**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY
HYDERABAD.**

B. TECH. INFORMATION TECHNOLOGY

II YEAR   **I Semester**

COURSE STRUCTURE

Code	Subject	T	P	C
	Probability and Statistics	4+1*	0	4
	Mathematical Foundations of Computer Science	4+1*	0	4
	Advanced Data Structures and Algorithms	4+1 *	0	4
	Digital Logic Design	4+1 *	0	4
	Unix and Shell Programming	4+1 *	0	4
	Managerial Economics and Financial Analysis	4+1*	0	4
	Advanced Data Structures and Algorithms Lab	0	3	2
	Unix and Shell Programming Lab	0	3	2
	Total	**30**	**6**	**28**

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4+1*	0	4

PROBABILITY AND STATISTICS

UNIT-I
Probability: Sample space and events – Probability – The axioms of probability – Some Elementary theorems - Conditional probability – Baye's theorem.

UNIT-II
Random variables – Discrete and continuous – Distribution – Distribution function. Distribution

UNIT-III
Binomial and poison distributions Normal distribution – related properties.

UNIT-IV
Sampling distribution: Populations and samples - Sampling distributions of mean (known and unknown) proportions, sums and differences.

UNIT-V
Estimation: Point estimation – interval estimation - Bayesian estimation.

UNIT-VI
Test of Hypothesis – Means– Hypothesis concerning one and two means– Type I and Type II errors. One tail, two-tail tests.

UNIT-VII
Tests of significance – Student's t-test, F-test, χ^2 test. Estimation of proportions.

UNIT-VIII
Queuing Theory: Pure Birth and Death Process M/M/1 Model and Simple Problems.

Text Books:
1. Probability & Statistics, T. K. V. Iyengar, B. Krishna Gandhi and Others, S. Chand & Company.
2. A text book of Probability & Statistics, Shahnaz Bathul, V. G. S. Book Links.

References:
1. Probability & Statistics, Arnold O. Allen, Academic Press.
2. Probability & Statistics for Engineers, Miller and John E. Freund, Prentice Hall of India.
3. Probability & Statistics, Mendan Hall, Beaver Thomson Publishers.
4. Probability & Statistics, D. K. Murugeson & P. Guru Swamy, Anuradha Publishers.

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MATHEMATICAL FOUNDATION OF COMPUTER SCIENCE

UNIT-I
Mathematical Logic : Statements and notations, Connectives, Well formed formulas, Truth Tables, tautology, equivalence implication, Normal forms.

UNIT-II
Predicates : Predicative logic, Free & Bound variables, Rules of inference, Consistency, proof of contradiction, Automatic Theorem Proving.

UNIT-III
Set Theory : Properties of binary Relations, equivalence, compatibility and partial ordering relations, Hasse diagram. Functions: Inverse Function Comports of functions, recursive Functions, Lattice and its Properties, Pigeon hole principles and its application.

UNIT-IV
Algebraic structures : Algebraic systems Examples and general properties, Semi groups and monads, groups sub groups' homomorphism, Isomorphism.

UNIT-V
Elementary Combinatorics: Basis of counting, Combinations & Permutations, with repetitions, Constrained repetitions, Binomial Coefficients, Binomial Multinomial theorems, the principles of Inclusion – Exclusion.

UNIT-VI
Recurrence Relation : Generating Functions, Function of Sequences Calculating Coefficient of generating function, Recurrence relations, Solving recurrence relation by substitution and Generating funds. Characteristics roots solution of In homogeneous Recurrence Relation.

UNIT-VII
Graph Theory : Representation of Graph, DFS, BFS, Spanning Trees, planar Graphs

UNIT-VIII
Graph Theory and Applications, Basic Concepts Isomorphism and Sub graphs, Multi graphs and Euler circuits, Hamiltonian graphs, Chromatic Numbers

TEXT BOOKS :
1. Discrete and Combinational Mathematics- An Applied Introduction-5th Edition – Ralph. P.Grimaldi.Pearson Education
2. Discrete Mathematical Structures with applications to computer science Trembly J.P. & Manohar .P, TMH
3.Discrete Mathematics and its Applications, Kenneth H. Rosen, Fifth Edition.TMH.

REFERENCES :
1. Discrete Mathematics with Applications, Thomas Koshy, Elsevier
2. Discrete Mathematical Structures, Bernand Kolman, Roberty C. Busby, Sharn Cutter Ross, Pearson Education/PHI.
3. Discrete Mathematical structures Theory and application-Malik & Sen
4. Discrete Mathematics for Computer science, Garry Haggard and others, Thomson.
5. Discrete Mathematics for Computer Scientists & Mathematicians, J.L. Mott, A. Kandel, T.P. Baker Prentice Hall.
6. Logic and Discrete Mathematics, Grass Man & Trembley, Person Education.

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ADVANCED DATA STRUCTURES AND ALGORITHMS

Unit I:-
C++ Class Overview- Class Definition, Objects, Class Members, Access Control, Class Scope, Constructors and destructors, parameter passing methods, Inline functions, static class members, this pointer, friend functions, dynamic memory allocation and deallocation (new and delete), exception handling.

Unit II:-
Function Overloading, Operator Overloading, Generic Programming- Function and class templates, Inheritance basics, base and derived classes, inheritance types, base class access control, runtime polymorphism using virtual functions, abstract classes, streams I/O.

Unit III:-
Algorithms, performance analysis-time complexity and space complexity,O-notation, Omega notation and Theta notation, Review of basic data structures - the list ADT, stack ADT, queue ADT, implementation using template classes in C++, sparse matrix representation.

Unit IV:-
Dictionaries, linear list representation, skip list representation, operations- insertion, deletion and searching, hash table representation, hash functions, collision resolution-separate chaining, open addressing-linear probing, quadratic probing, double hashing, rehashing,extendible hashing, comparison of hashing and skip lists.

Unit V:-
Priority Queues – Definition, ADT, Realizing a Priority Queue using Heaps, Definition, insertion, Deletion, Application-Heap Sort, External Sorting- Model for external sorting, Multiway merge, Polyphase merge.

Unit VI:-
Search trees (part I) : Binary search trees, definition, ADT, implementation, operations-searching, insertion and deletion, Balanced search trees- AVL trees, definition, height of an AVL tree, representation, operations-insertion, deletion and searching.

Search trees (part II) : Introduction to Red –Black trees and Splay Trees, B-Trees-B-Tree of order m, height of a B-Tree, insertion, deletion and searching, Comparison of Search Trees.

Unit VII:-
Divide and Conquer- General method, applications – Binary search, merge sort, quick sort, Strassen's matrix multiplication
Efficient non recursive tree traversal algorithms, Biconnected components. Disjoint set operations, union and find algorithms.

Unit VIII:-
Greedy method and Dynamic programming : General method (Greedy), Minimum cost spanning trees, Job sequencing with deadlines, General method (Dynamic Programming), Optimal binary search trees, 0/1 knapsack problem, Ordering Matrix Multiplications

TEXT BOOKS :
1. Data Structures and Algorithm Analysis in C++, Mark Allen Weiss, Pearson
   Education, second edition.
2. Data structures, Algorithms and Applications in C++,S.Sahni,University press (India)
   pvt ltd, 2nd edition, Orient Longman pvt.ltd.
REFERENCE :
1. Data structures and Algorithms in C++, Michael T.Goodrich, R.Tamassia and
   D.Mount, Seventh Edition Wiley student edition, John Wiley and Sons.
2. Data Structures and Algorithms in C++, Third Edition, Adam Drozdek, Thomson
3. Problem solving with C++, The OOP, Fourth edition, W.Savitch, Pearson education.
4. C++, The Complete Reference, 4th Edition, Herbert Schildt, TMH.
5. Data structures using C and C++, Langsam, Augenstein and Tanenbaum, PHI/Pearson Education.

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DIGITAL LOGIC DESIGN

UNIT - I
BINARY SYSTEMS : Digital Systems, Binary Numbers, Number base conversions, Octal and Hexadecimal Numbers, complements, Signed binary numbers, Binary codes, Binary Storage and Registers, Binary logic.

UNIT - II
BOOLEAN ALGEBRA AND LOGIC GATES : Basic Definitions, Axiomatic definition of Boolean Algebra, Basic theorems and properties of Boolean algebra, Boolean functions canonical and standard forms, other logic operations, Digital logic gages, integrated circuits.

UNIT - III
GATE – LEVEL MINIMIZATION : The map method, Four-variable map, Five-Variable map, product of sums simplification Don't-care conditions, NAND and NOR implementation other Two-level implementnations, Exclusive – Or function, Hardward Description language (HDL).

UNIT - IV
COMBINATIONAL LOGIC : Combinational Circuits, Analysis procedure Design procedure, Binary Adder-Subtractor Decimal Adder, Binary multiplier, magnitude comparator, Decoders, Encoders, Multiplexers, HDL for combinational circuits.

UNIT - V
SYNCHRONOUS SEQUENTIAL LOGIC : Sequential circuits, latches, Flip-Flops Analysis of clocked sequential circuits, HDL for sequential circuits, State Reduction and Assignment, Design Procedure**.**

UNIT - VI
Registers, shift Registers, Ripple counters synchronous counters, other counters, HDL for Registers and counters.

UNIT - VII
Introduction, Random-Access Memory, Memory Decoding, Error Detection and correction Read-only memory, Programmable logic Array programmable Array logic, Sequential Programmable Devices.

UNIT - VIII
ASYNCHRONOUS SEQUENTIAL LOGIC : Introduction, Analysis Procedure, Circuits with Latches, Design Procedure, Reduciton of state and Flow Tables, Race-Free state Assignment Hazards, Design Example.

TEXT BOOKS :
1. DIGITAL DESIGN – Third Edition , M.Morris Mano, Pearson Education/PHI.
2. FUNDAMENTALS OF LOGIC DESIGN, Roth,5th Edition,Thomson.

REFERENCES :
1. Switching and Finite Automata Theory by Zvi. Kohavi, Tata McGraw Hill.
2. Switching and Logic Design, C.V.S. Rao, Pearson Education
3. Digital Principles and Design – Donald D.Givone, Tata McGraw Hill, Edition.
4. Fundamentals of Digital Logic & Micro Computer Design , 5TH Edition, M.
   Rafiquzzaman John Wiley

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UNIX AND SHELL PROGRAMMING

Unit I:
Introduction to Unix:- Architecture of Unix, Features of Unix , Unix Commands – PATH, man, echo, printf, script, passwd, uname, who, date, stty, pwd, cd, mkdir, rmdir, ls, cp, mv, rm, cat, more, wc, lp, od, tar, gzip.

Unit II :
Unix Utilities:- Introduction to unix file system, vi editor, file handling utilities, security by file permissions, process utilities, disk utilities, networking commands, unlink, du, df, mount, umount, find, unmask, ulimit, ps, w, finger, arp, ftp, telnet, rlogin.Text processing utilities and backup utilities , detailed commands to be covered are tail, head , sort, nl, uniq, grep, egrep, fgrep, cut, paste, join, tee, pg, comm, cmp, diff, tr, awk, cpio

Unit III :
Introduction to Shells :
Unix Session, Standard Streams, Redirection, Pipes, Tee Command, Command Execution, Command-Line Editing, Quotes, Command Substitution, Job Control, Aliases, Variables, Predefined Variables, Options, Shell/Environment Customization.
Filters :
Filters and Pipes, Concatenating files, Display Beginning and End of files, Cut and Paste, Sorting, Translating Characters, Files with Duplicate Lines, Count characters, Words or Lines, Comparing Files.

Unit IV :
Grep :
Operation, grep Family, Searching for File Content.
Sed :
Scripts, Operation, Addresses, commands, Applications, grep and sed.

Unit V :
awk:
Execution, Fields and Records, Scripts, Operations, Patterns, Actions, Associative Arrays, String Functions, String Functions, Mathematical Functions, User – Defined Functions, Using System commands in awk, Applications, awk and grep, sed and awk.

Unit VI :
Interactive Korn Shell :
Korn Shell Features, Two Special Files, Variables, Output, Input, Exit Status of a Command, eval Command, Environmental Variables, Options, Startup Scripts, Command History, Command Execution Process.
Korn Shell Programming :
Basic Script concepts, Expressions, Decisions: Making Selections, Repetition, special Parameters and Variables, changing Positional Parameters, Argument Validation, Debugging Scripts, Script Examples.

Unit VII :
Interactive C Shell :
C shell features, Two Special Files, Variables, Output, Input, Exit Status of a Command, eval Command, Environmental Variables, On-Off Variables, Startup and Shutdown Scripts, Command History, Command Execution Scripts.
C Shell Programming :
Basic Script concepts, Expressions, Decisions: Making Selections, Repetition, special Parameters and Variables, changing Positional Parameters, Argument Validation, Debugging Scripts, Script Examples.

Unit VIII :
File Management :
File Structures, System Calls for File Management – create, open, close, read, write, lseek, link, symlink, unlink, stat, fstat, lstat, chmod, chown, Directory API – opendir, readdir, closedir, mkdir, rmdir, umask.

TEXT BOOKS :
1. Unix and shell Programming Behrouz A. Forouzan, Richard F. Gilberg.Thomson
2. Your Unix the ultimate guide, Sumitabha Das, TMH. 2nd Edition.

REFERENCES :
1. Unix for programmers and users, 3rd edition, Graham Glass, King Ables, Pearson   Education.
2. Unix programming environment, Kernighan and Pike, PHI. / Pearson Education
3. The Complete Reference Unix, Rosen, Host, Klee, Farber, Rosinski, Second Edition, TMH.

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MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

Unit I *Introduction to Managerial Economics:*
Definition, Nature and Scope of Managerial Economics–Demand Analysis: Demand Determinants, Law of Demand and its exceptions.

Unit II *Elasticity of Demand*:
Definition, Types, Measurement and Significance of Elasticity of Demand. Demand Forecasting, Factors governing demand forecasting, methods of demand forecasting (survey methods, statistical methods, expert opinion method, test marketing, controlled experiments, judgmental approach to demand forecasting)

Unit III Theory of Production and Cost Analysis:
Production Function – Isoquants and Isocosts, MRTS, Least Cost Combination of Inputs, Cobb-Douglas Production function, Laws of Returns, Internal and External Economies of Scale.
Cost Analysis: Cost concepts, Opportunity cost, Fixed vs. Variable costs, Explicit costs Vs. Implicit costs, Out of pocket costs vs. Imputed costs. Break-even Analysis (BEA)-Determination of Break-Even Point (simple problems)- Managerial Significance and limitations of BEA.

Unit IV Introduction to Markets & Pricing Policies:
Market structures: Types of competition, Features of Perfect competition, Monopoly and Monopolistic Competition. Price-Output Determination in case of Perfect Competition and Monopoly.
Objectives and Policies of Pricing- **Methods of Pricing:** Cost Plus Pricing, Marginal Cost Pricing, Sealed Bid Pricing, Going Rate Pricing, Limit Pricing, Market Skimming Pricing, Penetration Pricing, Two-Part Pricing, Block Pricing, Bundling Pricing, Peak Load Pricing, Cross Subsidization.

Unit V Business & New Economic Environment:
Characteristic features of Business, Features and evaluation of Sole Proprietorship, Partnership, Joint Stock Company, Public Enterprises and their types, Changing Business Environment in Post-liberalization scenario.

Unit VI Capital and Capital Budgeting:
Capital and its significance, Types of Capital, Estimation of Fixed and Working capital requirements, Methods and sources of raising finance.
Nature and scope of capital budgeting, features of capital budgeting proposals, Methods of Capital Budgeting: Payback Method, Accounting Rate of Return (ARR) and Net Present Value Method (simple problems)

Unit VII Introduction to Financial Accounting:
Double-Entry Book Keeping, Journal, Ledger, Trial Balance- Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments).

Unit VIII Financial Analysis through ratios:
Computation, Analysis and Interpretation of Liquidity Ratios (Current Ratio and quick ratio), Activity Ratios (Inventory turnover ratio and Debtor Turnover ratio), Capital structure Ratios (Debt- Equity ratio, Interest Coverage ratio), and Profitability ratios (Gross Profit Ratio, Net Profit ratio, Operating Ratio, P/E Ratio and EPS).

TEXT BOOKS:

1. Aryasri: Managerial Economics and Financial Analysis, 2/e, TMH, 2005.
2. Varshney & Maheswari: Managerial Economics, Sultan Chand, 2003.

REFERENCES:

1. Ambrish Gupta, Financial Accounting for Management, Pearson Education, New Delhi.
2. H. Craig Peterson & W. Cris Lewis, Managerial Economics, PHI, 4th Ed.
3. Suma Damodaran, Managerial Economics, Oxford University Press.
4. Lipsey & Chrystel, Economics, Oxford University Press.

5. S. A. Siddiqui & A. S. Siddiqui, Managerial Economics & Financial Analysis, New age International Space Publications.
6. Domnick Salvatore: Managerial Economics In a Global Economy, 4th Edition, Thomson.
7. Narayanaswamy: Financial Accounting—A Managerial Perspective, PHI.
8. Raghunatha Reddy & Narasimhachary: Managerial Economics& Financial Analysis, Scitech.
9. S.N.Maheswari & S.K. Maheswari, Financial Accounting, Vikas.
10. Truet and Truet: Managerial Economics:Analysis, Problems and Cases, Wiley.
11. Dwivedi:Managerial Economics, 6th Ed., Vikas.

Prerequisites: Nil

Objective: To explain the basic principles of managerial economics, accounting and current business environment underlying business decision making.

Codes/Tables: Present Value Tables need to be permitted into the examinations Hall.

Question Paper Pattern: 5 Questions to be answered out of 8 questions.
Each question should not have more than 3 bits.

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ADVANCED DATA STRUCTURES AND ALGORITHMS LAB

Objectives:
- To make the student learn a object oriented way of solving problems.
- To make the student write ADTS for all data structures.
- To make the student learn different algorithm design techniques.

Recommended Systems/Software Requirements:

- Intel based desktop PC with minimum of 166 MHZ or faster processor with atleast 64 MB RAM and 100 MB free disk space
- C++ compiler and STL Recommended

Week1- C++ programs to implement the following using an array.
        a) Stack ADT b) Queue ADT
Week2- Write C++ programs to implement the following using a singly linked list.
        a) Stack ADT b) Queue ADT
Week3- Write C++ programs to implement the deque (double ended queue) ADT using
        a doubly linked list and an array.
Week 4- Write a C++ program to perform the following operations:
        a) Insert an element into a binary search tree.
        b) Delete an element from a binary search tree.
        c) Search for a key element in a binary search tree.
Week5-. Write C++ programs that use non-recursive functions to traverse the given
        binary tree in
        a) Preorder b) inorder and c) postorder.
Week6-. Write C++ programs for the implementation of bfs and dfs for a given graph.
Week7- Write C++ programs for implementing the following sorting methods:
        a) Merge sort b) Heap sort
Week8-. Write a C++ program to perform the following operations
        a) Insertion into a B-tree b) Deletion from a B-tree
Week9-. Write a C++ program to perform the following operations
        a) Insertion into an AVL-tree b) Deletion from an AVL-tree
Week10- Write a C++ program to implement Kruskal's algorithm to generate a
        minimum cost spanning tree.
Week11- Write a C++ program to implement Prim's algorithm to generate a minimum
        cost spanning tree.
Week12-. Write a C++ program to implement all the functions of a dictionary (ADT)
        using hashing.

(Note: Use Class Templates In the above Programs)

TEXT BOOKS :
1.Data Structures and Algorithms in C++, Third Edition, Adam Drozdek, Thomson.
2.Data Structures using C++, D.S. Malik, Thomson

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UNIX AND SHELL PROGRAMMING LAB

Objectives:
- To teach students various unix utilities and shell scripting

Recommended Systems/Software Requirements:
- Intel based desktop PC with minimum of 166 MHZ or faster processor with atleast 64 MB RAM and 100 MB free disk space LAN Connected
- Any flavour of Unix / Linux

Week1

Session-1
a)Log into the system
b)Use vi editor to create a file called myfile.txt which contains some
text.
c)correct typing errors during creation.
d)Save the file
e)logout of the system

Session-2
a)Log into the system
b)open the file created in session 1
c)Add some text
d)Change some text
e)Delete some text
f)Save the Changes
g)Logout of the system

Week2

a)Log into the system
b)Use the cat command to create a file containing the following data. Call it mytable use tabs to separate the fields.

1425	Ravi	15.65
4320	Ramu	26.27
6830	Sita	36.15
1450	Raju	21.86

c)Use the cat command to display the file, mytable.
d)Use the vi command to correct any errors in the file, mytable.
e)Use the sort command to sort the file mytable according to the first field. Call the sorted file my table (same name)
f)Print the file mytable
g)Use the cut and paste commands to swap fields 2 and 3 of mytable. Call it my table (same name)
h)Print the new file, mytable
i)Logout of the system.

Week3

1)   a)Login to the system
        b)Use the appropriate command to determine your login shell
        c)Use the /etc/passwd file to verify the result of step b.
        d)Use the who command and redirect the result to a file called myfile1. Use the more command to see the contents of myfile1.
        e)Use the date and who commands in sequence (in one line) such that the output of date will display on the screen and the output of who will be redirected to a file called myfile2. Use the more command to check the contents of myfile2.

2)   a)Write a sed command that deletes the first character in each line in a
        file.

b)Write a sed command that deletes the character before the last character in each line in a file.
c)Write a sed command that swaps the first and second words in each line in a file.

Week4
a)Pipe your /etc/passwd file to awk, and print out the home directory of each user.
b)Develop an interactive grep script that asks for a word and a file name and then tells how many lines contain that word.
c)Repeat
d)Part using awk

Week5
a)Write a shell script that takes a command –line argument and reports on whether it is directory, a file, or something else.
b)Write a shell script that accepts one or more file name as arguments and converts all of them to uppercase, provided they exist in the current directory.
c)Write a shell script that determines the period for which a specified user is working on the system.

Week6
a)Write a shell script that accepts a file name starting and ending line numbers as arguments and displays all the lines between the given line numbers.
b)Write a shell script that deletes all lines containing a specified word in one or more files supplied as arguments to it.

Week7
a)Write a shell script that computes the gross salary of a employee according to the following rules:
i)If basic salary is < 1500 then HRA =10% of the basic and DA =90% of the basic.
ii)If basic salary is >=1500 then HRA =Rs500 and DA=98% of the basic
The basic salary is entered interactively through the key board.
b)Write a shell script that accepts two integers as its arguments and computers the value of first number raised to the power of the second number.

Week8
a)Write an interactive file-handling shell program. Let it offer the user the choice of copying, removing, renaming, or linking files. Once the user has made a choice, have the program ask the user for the necessary information, such as the file name, new name and so on.
b)Write shell script that takes a login name as command – line argument and reports when that person logs in
c)Write a shell script which receives two file names as arguments. It should check whether the two file contents are same or not. If they are same then second file should be deleted.

Week9
a)Write a shell script that displays a list of all the files in the current directory to which the user has read, write and execute permissions.
b)Develop an interactive script that ask for a word and a file name and then tells how many times that word occurred in the file.
c)Write a shell script to perform the following string operations:
i)To extract a sub-string from a given string.
ii)To find the length of a given string.

Week10
Write a C program that takes one or more file or directory names as command line input and reports the following information on the file:
i)File type
ii)Number of links
iii)Read, write and execute permissions
iv)Time of last access
(Note : Use stat/fstat system calls)

Week11
Write C programs that simulate the following unix commands:
a)mv
b)cp
(Use system calls)

Week12
Write a C program that simulates ls Command
(Use system calls / directory API)

TEXT BOOKS

1)Introduction to UNIX & SHELL programming, M.G. Venkatesh Murthy, Pearson Education.
2)Unix concepts and applications, Fourth Edition, Sumitabha Das, TMH.
3)Unix for programmers and users, 3rd edition, Gaham Glass & K. Ables, pearson education.
4)Unix and shell Programming –A text book, B.A. Forouzan & R.F. Giberg, Thomson.
5)Beginning shell scripting, E. Foster – Johnson & other, Wile Y- India.