JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA
KAKINADA – 533 003, Andhra Pradesh, India

DEPARTMENT OF CSE – IOT & CS INCLUDING BLOCK CHAIN TECHNOLOGY

COURSE STRUCTURE AND SYLLABUS

For UG – R20

B. Tech - COMPUTER SCIENCE & ENGINEERING with Specialization

IOT & CS INCLUDING BLOCK CHAIN TECHNOLOGY

(Applicable for batches admitted from 2020-2021)

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II Year – I SEMESTER

S. No	Course Code	Course Title	L	T	P	C
1.	BSC2101	Mathematics – III	3	0	0	3
2.	PCC2101	Mathematical Foundations of Computer Science	3	0	0	3
3.	PCC2102	Data Structures	3	0	0	3
4.	PCC2103	Operating Systems	3	0	0	3
5.	PCC2104	Java Programming	3	0	0	3
6.	PCC2105	Data Structures Lab	0	0	3	1.5
7.	PCC2106	OS&UNIX Programming Lab	0	0	3	1.5
8.	PCC2107	Java Programming Lab	0	0	3	1.5
9.	SC2101	Free and Open Source Software	0	0	4	2
10.	MC2101	Essence of Indian Traditional Knowledge	2	0	0	0
TOTAL						**21.5**

II Year – II SEMESTER

S. No	Course Code	Course Title	L	T	P	C
1.	ESC2201	Computer Organization& Architecture	3	0	0	3
2.	BSC2201	Probability and Statistics	3	0	0	3
3.	PCC2201	Formal Languages & Automata Theory	3	0	0	3
4.	PCC2202	Database Management Systems	3	0	0	3
5.	HSMC2201	Managerial Economics and Financial Accountancy	3	0	0	3
6.	ESC2202	Computer Organization& Architecture Lab	0	0	3	1.5
7.	PCC2203	Database Management Systems Lab	0	0	3	1.5
8.	PCC2204	R Programming Lab	0	0	3	1.5
9.	SC2201	Android Application Development	0	0	4	2
TOTAL						**21.5**
	Minor courses (The hours distribution can be 3-0-2 or 3-1-0 also)		4	0	0	4
	Internship 2 Months (Mandatory) during summer vacation					

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II Year - I Semester		L	T	P	C
		3	0	0	3
MATHEMATICS - III (BSC2101)					

Course Objectives:

- To familiarize the techniques in partial differentialequations
- To furnish the learners with basic concepts and techniques at plus two level to lead them into advanced level by handling various real worldapplications.

Course Outcomes:

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

- Interpret the physical meaning of different operators such as gradient, curl and divergence(L5)
- Estimate the work done against a field, circulation and flux using vector calculus (L5)
- Apply the Laplace transform for solving differential equations(L3)
- Find or compute the Fourier series of periodic signals(L3)
- Know and be able to apply integral expressions for the forwards and inverse Fourier transform to a range of non-periodic waveforms(L3)
- Identify solution methods for partial differential equations that model physical processes(L3)

UNIT I: Vectorcalculus:
Vector Differentiation: Gradient – Directional derivative – Divergence – Curl – Scalar Potential. Vector Integration: Line integral – Work done – Area – Surface and volume integrals – Vector integral theorems: Greens, Stokes and Gauss Divergence theorems (without proof).

UNIT II: LaplaceTransforms:
Laplace transforms of standard functions – Shifting theorems – Transforms of derivatives and integrals – Unit step function – Dirac's delta function – Inverse Laplace transforms – Convolution theorem (without proof).

Applications: Solving ordinary differential equations (initial value problems) using Laplace transforms.

UNIT III: Fourier series andFourierTransforms:
Fourier Series: Introduction – Periodic functions – Fourier series of periodic function – Dirichlet's conditions – Even and odd functions – Change of interval – Half-range sine and cosine series. Fourier Transforms: Fourier integral theorem (without proof) – Fourier sine and cosine integrals – Sine and cosine transforms – Properties – inverse transforms – Finite Fourier transforms.

UNIT IV: PDE of first order:
Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions – Solutions of first order linear (Lagrange) equation and nonlinear (standard types) equations.

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UNIT V: Second order PDE and Applications:

Second order PDE: Solutions of linear partial differential equations with constant coefficients – RHS term of the type e^{ax+by}, $\sin(ax+by)$, $\cos(ax+by)$, $x^m y^n$.

Applications of PDE: Method of separation of Variables – Solution of One dimensional Wave, Heat and two-dimensional Laplace equation.

Text Books:

1) B. S. Grewal, Higher Engineering Mathematics, 43rd Edition, KhannaPublishers.
2) B. V. Ramana, Higher Engineering Mathematics, 2007 Edition, Tata Mc. GrawHill Education.

Reference Books:

1) Erwin Kreyszig, Advanced Engineering Mathematics, 10thEdition,Wiley-India.
2) Dean. G. Duffy, Advanced Engineering Mathematics with MATLAB, 3rd Edition, CRC Press.
3) Peter O' Neil, Advanced Engineering Mathematics,Cengage.
4) Srimantha Pal, S C Bhunia, Engineering Mathematics, Oxford UniversityPress.

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II Year – I Semester		L	T	P	C
		3	0	0	3
MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE (PCC2101)					

Course Objectives:

This course is designed to:

- To introduce the students to the topics and techniques of discrete methods and combinatorialreasoning
- To introduce a wide variety of applications. The algorithmic approach to the solution of problems is fundamental in discrete mathematics, and this approach reinforces the close ties between this discipline and the area of computerscience

Course Outcomes:

At the end of the course student will be able to

- Demonstrate skills in solving mathematicalproblems
- Comprehend mathematical principles andlogic
- Demonstrate knowledge of mathematical modeling and proficiency in using mathematical software
- Manipulate and analyze data numerically and/or graphically using appropriateSoftware
- Communicate effectively mathematical ideas/results verbally or inwriting

UNIT I

Mathematical Logic: Propositional Calculus: Statements and Notations, Connectives, Well Formed Formulas, Truth Tables, Tautologies, Equivalence of Formulas, Duality Law, Tautological Implications, Normal Forms, Theory of Inference for Statement Calculus, Consistency of Premises, Indirect Method of Proof, Predicate Calculus: Predicates, Predicative Logic, Statement Functions, Variables and Quantifiers, Free and Bound Variables, Inference Theory for Predicate Calculus.

UNIT II

Set Theory: Sets: Operations on Sets, Principle of Inclusion-Exclusion, Relations: Properties, Operations, Partition and Covering, Transitive Closure, Equivalence, Compatibility and Partial Ordering, Hasse Diagrams, Functions: Bijective, Composition, Inverse, Permutation, and Recursive Functions, Lattice and its Properties, Algebraic Structures: Algebraic Systems, Properties, Semi Groups and Monoids, Group, Subgroup and Abelian Group, Homomorphism, Isomorphism.

UNIT III

Combinatorics: Basis of Counting, Permutations, Permutations with Repetitions, Circular and Restricted Permutations, Combinations, Restricted Combinations, Binomial and Multinomial Coefficients and Theorems, Number Theory: Properties of Integers, Division Theorem, Greatest Common Divisor, Euclidean Algorithm, Least Common Multiple, Testing for Prime Numbers, The Fundamental Theorem of Arithmetic, Modular Arithmetic, Fermat's and Euler'sTheorems

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UNIT IV

Recurrence Relations: Generating Functions, Function of Sequences, Partial Fractions, Calculating Coefficient of Generating Functions, Recurrence Relations, Formulation as Recurrence Relations, SolvingRecurrence Relations by Substitution and Generating Functions, Method of Characteristic Roots, Solving Inhomogeneous Recurrence Relations.

UNIT V

Graph Theory: Basic Concepts, Graph Theory and its Applications, Sub graphs, Graph Representations: Adjacency and Incidence Matrices, Isomorphic Graphs, Paths and Circuits, Eulerian and Hamiltonian Graphs, Multigraphs, Bipartite and Planar Graphs, Euler's Theorem, Graph Colouring and Covering, Chromatic Number, Spanning Trees, Prim's and Kruskal's Algorithms, BFS and DFS Spanning Trees.

Text Books:

1) Discrete Mathematical Structures with Applications to Computer Science, J. P. Tremblay and P. Manohar, Tata McGrawHill.
2) Elements of Discrete Mathematics-A Computer Oriented Approach, C. L. Liu and D. P. Mohapatra, 3rd Edition, Tata McGrawHill.

Reference Books:

1) Discrete Mathematics for Computer Scientists and Mathematicians, J. L. Mott, A. Kandel and T. P. Baker, 2nd Edition, Prentice Hall ofIndia.
2) Discrete Mathematical Structures, BernandKolman, Robert C. Busby and Sharon Cutler Ross,PHI.
3) Discrete Mathematics and its Applications with Combinatorics and Graph Theory, K. H. Rosen, 7th Edition, Tata McGrawHill.

e-Resources:

1) https://nptel.ac.in/courses/106/106/106106094/

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II Year – I Semester		L	T	P	C
		3	0	0	3
DATA STRUCTURES(PCC2102)					

Course Objectives:

The objective of the course is to

- Introduce the fundamental concept of data structures and abstract datatypes
- Emphasize the importance of data structures in developing and implementing efficient algorithms
- Describe how arrays, records, linked structures, stacks, queues, trees, and graphs are represented in memory and used byalgorithms

Course Outcomes:

After completing this course a student will be able to:

- Summarize the properties, interfaces, and behaviors of basic abstract datatypes
- Discuss the computational efficiency of the principal algorithms for sorting &searching
- Use arrays, records, linked structures, stacks, queues, trees, and Graphs in writing programs
- Demonstrate different methods for traversingtrees

UNIT I

Data Structures - Definition, Classification of Data Structures, Operations on Data Structures, Abstract Data Type (ADT), Preliminaries of algorithms. Time and Space complexity.

Searching - Linear search, Binary search, Fibonacci search.

Sorting- Insertion sort, Selection sort, Exchange (Bubble sort, quick sort), distribution (radix sort), merging (Merge sort) algorithms.

UNIT II

Linked List: Introduction, Single linked list, Representation of Linked list in memory, Operations on Single Linked list-Insertion, Deletion, Search and Traversal ,Reversing Single Linked list, Applications on Single Linked list- Polynomial Expression Representation ,Addition and Multiplication, Sparse Matrix Representation using Linked List, Advantages and Disadvantages of Single Linked list, Double Linked list-Insertion, Deletion, Circular Linked list-Insertion, Deletion.

UNIT III

Queues: Introduction to Queues, Representation of Queues-using Arrays and using Linked list, Implementation of Queues-using Arrays and using Linked list, Application of Queues-Circular Queues, Deques, Priority Queues, Multiple Queues.

Stacks: Introduction to Stacks, Array Representation of Stacks, Operations on Stacks, Linked list Representation of Stacks, Operations on Linked Stack, Applications-Reversing list, Factorial Calculation, Infix to Postfix Conversion, Evaluating Postfix Expressions.

UNIT IV

Trees: Basic Terminology in Trees, Binary Trees-Properties, Representation of Binary Trees using Arrays and Linked lists. Binary Search Trees- Basic Concepts, BST Operations: Insertion, Deletion, Tree Traversals, Applications-Expression Trees, Heap Sort, Balanced Binary Trees-AVL Trees, Insertion, Deletion andRotations.

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UNIT V

Graphs: Basic Concepts, Representations of Graphs-Adjacency Matrix and using Linked list, Graph Traversals (BFT & DFT), Applications- Minimum Spanning Tree Using Prims***&Kruskals***Algorithm, Dijkstra's shortest path, Transitive closure, Warshall's Algorithm.

Text Books:

1) Data Structures Using C. 2nd Edition.ReemaThareja,Oxford.
2) Data Structures and algorithm analysis in C, 2nd ed, Mark AllenWeiss.

Reference Books:

1) Fundamentals of Data Structures in C, 2nd Edition, Horowitz, Sahni, UniversitiesPress.
2) Data Structures: A PseudoCode Approach, 2/e, Richard F.Gilberg, BehrouzA. Forouzon, Cengage.
3) Data Structures with C, Seymour LipschutzTMH

e-Resources:

1) http://algs4.cs.princeton.edu/home/
2) https://faculty.washington.edu/jstraub/dsa/Master_2_7a.pdf

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II Year – I Semester		L	T	P	C
		3	0	0	3
OPERATING SYSTEMS(PCC2103)					

Course Objectives:

The objectives of this course is to

- Introduce to the internal operation of modern operatingsystems
- Define, explain, processes and threads, mutual exclusion, CPU scheduling,deadlock, memory management, and filesystems
- Understand File Systems in Operating System like UNIX/Linux andWindows
- Understand Input Output Management and use of Device Driver and Secondary Storage (Disk)Mechanism
- Analyze Security and Protection Mechanism in OperatingSystem

Course Outcomes:

After learning, the course the students should be able to:

- Describe various generations of Operating System and functions of OperatingSystem
- Describe the concept of program, process and thread and analyze various CPU Scheduling Algorithms and compare theirperformance
- Solve Inter Process Communication problems using Mathematical Equations by various methods
- Compare various Memory Management Schemes especially paging and Segmentation in Operating System and apply various Page ReplacementTechniques

Outline File Systems in Operating System like UNIX/Linux andWindows

UNIT I

Operating Systems Overview: Operating system functions, Operating system structure, Operating systems operations, Computing environments, Open-Source Operating Systems.
System Structures: Operating System Services, User and Operating-System Interface, systems calls, Types of System Calls, system programs, operating system structure, operating system debugging, System Boot.

UNIT II

Process Concept: Process scheduling, Operations on processes, Inter-process communication, Communication in client server systems.
Multithreaded Programming: Multithreading models, Thread libraries, Threading issues.
Process Scheduling: Basic concepts, Scheduling criteria, Scheduling algorithms, Multiple processor scheduling, Thread scheduling.
Inter-process Communication: Race conditions, Critical Regions, Mutual exclusion with busy waiting, Sleep and wakeup, Semaphores, Mutexes, Monitors, Message passing, Barriers, Classical IPC Problems - Dining philosophers problem, Readers and writers problem.

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UNIT III

Memory-Management Strategies: Introduction, Swapping, Contiguous memory allocation, Paging,Segmentation.

Virtual Memory Management: Introduction, Demand paging, Copy on-write, Page replacement, Frame allocation, Thrashing, Memory-mapped files, Kernel memory allocation.

UNIT IV

Deadlocks: Resources, Conditions for resource deadlocks, Ostrich algorithm, Deadlock detection and recovery, Deadlock avoidance, Deadlock prevention.
File Systems: Files, Directories, File system implementation, management and optimization.
Secondary-Storage Structure: Overview of disk structure, and attachment, Disk scheduling, RAID structure, Stable storage implementation.

UNIT V

System Protection: Goals of protection, Principles and domain of protection, Access matrix, Access control, Revocation of access rights.
System Security: Introduction, Program threats, System and network threats, Cryptography for security, User authentication, Implementing security defenses, Firewalling to protect systems and networks, Computer security classification.
Case Studies: Linux, Microsoft Windows.

Text Books:

1) SilberschatzA, Galvin P B, and Gagne G, Operating System Concepts, 9th edition, Wiley, 2013.
2) Tanenbaum A S, Modern Operating Systems, 3rd edition, Pearson Education, 2008. (forInterprocess Communication and Filesystems.)

Reference Books:

1) Dhamdhere D M, Operating Systems A Concept Based Approach, 3rd edition, Tata McGraw-Hill,2012.
2) Stallings W, Operating Systems -Internals and Design Principles, 6th edition, Pearson Education,2009
3) Nutt G, Operating Systems, 3rd edition, Pearson Education,2004.

e-Resources:

1) https://nptel.ac.in/courses/106/105/106105214/

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II Year – I Semester		L	T	P	C
		3	0	0	3
JAVA PROGRAMMING(PCC2104)					

Course Objectives:

The learning objectives of this course are:

- To identify Java language components and how they work together inapplications
- To learn the fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using classlibraries.
- To learn how to extend Java classes with inheritance and dynamic binding and how to use exception handling in Javaapplications
- To understand how to design applications with threads inJava
- To understand how to use Java APIs for programdevelopment

Course Outcomes:

By the end of the course, the student will be

- Able to realize the concept of Object Oriented Programming & Java Programming Constructs
- Able to describe the basic concepts of Java such as operators, classes, objects, inheritance, packages, Enumeration and variouskeywords
- Apply the concept of exception handling and Input/ Outputoperations
- Able to design the applications of Java &Javaapplet
- Able to Analyze& Design the concept of Event Handling and Abstract Window Toolkit

UNIT I

Program Structure in Java: Introduction, Writing Simple Java Programs, Elements or Tokens in Java Programs, Java Statements, Command Line Arguments, User Input to Programs, Escape Sequences Comments, Programming Style.

Data Types, Variables, and Operators :Introduction, Data Types in Java, Declaration of Variables, Data Types, Type Casting, Scope of Variable Identifier, Literal Constants, Symbolic Constants, Formatted Output with printf() Method, Static Variables and Methods, Attribute Final, Introduction to Operators, Precedence and Associativity of Operators, Assignment Operator (=), Basic Arithmetic Operators, Increment (++) and Decrement (- -) Operators, Ternary Operator, Relational Operators, Boolean Logical Operators, Bitwise Logical Operators.

Control Statements: Introduction, if Expression, Nested if Expressions, if–else Expressions, Ternary Operator?:, Switch Statement, Iteration Statements, while Expression, do–while Loop, for Loop, Nested for Loop, For–Each for Loop, Break Statement, Continue Statement.

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UNIT II

Classes and Objects: Introduction, Class Declaration and Modifiers, Class Members, Declaration of Class Objects, Assigning One Object to Another, Access Control for Class Members, Accessing Private Members of Class, Constructor Methods for Class, Overloaded Constructor Methods, Nested Classes, Final Class and Methods, Passing Arguments by Value andby Reference, Keyword this.

Methods: Introduction, Defining Methods, Overloaded Methods, Overloaded Constructor Methods, Class Objects as Parameters in Methods, Access Control, Recursive Methods, Nesting of Methods, Overriding Methods, Attributes Final andStatic.

UNIT III

Arrays: Introduction, Declaration and Initialization of Arrays, Storage of Array in Computer Memory, Accessing Elements of Arrays, Operations on Array Elements, Assigning Array to Another Array, Dynamic Change of Array Size, Sorting of Arrays, Search for Values in Arrays, Class Arrays, Two-dimensional Arrays, Arrays of Varying Lengths, Three-dimensional Arrays, Arrays as Vectors.

Inheritance: Introduction, Process of Inheritance, Types of Inheritances, Universal Super Class-Object Class, Inhibiting Inheritance of Class Using Final, Access Control and Inheritance, Multilevel Inheritance, Application of Keyword Super, Constructor Method and Inheritance, Method Overriding, Dynamic Method Dispatch, Abstract Classes, Interfaces and Inheritance.

Interfaces: Introduction, Declaration of Interface, Implementation of Interface, Multiple Interfaces, Nested Interfaces, Inheritance of Interfaces, Default Methods in Interfaces, Static Methods in Interface, Functional Interfaces,Annotations.

UNIT IV

Packages and Java Library: Introduction, Defining Package, Importing Packages and Classes into Programs, Path and Class Path, Access Control, Packages in Java SE, Java.lang Package and its Classes, Class Object, Enumeration, class Math, Wrapper Classes, Auto-boxing and Auto- unboxing, Java util Classes and Interfaces, Formatter Class, Random Class, Time Package, Class Instant (java.time.Instant), Formatting for Date/Time in Java, Temporal Adjusters Class, Temporal Adjusters Class.

Exception Handling: Introduction, Hierarchy of Standard Exception Classes, Keywords throws and throw, try, catch, and finally Blocks, Multiple Catch Clauses, Class Throwable, Unchecked Exceptions, Checked Exceptions, try-with-resources, Catching Subclass Exception, Custom Exceptions, Nested try and catch Blocks, Rethrowing Exception, Throws Clause.

UNIT V

String Handling in Java: Introduction, Interface Char Sequence, Class String, Methods for Extracting Characters from Strings, Methods for Comparison of Strings, Methods for Modifying Strings, Methods for Searching Strings, Data Conversion and Miscellaneous Methods, Class String Buffer, Class StringBuilder.

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Multithreaded Programming: Introduction, Need for Multiple Threads Multithreaded Programming for Multi-core Processor, Thread Class, Main Thread- Creation of New Threads, Thread States, Thread Priority-Synchronization, Deadlock and Race Situations, Inter-thread Communication - Suspending, Resuming, and Stopping of Threads**.**

Java Database Connectivity: Introduction, JDBC Architecture, Installing MySQL and MySQL Connector/J, JDBC Environment Setup, Establishing JDBC Database Connections, ResultSet Interface, Creating JDBC Application, JDBC Batch Processing, JDBC Transaction Management.

Text Books:

1) JAVA one step ahead, Anitha Seth, B.L.Juneja,Oxford.
2) The complete Reference Java, 8th edition, Herbert Schildt,TMH.
3) JAVA Programming for Core and Advanced Learners, Sagayaraj, Denis, Karthik, Gajalakshmi, Universities Press.

References Books:

1) Introduction to java programming, 7th edition by Y Daniel Liang,Pearson
2) Constructive JAVA Programming, Sagayaraj, Denis, Karthik, Gajalakshmi, Universities Press.

e-Resources:

1) https://nptel.ac.in/courses/106/105/106105191/
2) ***https://www.w3schools.com/java/java_data_types.asp***

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II Year – I Semester		L	T	P	C
		0	0	3	1.5
DATA STRUCTURES LAB (PCC2105)					

Course Objectives:
The objective of this lab is to
- Demonstrate procedural and object oriented paradigm with concepts of streams, classes, functions, dataandobjects.
- Understand dynamic memory management techniques using pointers, constructors, destructors,etc
- Demonstrate the concept of function overloading, operator overloading, virtual functions and polymorphism,inheritance.
- Demonstrate the different data structuresimplementation.

Course Outcomes:
By the end of this lab the student is able to
- Use basic data structures such as arrays and linkedlist.
- Programs to demonstrate fundamental algorithmic problems including Tree Traversals, Graph traversals, and shortestpaths.
- Use various searching and sortingalgorithms.

Exercise1:
Write recursive program which computes the n^{th}Fibonacci number, for appropriate values of n. Analyzebehavior of the program Obtain the frequency count of the statement for various values of n.

Exercise 2:
Write recursive program for the following
a) Write recursive and non recursive C program for calculation of Factorial of aninteger
b) Write recursive and non recursive C program for calculation of GCD (n,m)
c) Write recursive and non recursive C program for Towers of Hanoi : N disks are to be transferred from peg S to peg D with Peg I as the intermediatepeg.

Exercise 3:
a) Write C program that use both recursive and non recursive functions to perform Linear search for a Key value in a givenlist.
b) Write C program that use both recursive and non recursive functions to perform Binary search for a Key value in a givenlist.
c) Write C program that use both recursive and non recursive functions to perform Fibonacci search for a Key value in a givenlist.

Exercise 4:
a) Write C program that implement Bubble sort, to sort a given list of integers in ascendingorder
b) Write C program that implement Quick sort, to sort a given list of integers in ascendingorder
c) Write C program that implement Insertion sort,to sort a given list of integers in ascendingorder

Exercise 5:
a) Write C program that implement heap sort, to sort a given list of integers in ascendingorder
b) Write C program that implement radix sort, to sort a given list of integers in ascendingorder
c) Write C program that implement merge sort, to sort a given list of integers in ascendingorder

Exercise 6:
a) Write C program that implement stack (its operations) usingarrays
b) Write C program that implement stack (its operations) using Linkedlist

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Exercise 7:
a) Write a C program that uses Stack operations to Convert infix expression into postfix expression
a) Write C program that implement Queue (its operations) usingarrays.
b) Write C program that implement Queue (its operations) using linkedlists
Exercise 8:
a) Write a C program that uses functions to create a singly linkedlist
b) Write a C program that uses functions to perform insertion operation on a singly linkedlist
c) Write a C program that uses functions to perform deletion operation on a singly linkedlist
Exercise 9:
a) Adding two large integers which are represented in linked listfashion.
b) Write a C program to reverse elements of a single linkedlist.
c) Write a C program to store a polynomial expression in memory using linkedlist
d) Write a C program to representation the given Sparse matrix usingarrays.
e) Write a C program to representation the given Sparse matrix using linkedlist
Exercise10:
a) Write a C program to Create a Binary Tree ofintegers
b) Write a recursive C program for Traversing a binary tree in preorder, inorderandpostorder.
c) Write a non recursive C program for Traversing a binary tree in preorder, inorderandpostorder.
d) Program to check balance property of atree.
Exercise 11:
a) Write a C program to Create aBST
b) Write a C program to insert a node into aBST.
c) Write a C program to delete a node from aBST.

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II Year – I Semester		L	T	P	C
		0	0	3	1.5
OS & UNIX PROGRAMMING LAB (PCC2106)					

Course Objectives:

- To understand the design aspects of operatingsystem
- To study the process management concepts & Techniques
- To study the storage managementconcepts
- To familiarize students with the Linuxenvironment
- To learn the fundamentals of shellscripting/programming

Course Outcomes:

- To use Unix utilities and perform basic shell control of theutilities
- To use the Unix file system and file accesscontrol
- To use of an operating system to developsoftware
- Students will be able to use Linux environmentefficiently
- Solve problems using bash for shellscripting

1) a) Study of Unix/Linux general purpose utility command list: man,who,cat, cd, cp, ps, ls, mv, rm, mkdir, rmdir, echo, more, date, time, kill, history, chmod, chown, finger, pwd, cal, logout,shutdown.
   b) Study of vieditor
   c) Study of Bash shell, Bourne shell and C shell in Unix/Linux operatingsystem
   d) Study of Unix/Linux file system (treestructure)
   e) Study of .bashrc, /etc/bashrc and Environmentvariables.
2) Write a C program that makes a copy of a file using standard I/O, and systemcalls
3) Write a C program to emulate the UNIX ls–lcommand.
4) Write a C program that illustrates how to execute two commands concurrently with a command pipe. Ex: - ls–l |sort
5) Simulate the following CPU scheduling algorithms: (a) Round Robin (b) SJF (c) FCFS (d)Priority
6) Multiprogramming-Memory management-Implementation of fork (), wait (), exec() and exit (), System calls
7) Simulate the following:
   a) Multiprogramming with a fixed number of tasks (MFT)
   b) Multiprogramming with a variable number of tasks (MVT)
8) Simulate Bankers Algorithm for Dead Lock Avoidance
9) Simulate Bankers Algorithm for Dead Lock Prevention.

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10) Simulate the following page replacementalgorithms:
    a) FIFO b) LRU c) LFU
11) Simulate the following File allocationstrategies
    (a) Sequenced (b) Indexed (c)Linked

12) Write a C program that illustrates two processes communicatingusingshared memory

13) Write a C program to simulate producer and consumer problemusingsemaphores

14) Write C program to create a thread using pthreads library and let it run itsfunction.

15) Write a C program to illustrate concurrent execution of threads using pthreadslibrary.

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II Year – I Semester		L	T	P	C
		0	0	3	1.5
JAVA PROGRAMMING LAB (PCC2107)					

Course Objectives:
The aim of this lab is to
- Practice programming in theJava
- Gain knowledge of object-oriented paradigm in the Java programminglanguage
- Learn use of Java in a variety of technologies and on differentplatforms

Course Outcomes:
By the end of the course student will be able to write java program for
- Evaluate default value of all primitive data type, Operations, Expressions, Control-flow, Strings
- Determine Class, Objects, Methods, Inheritance, Exception, Runtime Polymorphism, User defined Exception handlingmechanism
- Illustrating simple inheritance, multi-level inheritance, Exception handlingmechanism
- Construct Threads, Event Handling, implement packages, developingapplets

Exercise - 1 (Basics)
a) Write a JAVA program to display default value of all primitive data type ofJAVA
b) Write a java program that display the roots of a quadratic equation $ax^2+bx=0$. Calculate the discriminate D and basing on value of D, describe the nature ofroot.
c) Five Bikers Compete in a race such that they drive at a constant speed which may or may not bethesame as the other. To qualify the race, the speed of a racer must be more than the average speed of all 5 racers. Take as input the speed of each racer and print back the speed of qualifying racers.

Exercise - 2 (Operations, Expressions, Control-flow, Strings)
a) Write a JAVA program to search for an element in a given list of elements using binary search mechanism.
b) Write a JAVA program to sort for an element in a given list of elements using bubblesort
c) Write a JAVA program to sort for an element in a given list of elements using mergesort.
d) Write a JAVA program using StringBuffer to delete, removecharacter.

Exercise - 3 (Class, Objects)
a) Write a JAVA program to implement class mechanism. Create a class, methods and invoke them inside mainmethod.
b) Write a JAVA program to implementconstructor.

Exercise - 4 (Methods)
a) Write a JAVA program to implement constructor overloading.
b) Write a JAVA program implement methodoverloading.

Exercise - 5 (Inheritance)
a) Write a JAVA program to implement SingleInheritance
b) Write a JAVA program to implement multi levelInheritance
c) Write a java program for abstract class to find areas of differentshapes

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Exercise - 6 (Inheritance - Continued)
a) Write a JAVA program give example for "super"keyword.
b) Write a JAVA program to implement Interface. What kind of Inheritance can beachieved?

Exercise - 7 (Exception)
a) Write a JAVA program that describes exception handlingmechanism
b) Write a JAVA program Illustrating Multiple catchclauses

Exercise – 8 (Runtime Polymorphism)
a) Write a JAVA program that implements Runtimepolymorphism
b) Write a Case study on run time polymorphism, inheritance that implements in aboveproblem

Exercise – 9 (User defined Exception)
a) Write a JAVA program for creation of Illustratingthrow
b) Write a JAVA program for creation of Illustratingfinally
c) Write a JAVA program for creation of Java Built-inExceptions
d) d)Write a JAVA program for creation of User DefinedException

Exercise – 10 (Threads)
a) Write a JAVA program that creates threads by extending Thread class .First thread display "Good Morning "every 1 sec, the second thread displays "Hello "every 2 seconds and the third display "Welcome" every 3 seconds ,(Repeat the same by implementingRunnable)
b) Write a program illustrating **isAlive**and**join()**
c) Write a Program illustrating DaemonThreads.

Exercise - 11 (Threads continuity)
a) Write a JAVA program Producer ConsumerProblem
b) Write a case study on thread Synchronization after solving the above producer consumer problem

Exercise – 12 (Packages)
a) Write a JAVA program illustrate classpath
b) Write a case study on including in class path in your os environment of yourpackage.
c) Write a JAVA program that import and use the defined your package in the previous Problem

Exercise - 13 (Applet)
a) Write a JAVA program to paint like paint brush inapplet.
b) Write a JAVA program to display analog clock usingApplet.
c) Write a JAVA program to create different shapes and fill colors usingApplet.

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II Year - I Semester		L	T	P	C
		0	0	4	2
FREE AND OPEN SOURCE SOFTWARE (SC2101)					

Course Objectives:

The student should be made to:

- Be exposed to the context and operation of free and open source software (FOSS) communities and associated software projects.
- Be familiar with participating in a FOSS project
- Learn scripting language like Python or Perl
- Learn programming language like Ruby
- Learn some important FOSS tools and techniques

1. Getting started with Linux basic commands and directory structure, execute file, directory operations.
2. Linux commands for redirection, pipes, filters, job control, file ownership, file permissions, link sand file system hierarchy.

3. Shell Programming: Write shell script to show various system configuration like
   1 Currently logged user and his logname
   2 Your current shell
   3 Your home directory
   4 Your operating system type
   5 Your current path setting
   6 Your current working directory
   7 Show Currently logged number of users

4. Write shell script to show various system configuration like
   1About your OS and version, release number, kernel version
   2 Show all available shells
   3 Show mouse settings
   4 Show computer CPU information like processor type, speed etc
   5 Show memory information
   6 Show hard disk information like size of hard-disk, cache memory, modeletc
   7 File system (Mounted)

5. Shell script program for scientific calculator.

6. Version Control System setup and usage using GIT.
   1 Creating a repository
   2 Checking out a repository
   3 Adding content to the repository
   4 Committing the data to a repository

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7. Shell script to implement a script which kills every process which uses more than aspecified value of memory or CPU and is run upon system start.

8. Running PHP : simple applications like login forms after

9. Advanced linux commands curl, wget, ftp, ssh and grep

10. Application deployment on a cloud-based LAMP stack/server with PHP eg: Openshift, Linode etc.

11. Virtualisation environment (e.g., xen, kqemu, virtualbox or lguest) to test anapplications, new kernels and isolate applications. It could also be used to exposestudents to other alternate OSs like *BSD

12. Introduction to packet management system : Given a set of RPM or DEB, how to buildand maintain, serve packages over http or ftp. and also how do you configure clientsystems to access the package repository.

13. Installing various software packages. Either the package is yet to be installed or anolder version is existing. The student can practice installing the latest version. Of course, this might need Internet access.
    1 Install samba and share files to windows
    2 Install Common Unix Printing System(CUPS)

TEXT BOOK:

Ellen Siever, Stephen Figgins, Robert Love, Arnold Robbins, “Linux in a Nutshell”, Sixth Edition, OReilly Media, 2009.

REFERENCES:

1. Philosophy of GNU URL: http://www.gnu.org/philosophy/.
2. Linux Administration URL: http://www.tldp.org/LDP/lame/LAME/linux-admin-made-easy/.
3. The Python Tutorial available at http://docs.python.org/2/tutorial/.

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		2	0	0	0
ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE (MC2101)					

Course Objectives:

To facilitate the students with the concepts of Indian traditional knowledge and to make them understand the Importance of roots of knowledge system

- The course aim of the importing basic principle of third process reasoning and inference sustainability is at the course of Indian traditional knowledgesystem
- To understand the legal framework and traditional knowledge and biological diversity act 2002 and geographical indication act2003
- The courses focus on traditional knowledge and intellectual property mechanism of traditional knowledge andprotection
- To know the student traditional knowledge in differentsector

Course Outcomes:

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

- Understand the concept of Traditional knowledge and itsimportance
- Know the need and importance of protecting traditionalknowledge
- Know the various enactments related to the protection of traditionalknowledge
- Understand the concepts of Intellectual property to protect the traditionalknowledge

UNITI

Introduction to traditional knowledge: Define traditional knowledge, nature and characteristics, scope and importance, kinds of traditional knowledge, the physical and social contexts in which traditional knowledge develop, the historical impact of social change on traditional knowledge systems. Indigenous Knowledge (IK), characteristics, traditional knowledge vis-à-vis indigenous knowledge, traditional knowledge Vs western knowledge traditional knowledge vis-à-vis formal knowledge

UNIT II

Protection of traditional knowledge: the need for protecting traditional knowledge Significance of TK Protection, value of TK in global economy, Role of Government to harness TK.

UNIT III

Legal framework and TK: A: The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006, Plant Varieties Protection and Farmers Rights Act,

2001 (PPVFR Act);B:The Biological Diversity Act 2002 and Rules 2004, the protection of traditional knowledge bill, 2016. Geographical indications act 2003.

UNIT IV

Traditional knowledge and intellectual property: Systems of traditional knowledge protection, Legal concepts for the protection of traditional knowledge, Certain non IPR mechanisms of traditional knowledge protection, Patents and traditional knowledge, Strategies to increase protection of traditional knowledge, global legal FORA for increasing protection of Indian Traditional Knowledge.

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UNIT V

Traditional knowledge in different sectors: Traditional knowledge and engineering, Traditional medicine system, TK and biotechnology, TK in agriculture, Traditional societies depend on it for their food and healthcare needs, Importance of conservation and sustainable development of environment, Management of biodiversity, Food security of the country and protection of TK.

***Reference Books**:*

1) Traditional Knowledge System in India, by Amit Jha,2009.
2) Traditional Knowledge System and Technology in India by Basanta Kumar Mohanta and Vipin Kumar Singh, PratibhaPrakashan2012.
3) Traditional Knowledge System in India by Amit Jha Atlantic publishers,2002
4) "Knowledge Traditions and Practices of India" Kapil Kapoor, MichelDanino

e-Resources:

1) https://www.youtube.com/watch?v=LZP1StpYEPM
2) http://nptel.ac.in/courses/121106003/