Total	Credit
			L	T	P	Sessional Exam			ESE		
						CT	TA	Total			
THEORY SUBJECT											
1	NAS-301/ NOE-031 to NOE-039	Mathematics III/Science Based Open Elective	3	1	0	30	20	50	100	150	4
2	NEC-309	Digital Logic Design	3	1	0	30	20	50	100	150	4
3	NCS-301	Data Structures Using C	3	1	0	30	20	50	100	150	4
4	NCS-302	Discrete Structures And Graph Theory	3	1	0	30	20	50	100	150	4
5	NHU-301/ NHU-302	Industrial Psychology/ Industrial Sociology	2	0	0	15	10	25	50	75	2
6	NCS-303	Computer Based Numerical And Statistical Techniques	2	1	0	15	10	25	50	75	3
	AUC-001/ AUC-002	*Human Values & Professional Ethics/ Cyber Security*	2	0	0	15	10	25	50	75*	
PRACTICAL/DESIGN/DRAWING											
7	NEC 359	Digital Logic Design Lab	0	0	3	10	10	20	30	50	1
8	NCS 351	Data Structures Using C Lab	0	0	3	10	10	20	30	50	1
9	NCS 353	Numerical Techniques Lab	0	0	2	10	10	20	30	50	1
10	NCS 355	Advance Programming Lab	0	0	2	10	10	20	30	50	1
11	NGP 301	GP						50		50	
		TOTAL	18	5	10					1000	25

Science Based Open Elective:

NOE031 Introduction to Soft Computing (Neural Network, Fuzzy Logic and Genetic Algorithm
NOE032 Nano Sciences
NOE033 Laser Systems and Applications
NOE034 Space Sciences
NOE035 Polymer Science & Technology
NOE036 Nuclear Science
NOE037 Material Science
NOE038 Discrete Mathematics
NOE039 Applied Linear Algebra

*Human values & Professional Ethics /Cyber Security will be offered as a compulsory audit course for which passing marks are 30% in End Semester Examination and 40% in aggregate.

B.TECH INFORMATION TECHNOLOGY

STUDY & EVALUATION SCHEME

2nd Year SEMESTER IV

S. No.	Course Code	Subject	Periods			Evaluation Scheme				Subject Total	Credit
			L	T	P	Sessional Exam			ESE		
						CT	TA	Total			
THEORY SUBJECT											
1	NOE-041 to NOE-049/ NAS-401	Science Based Open Elective/ Mathematics III	3	1	0	30	20	50	100	150	4
2	EHU-401/ EHU -402	Industrial Sociology/ Industrial Psychology	2	0	0	15	10	25	50	75	2
3	NEC-408	Information Theory and Coding	3	1	0	30	20	50	100	150	4
4	NCS- 401	Operating System	3	1	0	30	20	50	100	150	4
5	NCS- 402	Theory Of Automata and Formal Launguage	3	1	0	30	20	50	100	150	4
6	NIT-401	Multimedia and Animation	2	1	0	15	10	25	50	75	3
7	AUC-002/ AUC-001	*Cyber Security / Human Values & Professional Ethics*	2	0	0	15	10	25	50	75*	
PRACTICAL/DESIGN/DRAWING											
7	NCS-451	Operating System Lab	0	0	3	10	10	20	30	50	1
8	NIT-451	Multimedia and Animation Lab	0	0	3	10	10	20	30	50	1
9	NCS-455	Functional and Logic Programming Lab	0	0	3	10	10	20	30	50	1
10	NIT-456	Colloquium	0	0	3	10	10	20	30	50	1
11	NGP-401	GP						50		50	
		TOTAL	18	5	10					1000	25

Science Based Open Elective:

NOE-041 Introduction to Soft Computing (Neural Network, Fuzzy Logic and Genetic Algorithm
NOE-042 Nano Sciences
NOE-043 Laser Systems and Applications
NoE-044 Space Sciences
NOE-045 Polymer Science & Technology
NOE-046 Nuclear Science
NOE-047 Material Science
NOE-048 Discrete Mathematics
NOE-049 Applied Linear Algebra

*Human values & Professional Ethics /Cyber Security will be offered as a compulsory audit course for which passing marks are 30% in End Semester Examination and 40% in aggregate.

NEC-309: DIGITAL LOGIC DESIGN

Unit-I

Digital Design and Binary Numbers:

Binary Arithmetic, Negative Numbers and their Arithmetic, Floating point representation, Binary Codes, Cyclic Codes, Error Detecting and Correcting Codes, Hamming Codes.

Minterm and Maxterm Realization of Boolean Functions, Gate-level minimization: The map method up to four variable, don't care conditions, SOP and POS simplification, NAND and NOR implementation, Quine Mc-Cluskey Method (Tabular method).

Unit-II

Combinational Logic:

Combinational Circuits, Analysis Procedure, Design Procedure, Binary Adder-Subtractor, Code Converters, Parity Generators and Checkers, Decimal Adder, Binary Multiplier, Magnitude Comparator, Decoders, Encoders, Multiplexers, Hazards and Threshold Logic

Unit-III

Memory and Programmable Logic Devices:

Semiconductor Memories, RAM, ROM, PLA, PAL, Memory System design.

Unit-IV

Synchronous Sequential Logic:

Sequential Circuits, Storage Elements: Latches, Flip Flops, Analysis of Clocked Sequential circuits, state reduction and assignments, design procedure.

Registers and Counters: Shift Registers, Ripple Counter, Synchronous Counter, Other Counters.

Unit-V

Asynchronous Sequential Logic: Analysis procedure, circuit with latches, design procedure, reduction of state and flow table, race free state assignment, hazards.

References:

1. M. Morris Mano and M. D. Ciletti, "Digital Design", Pearson Education.
2.A.K .Singh, "Foundation of Digital Electronics and Logic design",New Age international.
3.M. Rafiquzzaman, "Fundamentals of Digital Logic and Microcomputer Design", Wiley Dreantech Publication.
4.ZVI Kohavi, "Switching and Finite Automata theory" ,Tata McGraw-Hill.
5.C.H Roth,Jr., "Fundamentals of Logic Design", ,Jaico Publishing.
6. Rajaraman & Radhakrishnan, "Digital Logic and Computer Organization",PHI Learning Private Limited, Delhi India.
7. Donald D. Givone, "Digital Principles and Design", Tata MCGraw Hill.
8. Marcovitz:Introduction to logic Design ,Tata Mcgraw-hill Education (India) Pvt. Ltd.

NCS-301: DATA STRUCTURES USING – C

Unit - I

Introduction: Basic Terminology, Elementary Data Organization, Algorithm, Efficiency of an Algorithm, Time and Space Complexity, Asymptotic notations: Big-Oh, Time-Space trade-off.

Abstract Data Types (ADT)

Arrays: Definition, Single and Multidimensional Arrays, Representation of Arrays: Row Major Order, and Column Major Order, Application of arrays, Sparse Matrices and their representations.

Linked lists: Array Implementation and Dynamic Implementation of Singly Linked Lists, Doubly Linked List, Circularly Linked List, Operations on a Linked List. Insertion, Deletion, Traversal, Polynomial Representation and Addition,Generalized Linked List .

Unit – II

Stacks: Abstract Data Type, Primitive Stack operations: Push & Pop, Array and Linked Implementation of Stack in C, Application of stack: Prefix and Postfix Expressions, Evaluation of postfix expression, Recursion, Tower of Hanoi Problem, Simulating Recursion, Principles of recursion,Tail recursion, Removal of recursion Queues, Operations on Queue: Create, Add, Delete, Full and Empty, Circular queues, Array and linked implementation of queues in C, Dequeue and Priority Queue.

Unit – III

Trees: Basic terminology, Binary Trees, Binary Tree Representation: Array Representation and Dynamic Representation, CompleteBinary Tree, Algebraic Expressions, Extended Binary Trees, Array and Linked Representation of Binary trees, Tree Traversal algorithms: Inorder, Preorder and Postorder, Threaded Binary trees, Traversing Threaded Binary trees, Huffman algorithm.

Unit – IV

Graphs: Terminology, Sequential and linked Representations of Graphs: Adjacency Matrices, Adjacency List, Adjacency Multi list, Graph Traversal : Depth First Search and Breadth First Search, Connected Component,

Spanning Trees, Minimum Cost Spanning Trees: Prims and Kruskal algorithm. Transistive Closure and Shortest Path algorithm: Warshal Algorithm and Dijikstra Algorithm, Introduction to Activity Networks
Unit – V
Searching : Sequential search, Binary Search, Comparison and Analysis Internal Sorting: Insertion Sort, Selection, Bubble Sort, Quick Sort, Two Way Merge Sort, Heap Sort, Radix Sort, Practical consideration for Internal Sorting.
Search Trees: Binary Search Trees(BST), Insertion and Deletion in BST, Complexity of Search Algorithm, AVL trees, Introduction to m-way Search Trees, B Trees & B+ Trees .
Hashing: Hash Function, Collision Resolution Strategies
Storage Management: Garbage Collection and Compaction.

References :

1. Aaron M. Tenenbaum,YedidyahLangsam and Moshe J. Augenstein "Data Structures Using C and C++", PHI Learning Private Limited, Delhi India
2. Horowitz and Sahani, "Fundamentals of Data Structures", *Galgotia Publications* Pvt Ltd Delhi India.
3. A.K. Sharma ,Data Structure Using C, Pearson Education India.
4. Rajesh K. Shukla, "Data Structure Using C and C++" Wiley Dreamtech Publication.
5. Lipschutz, "Data Structures" Schaum's Outline Series, Tata Mcgraw-hill Education (India) Pvt. Ltd .
6. Michael T. Goodrich, Roberto Tamassia, David M. Mount "Data Structures and Algorithms in C++", Wiley India.
7. P.S. Deshpandey, "C and Datastructure", Wiley Dreamtech Publication.
8. R. Kruse etal, "Data Structures and Program Design in C", Pearson Education
9. Berztiss, A.T.: Data structures, Theory and Practice :, Academic Press.
10. Jean Paul Trembley and Paul G. Sorenson, "An Introduction to Data Structures with applications", McGraw Hill.

NCS-302: DISCRETE STRUCTURES AND GRAPH THEORY

Unit-I
Set Theory: Introduction, Combination of sets, Multisets, Ordered pairs, Set Identities.
Relations: Definition, Operations on relations, Properties of relations, Composite Relations, Equality of relations, Order of relations.
Functions: Definition, Classification of functions, Operations on functions, Recursively defined functions.
Natural Numbers: Introduction, Mathematical Induction, Variants of Induction, Induction with Nonzero Base cases.
Unit-II
Algebraic Structures: Definition, Groups, Subgroups and order, Cyclic Groups, Cosets, Lagrange's theorem, Normal Subgroups, Permutation and Symmetric groups, Group Homomorphisms , Definition and elementary properties of Rings and Fields, Integers Modulo n.
Unit-III
Partial order sets: Definition, Partial order sets, Combination of partial order sets, Hasse diagram.
Lattices: Definition, Properties of lattices – Bounded, Complemented, Modular and Complete Lattice,Morphisms of lattices.
Boolean Algebra: Introduction, Axioms and Theorems of Boolean algebra, Algebraic manipulation of Boolean expressions. Simplification of Boolean Functions, Karnaugh maps, Logic gates, Digital circuits and Boolean algebra. Combinational and sequential Circuits
Unit-IV
Propositional Logic: Proposition, well formed formula, Truth tables, Tautology, Satisfiability, Contradiction, Algebra of proposition, Theory of Inference ,Natural Deduction.
Predicate Logic: First order predicate, well formed formula of predicate, quantifiers, Inference theory of predicate logic.
Unit-V
Trees : Definition, Binary tree, Binary tree traversal, Binary search tree.
Graphs: Definition and terminology, Representation of graphs, Multigraphs, Bipartite graphs, Planar graphs, Isomorphism and Homeomorphism of graphs, Euler and Hamiltonian paths, Graph coloring .
Recurrence Relation & Generating function: Recursive definition of functions, Recursive algorithms, Method of solving recurrences.
Combinatorics: Introduction, Counting Techniques, Pigeonhole Principle

References :

1. Liu and Mohapatra, "Elements of Distcrete Mathematics", McGraw Hill
2. Jean Paul Trembley, R Manohar, Discrete Mathematical Structures with Application to

Computer Science, McGraw-Hill
3. Y. N. Singh, "Discrete Mathematical Structures", Wiley India, New Delhi, First Edition, August 2010.
4. R.P. Grimaldi, Discrete and Combinatorial Mathematics, Addison Wesley,
5. B. Kolman, R.C. Busby, and S.C. Ross, Discrete Mathematical Structures, PHI Learning Private Limited, Delhi India.
6. Biswal ,"Discrete Mathematics and Graph Theory, PHI Learning Private Limited, Delhi India.
7. Goodaire and Parmenter," Discrete Mathematics with Graph Theory", PHI Learning Private Limited, Delhi India.
8. Lipschutz "Discrete Mathematics" Mc Graw Hill
9. Deo N., "Graph Theory with Applications to Engineering and Computer Science", PHI Learning Private Limited, Delhi India.

NCS-303: Computer Based Numerical and Statistical Techniques

- **Unit –I :**

  Computer Arithmetic and Errors: Floating Point Arithmetic, Machine epsilon, Round off Error, Chopping Error, Truncation Error, Associative and Distributive Law in Floating Point arithmetic, Inherent Error, Error propagation, Numerical Instability

  Roots of Equation: Secant Method, Newton Raphson Method and Fixed point Iteration Methods for Simple roots and derivation of their rate of convergence, Aitken Acceleration of Convergence, Modified Newton Raphson Method for Multiple roots, Birge-Vieta Method for Polynomials, Bairstrow Method for quadratic factors, Computer Algorithms of these methods.

- **Unit –II**

  Interpolation: Algorithms and Error Analysis of Lagrange and Newton divided difference interpolations, Relationship in various difference operators, Piecewise Linear Interpolation, Cubic Spline Interpolation, Natural Spline, Chebshev Polynomial Approximations, Lanczos Economization of Power Series

  Curve fitting: Linear and Non Linear Least Squares Approximation, ill Conditioning in Least Squares Methods, Gram-Schmidt Process of Orthogonalization. Computer Algorithms of Least Square Curve Fitting

- **Unit – III**

  Differentiation: Methods based on Interpolation and Finite Differences, Richrdson Extrapolation

  Integration: Error Analysis of Trepezoidal and Simpson Methods, Newton Cotes Integration Methods, Guassian Integration Methods: Guass Legendre Method, Lobatto Integration Method and Radau Integration Method, Error Terms in Integration Methods

- **Unit – IV**

  Solution of Simultaneous Linear Algebraic Equations: Guass Elimination Method, ill Conditioned Systems, Condition Number, Successive Over Relaxation Method, Rate of Convergence

  Solution of Ordinary Differential equations: Single Step Methods-Runge-Kutta Second Order, Third Order and Fourth Order Methods, Multi Step Method-Predictor- Corrector Method

  Statistical Techniques: Statistical Hypotheses, Test of Hypotheses, Type-I and Type-II Errors, Level of Significance, Test involving Normal Distribution

  Recommended Books:

  - *Numerical Methods: M.K. Jain, S.R.K. Iyenger and R.K. Jain*
  - *Applied Numerical Analysis: Curtis F. Gerald and Patrick O. Wheatley*
  - *Schaum's Outline of Theory and Problems of Statistics: Murray R. Spiegel*

NEC-359: LOGIC DESIGN LAB

Objective: To understand the digital logic and create various systems by using these logics.

1. Introduction to digital electronics lab- nomenclature of digital ICs, specifications, study of the data sheet, concept of Vcc and ground, verification of the truth tables of logic gates using TTL ICs.
2. Implementation of the given Boolean function using logic gates in both SOP and POS forms.
3. Verification of state tables of RS, JK, T and D flip-flops using NAND & NOR gates.
4. Implementation and verification of Decoder/De-multiplexer and Encoder using logic gates.

5. Implementation of 4x1 multiplexer using logic gates.
6. Implementation of 4-bit parallel adder using 7483 IC.
7. Design, and verify the 4-bit synchronous counter.
8. Design, and verify the 4-bit asynchronous counter.

Note: The Instructor may add/delete/modify/tune experiments, wherever he/she feels in a justified manner.

NCS-351: DATA STRUCTURE USING C LAB

Program in C or C++ for following:

1. To implement addition and multiplication of two 2D arrays.
2. To transpose a 2D array.
3. To implement stack using array.
4. To implement queue using array.
5. To implement circular queue using array.
6. To implement stack using linked list.
7. To implement queue using linked list.
8. To implement circular queue using linked list.
9. To implement binary tree using linked list.
10. To implement binary search tree using linked list.
11. To implement tree traversals using linked list.
12. To implement BFS using linked list.
13. To implement DFS using linked list.
14. To implement Linear Search.
15. To implement Binary Search.
16. To implement Bubble Sorting.
17. To implement Selection Sorting.
18. To implement Insertion Sorting.
19. To implement Merge Sorting.
20. To implement Heap Sorting.

Note: The Instructor may add/delete/modify/tune experiments, wherever he/she feels in a justified manner.

NCS-353: NUMERICAL TECHNIQUES LAB

Write Programs in 'C' Language:

1. To deduce error involved in polynomial equation.
2. To Find out the root of the Algebraic and Transcendental equations using Bisection, Regula-falsi , Newton Raphson and Iterative Methods. Also give the rate of convergence of roots in tabular form for each of these methods.
3. To implement Newton's Forward and Backward Interpolation formula.
4. To implement Gauss Forward and Backward, Bessel's, Sterling's and Evertt's Interpolation formula
5. To implement Newton's Divided Difference and Langranges Interpolation formula.
6. To implement Numerical Differentiations.
7. To implement Numerical Integration using Trapezoidal, Simpson 1/3 and Simpson 3/8 rule.
8. To implement Least Square Method for curve fitting.
9. To draw frequency chart like histogram, frequency curve and pie-chart etc.
10. To estimate regression equation from sampled data and evaluate values of standard deviation, t-statistics, regression coefficient, value of R^2 for atleast two independent variables.

Note: The Instructor may add/delete/modify/tune experiments, wherever he/she feels in a justified manner.

NCS-355: ADVANCE PROGRAMMING LAB

LIST OF EXPERIMENTS:

1. Programs using Functions and Pointers in C
2. Programs using Files in C
3. Programs using Classes and Objects

4. Programs using Operator Overloading
5. Programs using Inheritance, Polymorphism and its types
6. Programs using Arrays and Pointers
7. Programs using Dynamic memory allocation
8. Programs using Templates and Exceptions
9. Programs using Sequential and Random access files

Note: The Instructor may add/delete/modify/tune experiments, wherever he/she feels in a justified manner.

NEC-408: INFORMATION THEORY AND CODING

Unit I
Review of probability theory, Definition of Information Measure and Entropy: Measure of information, Average information content of symbols in long independent sequences, Average information content of symbols in long dependent sequences. Mark-off statistical model for information source, Entropy and information rate of mark-off source, Mutual information. Asymptotic Properties of Entropy and Problem Solving in Entropy
Unit – II
Block Code and its Properties, Data compression, Kraft-Mcmillan Equality and Compact Codes, Encoding of the source output, Shannon's encoding algorithm, Coding Strategies, Huffman Coding, Shannon-Fano-Elias Coding and Introduction to Arithmetic Coding.
Unit – III
Introduction to Information Channels, Communication Channels, Discrete communication channels, Continuous channels. Discrete memory less Channels, Mutual information, Channel Capacity, Channel coding theorem, Differential entropy and mutual information for continuous ensembles, Channel capacity Theorem.
Unit – IV
Introduction to Error Control Coding: Introduction, Types of errors, examples, Types of codes Linear Block Codes: Matrix description, Error detection and correction, Standard arrays and table look up for decoding
Unit – V
Binary Cycle Codes, Algebraic structures of cyclic codes, Encoding using an (n-k) bit shift register, Syndrome calculation. BCH codes. RS codes, Golay codes, Shortened cyclic codes, Burst error correcting codes. Burst and Random Error correcting codes. Convolution Codes, Time domain approach. Transform domain approach.

Reference:

1.K. Sam Shanmugam, "Digital and analog communication systems", John Wiley.
2.Simon Haykin, "Digital communication", John Wiley.
3.Ranjan Bose, "ITC and Cryptography" ,Tata McGraw-Hill.
4. Thomas M. Cover, Joy A. Thomas ," Elements of Information Theory, 2nd Edition", Wiley Publication.
5. Roberto Togneri, Christopher J.S deSilva **"**Fundamentals of Information Theory and Coding Design**"**, CRC Press.
6. Steven Roman," Introduction to Coding and Information Theory**"**, Springer New York.
7. Glover and Grant, "Digital Communications", Pearson Education.

NCS-401: OPERATING SYSTEM

Unit – I
Introduction : Operating system and functions, Classification of Operating systems- Batch, Interactive, Time sharing, Real Time System, Multiprocessor Systems, Multiuser Systems, Multiprocess Systems, Multithreaded Systems, Operating System Structure- Layered structure, System Components, Operating System services, Reentrant Kernels, Monolithic and Microkernel
Systems.
Unit – II
Concurrent Processes: Process Concept, Principle ofConcurrency, Producer / Consumer Problem, Mutual Exclusion, Critical Section Problem, Dekker's solution, Peterson's solution, Semaphores, Test and Set operation; Classical Problem in Concurrency- Dining Philosopher Problem, Sleeping Barber Problem; Inter Process Communication models and Schemes, Process
generation.
Unit – III
CPU Scheduling: Scheduling Concepts, Performance Criteria, Process States, Process Transition Diagram, Schedulers, Process Control Block (PCB), Process address space, Process identification information, Threads and their management, Scheduling Algorithms, Multiprocessor Scheduling. Deadlock: System model, Deadlock characterization, Prevention, Avoidance and detection, Recovery from deadlock.
Unit – IV
Memory Management: Basic bare machine, Resident monitor, Multiprogramming with fixed partitions, Multiprogramming with variable partitions, Protection schemes, Paging, Segmentation, Paged segmentation,

Virtual memory concepts, Demand paging, Performance of demand paging, Page replacement algorithms, Thrashing, Cache memory organization, Locality
of reference.
Unit – V
I/O Management and Disk Scheduling: I/O devices, and I/O subsystems, I/O buffering, Disk storage and disk scheduling, RAID. File System: File concept, File organization and access mechanism, File directories, and File sharing, File system implementation issues, File system protection and security.

References :

1. Silberschatz, Galvin and Gagne, "Operating Systems Concepts", Wiley
2. SibsankarHalder and Alex A Aravind, "Operating Systems", Pearson Education
3. Harvey M Dietel, " An Introduction to Operating System", Pearson Education
4. D M Dhamdhere, "Operating Systems : A Concept basedApproach", McGraw Hill.
5. Charles Crowley, "Operating Systems: A Design-Oriented Approach", Tata McGraw Hill Education".
1. Stuart E. Madnick & John J. *Donovan, " Operating Systems"*, Tata McGraw Hill.

NCS-402: THEORY OF AUTOMATA AND FORMAL LANGUAGES

Unit – I
Introduction; Alphabets, Strings and Languages; Automata and Grammars, Deterministic finite Automata (DFA)-Formal Definition, Simplified notation: State transition graph, Transition tabl e, Language of DFA, Nondeterministic finite Automata (NFA), NFA with epsilon transi ion, Language of NFA, Equi valence of NFA and DFA, Minimization of Finite Automata, Distinguis hing one string from other, Myhill-Nerode Theorem
Unit – II
Regular expression (RE) , Definition, Operators of regular expression and their precedence, Algebraic laws for Regular expressions, Kleen's Theorem, Regular expression to FA, DFA to Regular expression, Arden Theorem, Non Regular Languages, Pumping Lemma for regular Languages . Application of Pumping Lemma, Closure properties of Regular Languages, Decision properties of Regular Languages, FA with output: Moore and Mealy machine,
Equivalence of Moore and Mealy Machine, Applications and Limitation of FA.
Unit – III
Context free grammar (CFG) and Context Free Languages (CFL): Definition, Examples, Derivation , Derivation trees, Ambiguity in Grammer, Inherent ambiguity, Ambiguous to Unambiguous CFG, Useless symbols, Simplification of CFGs, Normal forms for CFGs: CNF
and GNF, Closure proper ties of CFLs, Decision Properties of CFLs: Emptiness, Finiteness and Memership, Pumping lemma for CFLs.
Unit – IV
Push Down Automata (PDA): Description and definition, Instantaneous Description, Language of PDA, Acceptance by Final state, Acceptance by empty stack, Deterministic PDA, Equivalence of PDA and CFG, CFG to PDA and PDA to CFG, Two stack PDA
Unit – V
Turing machines (TM): Basic model, definition and representation, Instantaneous Description,
Language acceptance by TM, Variants of Turing Machine, TM as Computerof Integer functions, Universal TM, Church's Thesis, Recursive and recursively enumerable languages, Halting problem, Introduction to Undecidability, Undecidable problems about TMs. Post correspondence problem (PCP), Modified PCP, Introduction to recursive function theory .

References :

1. Hopcroft, Ullman, "Introduction to Automata Theory,Languages and Computation", Pearson Education .
2. K.L.P. Mishra and N.Chandrasekaran, "Theory of Computer Science : Automata, Languages and Computation", PHI Learning Private Limited, Delhi India.
3.Peter Linz, "An Introduction to Formal Language and Automata", Narosa Publishing house.
4. Y.N.Singh "Mathematical Foundation of Computer Science", New Age International.
5. Papadimitrou, C. and Lewis, C.L., "Elements of the Theory of Computation", PHI Learning Private Limited, Delhi India.
6. K.Krithivasan and R.Rama; Introduction to Formal Languages, Automata Theory and Computation; Pearson Education.
7. Harry R. Lewis and Christos H. Papadimitriou, Elements of the theory of Computation,

Second Edition, Prentice-Hall of India Pvt. Ltd.
8. Micheal Sipser, “Introduction of the Theory and Computation”, Thomson Learning.

NIT-401: MULTIMEDIA AND ANIMATION

Unit I – Introduction:
Introduction to Multimedia and animation, Multimedia Systems, Design Fundamentals, Elements of multimedia and animation and their use, Back ground of Art, Color theory overview, Sketching & illustration, Storyboarding, different tools for animation .
Unit- 2 – Multimedia Projects:
Multimedia Skills, Hardware, Use of Graphics in Multimedia, Overview of Vector and Raster Graphics, Basic software tools, Multimedia Authoring Tools, Planning and Costing, Designing and Producing, Contents and talent, Delivering, Enhancing and Testing Multimedia Projects.
Unit-3 – Tools of Multimedia:
Paint and Draw Applications, Graphic effects and techniques, Image File Format, Anti-aliasing, Morphing, Multimedia Authoring tools, professional development tools.
Unit-4 - Animation:
Introduction and Principles of Animations, Power of Motion, Animation Techniques, Animation File Format, Making animation for Rolling Ball, making animation for a Bouncing Ball, Animation for the web, GIF, Plug-ins and Players, Animation tools for World Wide Web.

References:
1. Tay Vaughan, “Multimedia, Making IT Work”,Tata McGraw Hill.
2. Buford, “Multimedia Systems”, Addison Wesley.
3. Sleinreitz, “Multimedia System”, Addison Wesley.
4. Ze-Nian Li and Mark S.Drew, “Fundamentals of Multimedia”, Pearson Education.
5.Prabhat K Andleigh, Kiran Thakrar, “Multimedia systems design”, PHI Learning Private Limited, Delhi India.
6.Elsom Cook – “Principles of Interactive Multimedia” ,Tata McGraw Hill.

NCS-451: OPERATING SYSTEM LAB

1. To implement CPU Scheduling Algorithms
   - FCFS
   - SJF
   - SRTF
   - PRIORITY
   - ROUND ROBIN
2. Simulate all Page Replacement Algorithms
   - FIFO
   - LRU
3. Simulate Paging Technique of Memory Management

Note: The Instructor may add/delete/modify/tune experiments, wherever he/shefeels in a justified manner.

NIT-451: MULTIMEDIA AND ANIMATION LAB

1. Procedure to create an animation to represent the growing moon.
2. Procedure to create an animation to indicate a ball bouncing on steps.
3. Procedure to simulate movement of a cloud.
4. Procedure to draw the fan blades and to give proper animation.
5. Procedure to display the background given (filename: tulip.jpg) through your name.
6. Procedure to display the background given (filename: garden.jpg) through your name using mask.

7. Procedure to create an animation with the following features.
   WELCOME (Letters should appear one by one .The fill color of the text should change to a different colour after the display of the full word.)
8. Procedure to simulate a ball hitting another ball.
9. Procedure to design a visiting card containing at least one graphic and text information.
10. Procedure to take a photographic image. Give a title for the image. Put the border. Write your names. Write the name of institution and place.
11. Procedure to prepare a cover page for the book in your subject area. Plan your own design.
12. Procedure to extract the flower only from given photographic image and organize it on a background. Selecting your own background for organization.
13. Procedure to change a circle into a square using flash.
14. Procedure to display the background given (FILENAME: GARDEN.JPG) through your name using mask.

Note: The Instructor may add/delete/modify/tune experiments, wherever he/she feels in a justified manner.

NCS-455: FUNCTIONAL AND LOGIC PROGRAMMING LAB

Program in SML- NJ or CAML or F# for following:

1. To implement Linear Search.
2. To implement Binary Search.
3. To implement Bubble Sorting.
4. To implement Selection Sorting.
5. To implement Insertion Sorting.

Implement using LISP

6. Write a function that compute the factorial of a number.(factorial of 0 is 1, and factorial of n is n*(n-1)*...1.Factorial is defined only for integers greater than or equal to 0.)
7. Write a function that evaluate a fully parenthesized infix arithmetic expression . For examples, (infix (1+(2*3))) should return 7.
8. Write a function that perform a depth first traversal of binary tree. The function should return a list containing the tree nodes in the order they were visited.
9. Write a LISP program for water jug problem.
10. Write a LISP program that determines whether an integer is prime.
11. Write a PROLOG program that answers questions about family members and relationships includes predicates and rules which define sister,brother,father,mother,grandchild,grandfather and uncle. The program should be able to answer queries such as the following :

    - father(x,Amit)
    - grandson(x,y)
    - uncle(sumit,puneet)
    - mother(anita,x)
    -

Note: The Instructor may add/delete/modify/tune experiments, wherever he/shefeels in a justified manner.